Structural change and economic development

1. The Kuznets Facts

Simon Kuznets, *Modern Economic Growth*, 1966

Modern economic growth characterized by **secular changes of**:

- sector composition of output
- sector composition of employment
- distribution of population between rural and urban areas
- relative size of capital labour ratio across sectors

"We identify the economic growth of nations as a sustained increase in per capita or per worker product, most often accompanied by an increase in population and usually by sweeping structural changes. In modern times these were changes in the industrial structure within which product was turned out and resources employed—away from agriculture toward nonagricultural activities, the process of industrialization; in the distribution of population between the countryside and the cities, the process of urbanization; in the relative economic position of groups within the nation distinguished by employment status, attachment to various industries, level of per capita income, and the like; in the distribution of product by use—among household consumption, capital formation, and the government consumption, and within each of these major categories by further subdivisions; in the allocation of product by its origin within the nation's boundaries and elsewhere; and so on." Simon Kuznets (1966).
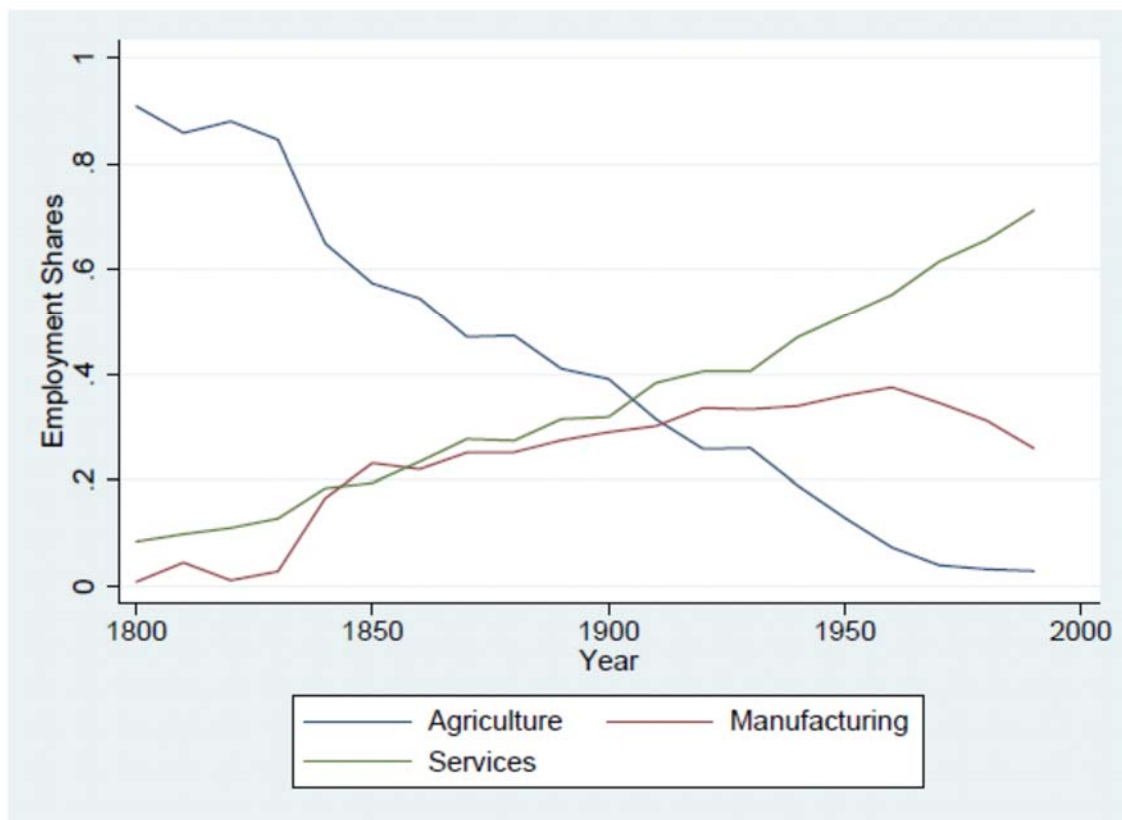
FIGURE 20.1. The share of US employment in agriculture, manufacturing and services, 1800-2000.

Supply and demand causes of the changes in employment shares

Supply side: technology

1. Difference in technological progress across sectors. Pasinetti (1960, 1981), Baumol (1967):

   secular growth of service employment caused by slower productivity growth in services, than in manufacturing

2. outsourcing

out-sourcing as a form of technological change

- If services inputs are internally produced by a manufacturing firm, the corresponding activity and employment are registered as belonging in the manufacturing sector.
- When these service activities are out-sourced to specialized service firms, the same service inputs are produced outside the manufacturing sector; the corresponding activities and employment are registered as belonging in the service sector

Demand side:

Difference in income elasticity of demand across sectors as a function of GDP per capita y

(Kongsamut, Rebelo, Xie, 2001)

c^A = agricultural consumption
c^M = manufacturing consumption
c^S = service consumption

- income elasticity of c^S is higher if y is higher
- income elasticity of c^A is lower if y is higher
- income elasticity of c^M is constant

why income elasticity of c^S is rising with GDP per capita?

- Consumption services represent ways of satisfying basic needs, previously mainly satisfied by 'home production', and not included in GDP, and then progressively supplied by the market or by government sector, to an extent that is increasing with per-capita GDP.

- Substitution of home produced services results from:

- Higher quality of the substitutes of home services produced by the market and/or by government. Examples are education, health care, recreation

- Time constraint restricting home production of services, partly resulting from increasing female participation to labour market Examples are child care or food services

- Growth of high-tech services at high GDP-per capita

Deindustrialization: falling share of manufacturing employment
A recent fact: As US GDP per capita increased through time,
employment-share in manufacturing followed an inverse-U curve
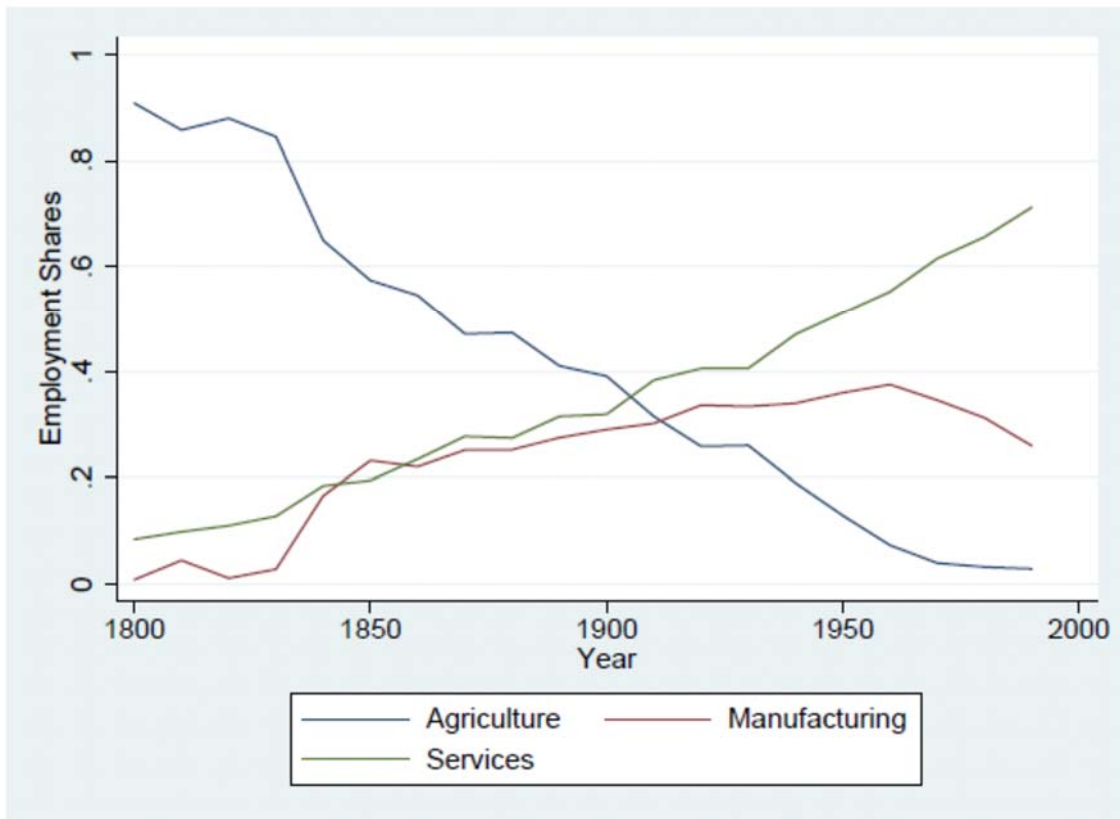

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Recent trends in share of manufacturing GDP at constant 2005 prices

Table 1 Indicators of global manufacturing activity (in 2005 constant USD)

	World	United States	Western Europe	Latin America and Caribbean	Asia (excluding China)	China	Sub-Saharan Africa
Shares in global MVA							
1970	1.00	0.26	0.24	0.06	0.15	0.00	0.01
1980	1.00	0.22	0.21	0.08	0.18	0.01	0.01
1990	1.00	0.21	0.19	0.06	0.24	0.02	0.01
2000	1.00	0.24	0.16	0.07	0.24	0.06	0.01
2010	1.00	0.20	0.13	0.06	0.26	0.16	0.01
2013	1.00	0.19	0.13	0.06	0.26	0.18	0.01
MVA share in GDP							
1970	0.17	0.13	0.22	0.20	0.16	0.09	0.14
1980	0.16	0.12	0.20	0.20	0.16	0.16	0.15
1990	0.16	0.12	0.19	0.19	0.19	0.18	0.15
2000	0.17	0.13	0.18	0.19	0.19	0.29	0.13
2010	0.18	0.13	0.18	0.17	0.21	0.36	0.11
2013	0.18	0.13	0.18	0.16	0.20	0.36	0.11

Source: Calculated from United Nations, http://unstats.un.org/unsd/snaama/selbasicFast.asp

Different patterns of deindustrialization: 1970-2013

1. costant price **GDP shares of manufacturing** are:

   - stable in World Economy, USA, and selected European countries
   - falling in Western Europe, Latin America,
   - rising in Asia, sharply rising in China

2. Share of manufacturing GDP at current prices lower than the same share at constant prices: this is because the price of manufacturing tends to fall, relative to the price of non-manufacturing.

3. **employment shares of manufacturing** are lower than GDP-shares and tend to fall over time. Combined effect of **demand-side and supply-side factors**:
   - Higher productivity growth in manufacturing
   - Elasticity of substitution lower than 1

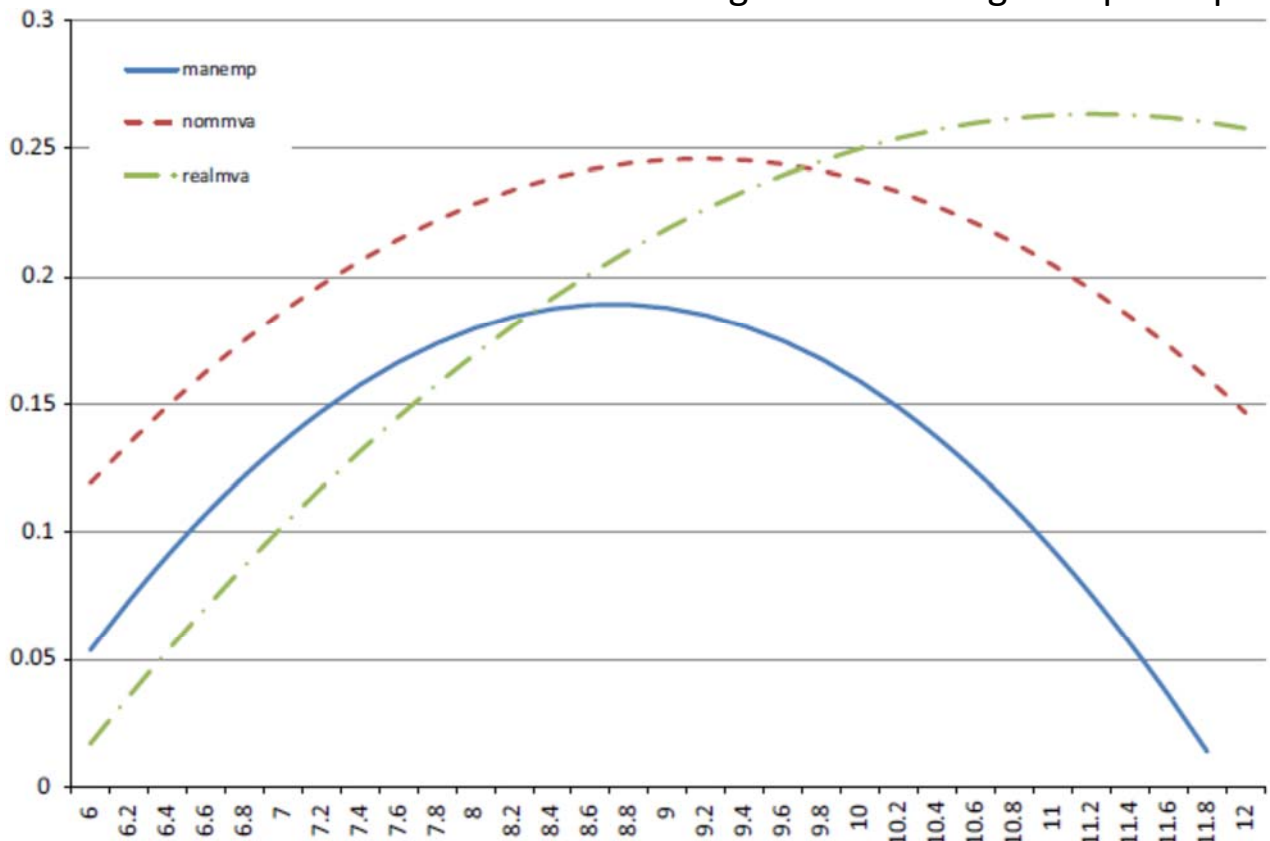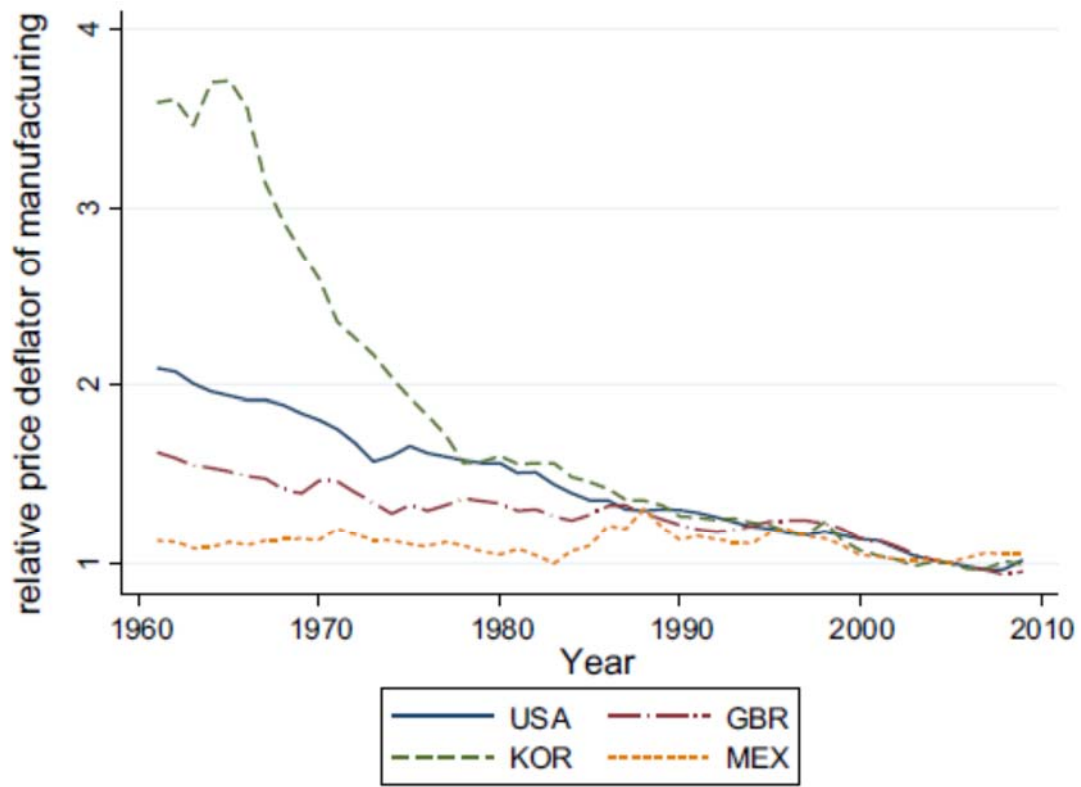# Simulated relation between manufacturing shares and log GDP per-capita

Fig. 1 Simulated manufacturing shares as a function of income (In GDP per capital in 1990 international dollars)

man-emp = employment share of manufacturing
realmva = GDP share of manufacturing at constant prices
nomva = GDP-share of manufacturing at current prices
hump in *realmva* occurs later, and is higher, than hump in *nomva* (relative-price effect eliminated)

Premature deindustrialization

'hump' of inverse-U relation between manufacturing employment share ('*manemp*') and GDP per capita y is identified by: $(y^*, manemp^*)$

Late industrializing countries have lower y^* and lower $manemp^*$
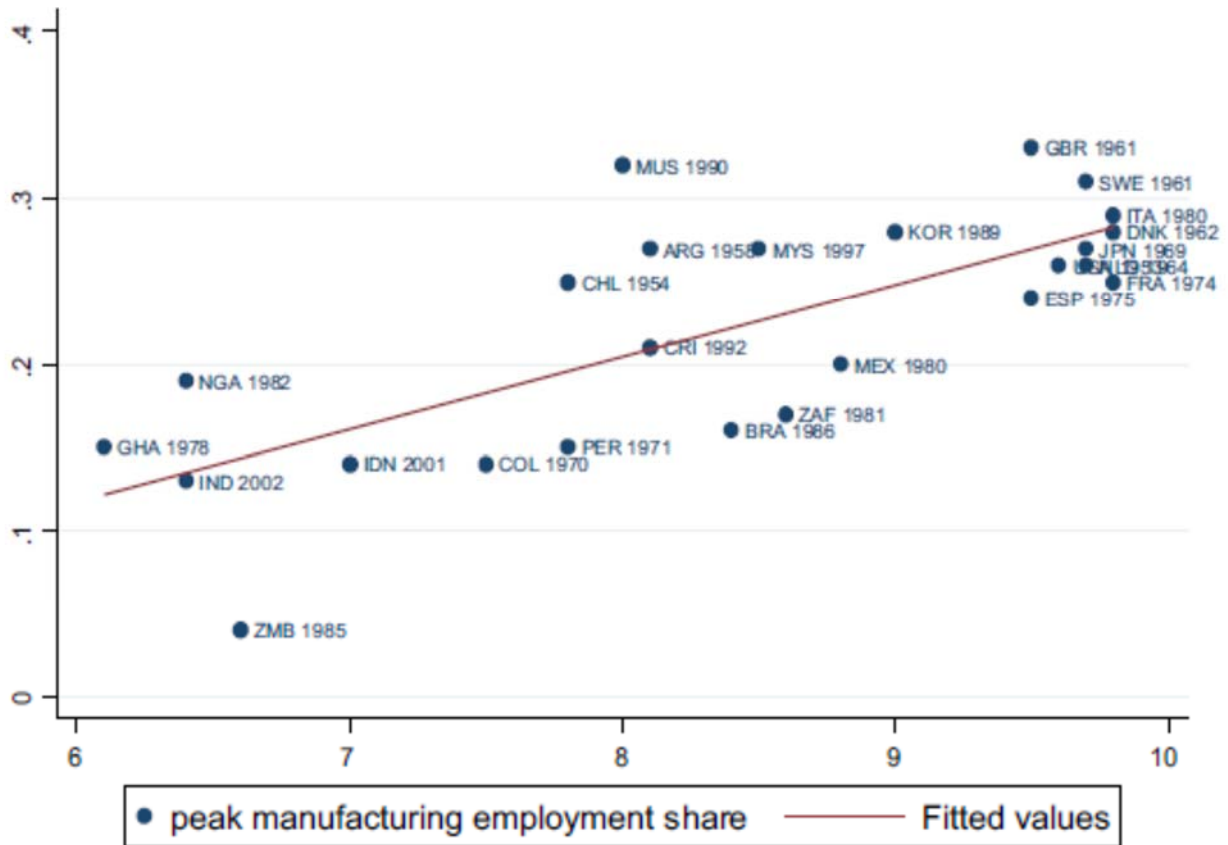

Fig. 5 Income at which manufacturing employment peaks (logs)

Different causes of deindustrialization

1. In advanced countries (example: USA), deindustrialization is to a large extent explained by technological progress: in manufacturing, the employment share is falling, but the GDP-share at constant prices is not.

2. In Latin-America and Sub-Saharan Africa (excluding Mauritius) the same explanation does not work: most of these countries are 'small' in terms of manufacturing output, and they can hardly affect international prices.

3. If price of manufacturing relative to the price of non-manufacturing is given, faster technological progress in manufacturing should cause industrialization, rather than deindustrialization

4. Premature deindustrialization in Latin-America and Sub-Saharan Africa is explained by globalization and the growth of China and the Asian Tigers

Deindustrialization in developing countries is worrying to the extent that manufacturing activities are instrumental to the process of growth of a developing country (Kaldor 1964, Rodrik 2017)

- Manufacturing is a technologically dynamic sector
- Labour productivity in manufacturing, but not in other sectors, shows evidence of <u>unconditional</u> convergence (Rodrik 2013)
- Labour-skills required in manufacturing are not prohibitively high for a developing country
- Manufacturing output is tradable: thanks to exports, internal-demand constraints will not be a barrier to the growth of manufacturing output

With this motivation we consider how traditional development theory addressed the process of industrialization, understood as the process of transition from an agriculture-based economy to a manufacture-based economy

Excess population in agriculture and the dual economy (Lewis, 1956).

Lewis William Arthur (1954): Economic Development with Unlimited Supplies of Labour, *The Manchester School*, **22, 139-191.**
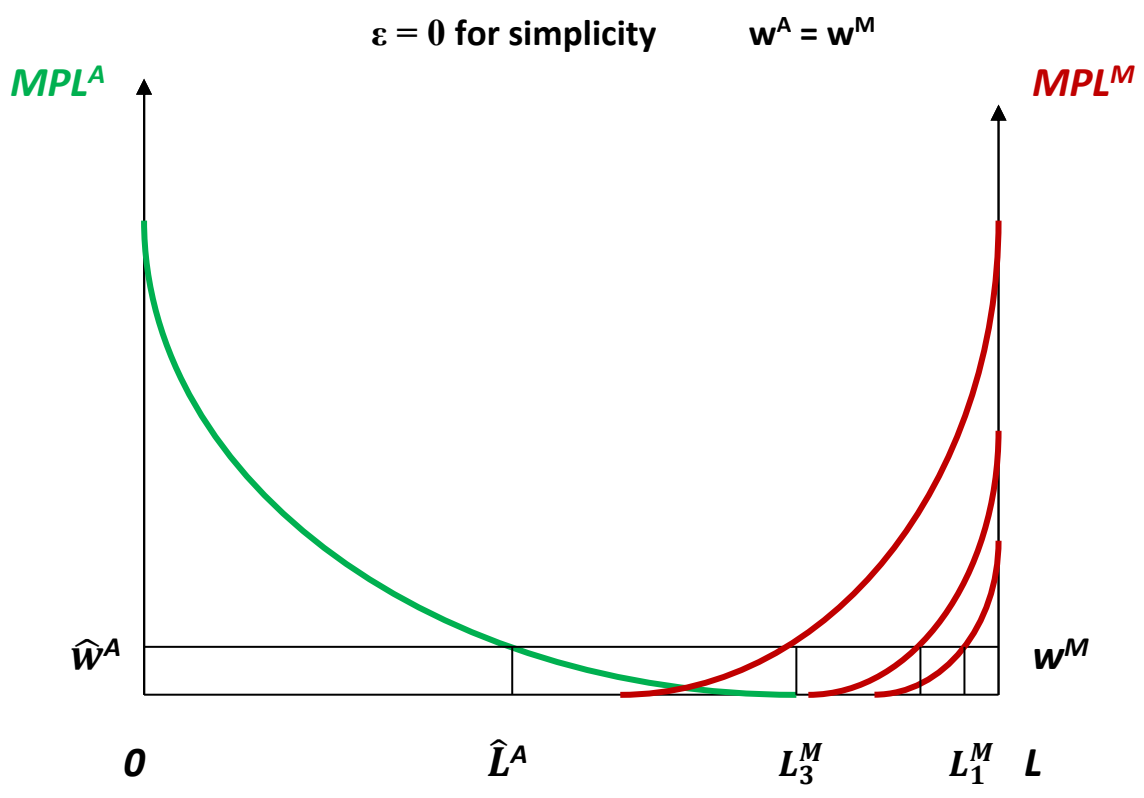
(simplified presentation)

1. *population $L = L^A + L^M$* $\qquad$ *A = agriculture, M = manifacturing*

2. **Excess population in agriculture →** $\quad dY^A / dL^A = 0$

3. $\qquad\qquad\qquad\qquad \hat{w}^A = subsistence\ wage > dY^A / dL^A$

4. *if $dY^A / dL^A = 0$, agricultural output Y^A does not fall if workers move to industry*

5. *Let $\hat{L}^A = L^A$ such that $\hat{w}^A = dY^A / dL^A$*

4. *as long as $L^A > \hat{L} \longrightarrow dY^A / dL^A < \hat{w}^A$, and a lower employment L^A:*

    does not cause a higher dY^A / dL^A ,

    does not cause a higher w^A

    $w^A = \hat{w}^A$ subsistence wage
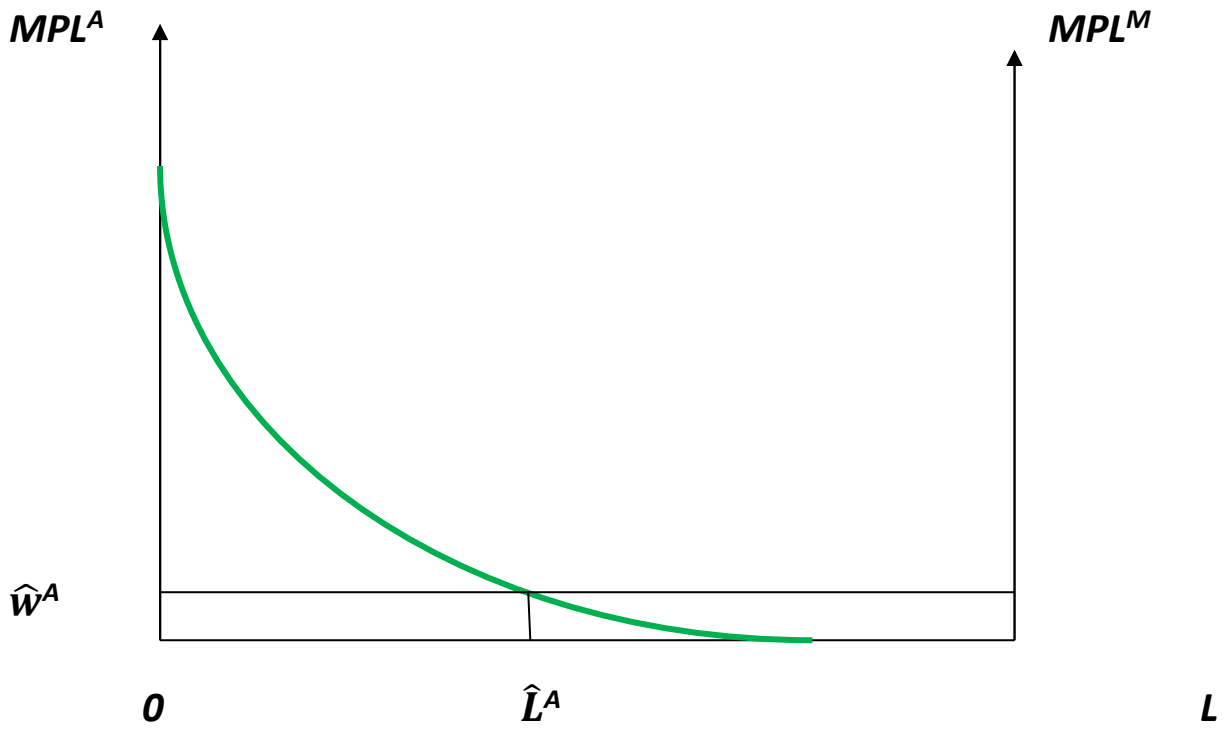
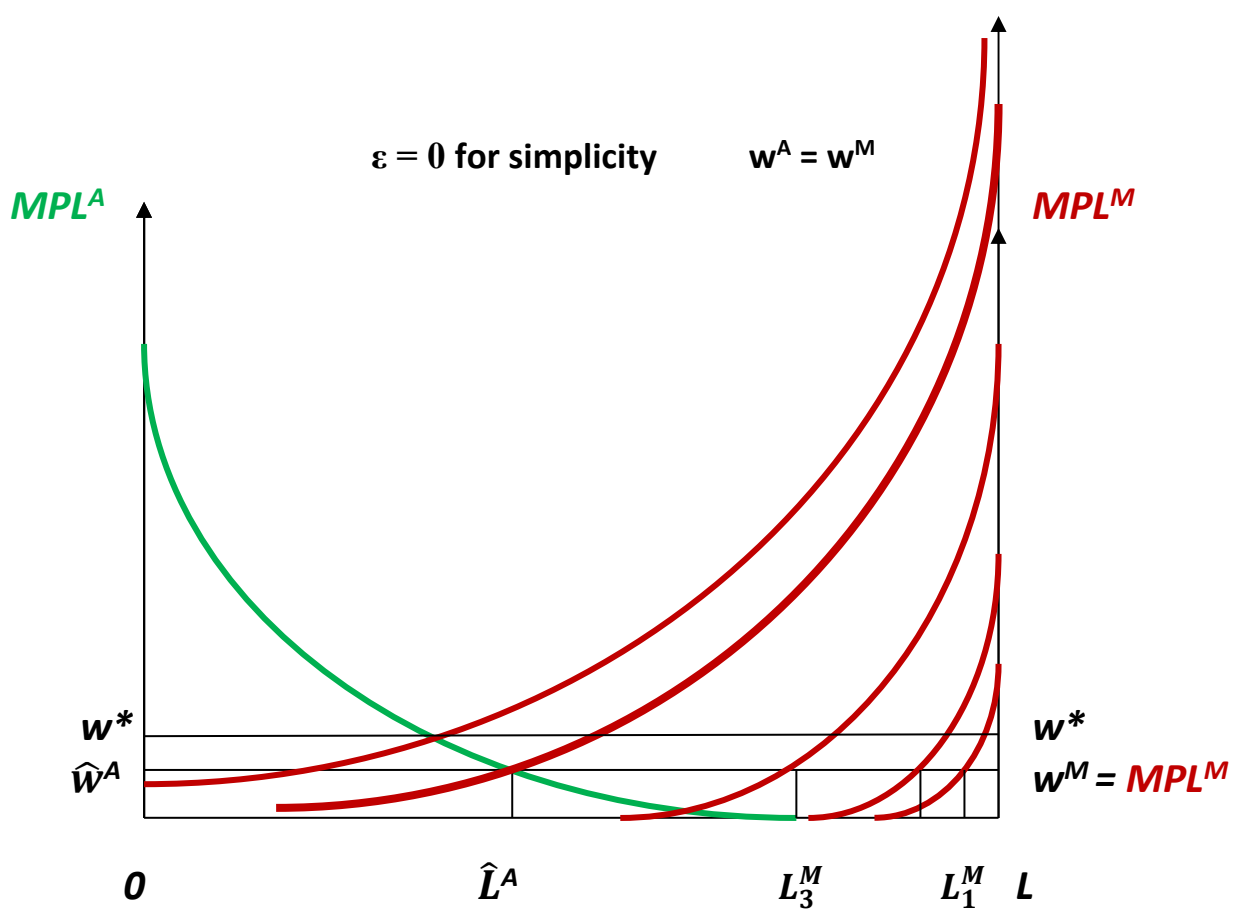*Manufacturing:*

5. *manufacturing wage influenced by migration*

6. $w^M = w^A$ *+ migration cost* ε

7. *Manufacturing capital* K^M *expands without causing rise of* w^M

8. *But causing rising* L^M

9. *Because of migration, capital accumulation in manufacturing does not cause rise of* $K^M / L^M \rightarrow$ *MPK does not fall*

MPL^A $\quad$ $\varepsilon = 0$ for simplicity $\quad$ $w^A = w^M$ $\quad$ MPL^M

$\widehat{w}^A$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ w^M

0 $\qquad\qquad\qquad\qquad$ $\widehat{L}^A$ $\qquad\qquad\qquad$ L_3^M $\qquad\qquad$ L_1^M $\quad$ L

Here L^M = manufacturing employment such that $\widehat{w}^A = w^M = MPL^M$

10. *structural break, at $L^A = \hat{L}^A$: here $dY^A / dL^A = \hat{w}^A$*

11. *That is: $L^M = L - \hat{L}^A$*

12. *Further capital accumulation in M will then cause:*

13. *Further Migration from A to M*

14. *Rising dY^A / dL^A*

15. *rising w^A, and rising w^M.*

$\varepsilon = 0$ for simplicity $\qquad$ $w^A = w^M$

MPL^A $\qquad$ MPL^M

w^*

$\widehat{w}^A$

w^*

$w^M = MPL^M$

0 $\qquad$ $\widehat{L}^A$ $\qquad$ L_3^M $\qquad$ L_1^M $\quad$ L

At $L^M > L - \widehat{L}^A$ a higher L^M, hence a lower L^A, causes a higher market wage w^*

P. Romer (1992): "Two strategies for economic development: using ideas and producing ideas", *Proceedings of the World Bank annual conference in Development Economics*.

Mauritius development in 1970's and 1980's

Throughout the 1960's traditional sector (agriculture) relying on sugarcane and exposed to unfavourable evolution of terms of trade

Export processing zones (EPZ, starting 1971), introduce special arrangements in:
- labour market
- profit tax regime
- selective trade policy (including imports of foreign equipment at international prices, international agreements supporting home exports)

In this way they promote:
- settlement of foreign entrepreneurs (FDI)
- importation of 'ideas' (adoption of modern technology).

Example: the garment industry G and the take off of an export-led sector

$Y_G = G(K_G, L_G, A)$ linear homogeneous in K, L

At given international prices r, p_G **and** p_K **cost minimization implies**

$p_G \, MPK(K_G/L_G)$ $=$ *user cost of capital (r, p_K)*

                       $\downarrow$

optimal $k_G = K_G/L_G$ **is fixed** $\rightarrow$ $dY_G / dL_G = MPL_G = constant$

                                          $\rightarrow$ $p_G \, MPL_G = constant = q$

Gross Profit Π = Total revenue – cost of capital = qL_G

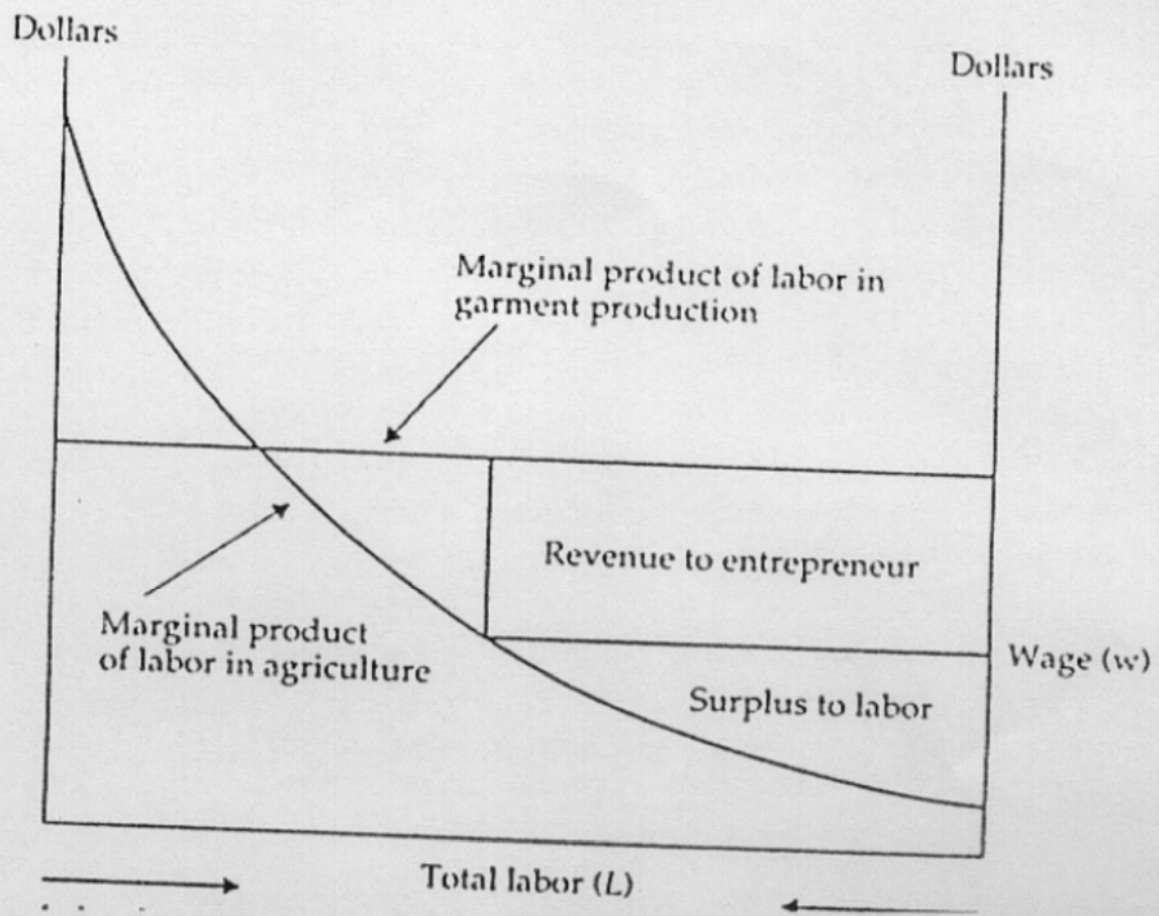**If economy was competitive: w L_G = qL_G (zero net profit)**

q = value marginal product of labour

But employer in G industry is a monopsonist

$\downarrow$

w < q

Figure 2. *Labor Market with a Monopsonist Entrepreneur*

Dollars

Dollars

Marginal product of labor in garment production

Marginal product of labor in agriculture

Revenue to entrepreneur

Wage (w)

Surplus to labor

Total labor (L)

- **Wage rate in industry is increasing with employment in industry:**

  w^G = opportunity cost of working in G = $w^A(L_A)$

  $w^G(L_G) = w^A(L_A) = w^A(L - L_G)$ increasing in L_G

- **Max: Profit net of labor cost**
  Max: $\Psi = q\, L_G - w^A(L - L_G)\, L_G = (q - w^A(L - L_G))\, L_G$

- **At L^*_G:** $\partial\Psi / \partial L_G = 0$

- $\partial\Psi / \partial L_G = q - w^A - L_G\,(dw^A/d\,L_G) =$

- $w^A = q - L_G\,[\,dw^A/d\,L_G]$

  $dw^A/d\,L_G > 0$ because higher L_G causes lower L_A and higher MPL^A

- $w^G(L^*_G) = w^A\,(L - L^*_G) < q$

→ **Wage rate lower than value marginal product of labor**

Romer: evidence of labor 'exploitation'

- **home population is earning a positive net surplus from the FDI policy**

- **Extra profit is justifiable only to the extent that it is reduced to the minimum that is required to induce flow of FDI into the home country**

Romer:

1. The right policy choice is to <u>maximize the value of the surplus</u> to home population that is consistent with FDI flowing into the country

2. It must be matched by policy action ensuring transfer of technological capability to the local industry

3. EPZ strategy cannot be a <u>persistent</u> policy choice, because:

   Importation of ideas

   Importation of capital equipment

   are options open to any developing economy with well-educated labour

4. An ever larger number of countries will be in the position to effectively produce traditional manufacturing goods

5. Transition is needed to home production of ideas and equipment

Notice connection with discussion of 'infant industry protection'

a. Through regulation and deviation from competition, growth rate may be temporarily increased, by stimulating adoption of foreign technology.

b. If entrenched interests cause high resistance to a pro-innovation policy, because this requires a more selective and competitive environment, hence the loss of rents, the transition may be indefinitely postponed, and may never occur.

c. Transition to the 'production of ideas' paradigm requires building an institutional environment different from the environment that had stimulated the 'imports of ideas'.

d. If institutional transition does not take place.. a 'middle income trap' may follow.

Alternative interpretations of Mauritian miracle

1   P. Romer (1992): *incentives to FDI (labour market segmentation trough EPZ) and learning coordinated by policy*

2   J. D. Sachs and A. Warner (1995, 1997): *openness*

3   D. Rodrik (1999a): *selective trade policy (heterodox opening) through:*

   duty-free access to all imported inputs
   tax incentives to firms operating in EPZ

See discussion in A. Subramanian and D. Roy (2003): "Who can explain the Mauritian miracle? Meade, Romer, Sachs, or Rodrik?", in D. Rodrik (ed.), *In Search of Prosperity: analytic narratives on economic growth*, Princeton, Princeton University Press.