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- structural change:
 - page 283, table 8-1 – shows the rate of growth of labor force by region – this is high, between 2-3% in each region:
 - page 284, table 8-2 – shows the share of employment in agriculture, industry, and services by income group:

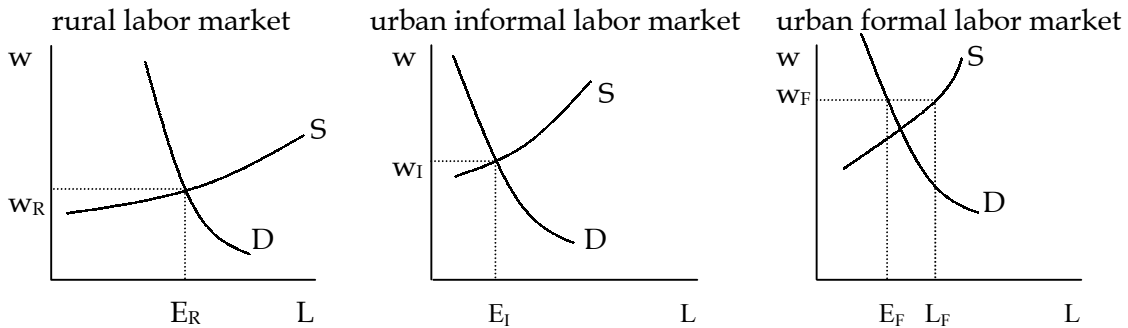
Income per capita, PPP	Agriculture	Industry	Services
< \$1,000	70%	6%	23%
\$1,000-\$4,000	64%	16%	20%
\$4,000-\$7,000	26%	30%	43%
\$7,000-\$12,000	19%	27%	54%
> \$12,000	5%	28%	67%

- the table shows that the share of labor in agriculture decreases with development; the share of labor in services increases with development; and the share of labor in industry increases with development up to a per capita income of \$4,000, where it levels off at about 25%-30%
 - although the share of labor in industry levels off, the share of labor in services continues to grow up to 67%; thus, economic development is not exclusively about industrialization
 - a stylized fact: middle- and high-income countries are distinguished by the share of the labor force in agriculture, not the share of the labor force in industry
 - page 285, table 8-3 – shows employment shares of the three sectors in various countries:
 - this table shows that countries follow the general trends of labor shares in the different sectors with respect to income, but also shows variation within income groups
 - for example, although both Ethiopia and Egypt are low-income countries, agriculture's share of labor in Ethiopia is 86% but is 31% in Egypt
- unemployment in developing countries:
 - statistics on unemployment in developing countries are often either incomplete or unreliable
 - although the unemployment rate in a developing country might be low (only a few percent), by observation, it is apparent that a high proportion of the population is engaged in low-productivity activities; however, people are only counted in unemployment statistics if they are earning no income and are searching for work
 - in poor countries, the poorest cannot afford to be unemployed while looking for a job; if they cannot find work in the formal sector, they will likely work in agriculture or the informal sector where they will earn an income from casual labor or self-employment; these workers that are often in low-productivity jobs and earn low incomes are called “underemployed” (the term “disguised unemployment” is also used); although underemployment can be large because many people are engaged in low-productivity activities, underemployed people will not be counted in unemployment statistics because they are earning an income
 - the people who are unemployed tend to be highly educated individuals in upper-income brackets who are temporarily out of work (perhaps because they just graduated from school) and looking for a job; these people can afford to be unemployed because

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their families can support them or they can borrow against future earnings; thus, unemployment can be considered a luxury that few people in a developing country can afford

- labor markets in developing countries:
 - there are considered to be three labor markets in developing countries: the rural labor market, the urban informal labor market, and the urban formal labor market



- the rural labor market:
 - the supply of labor is very elastic in the rural labor market
 - demand for labor is inelastic because the demand for labor is mostly determined by the amount of land available, instead of the price of labor
 - most often laborers in the rural labor market are self-employed farmers and their families – thus, an income-sharing model of the household might be a better model of the labor market in the rural sector; however, there is still a market for laborers to help families
 - because most of rural agriculture is done on family farms in some countries, this model does not apply to much of the rural population in a developing country
- the urban informal labor market:
 - the informal sector consists of small-scale activities that are too small to be monitored; workers/firms in this sector do not pay taxes and do not adhere to the same laws as the formal sector (such as minimum wage laws); the informal sector in LDCs provides services, manufacturing, materials, etc.
 - some studies suggest the informal sector is more efficient than the formal sector because it has greater employment and is more responsive to prices; in contrast, large-scale firms in the formal sector might have access to cheap capital and minimum wage laws might make labor expensive – they will use more capital and less labor, which is probably inefficient
 - government policies may retard the growth of the urban informal sector, such as by making it difficult to acquire physical facilities or making capital expensive (because loans from banks are not available)
- the urban formal sector:
 - the formal sector of the economy deals officially with the government and pays taxes; it includes large enterprises, the government, hospitals, universities, foreign investors, etc.
 - in a competitive labor market, it is expected that the wage is competed down to the equilibrium (market-clearing) wage; however, the wage in the urban formal

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sector is above the equilibrium wage and the quantity of labor supplied (L_F) exceeds the quantity of labor demanded (E_F)

- the wage could be higher than the market-clearing level in the urban formal sector for several reasons:

1. “inertia” from the colonial period – after colonial rule ended, high civil service wages were not reduced because lowering wages could be seen as demeaning
2. spillover of salaries from other sectors in the economy
3. MNCs offering high salaries to stave off political resistance
4. the efficiency-wage motive – the employer pays the employee a wage greater than the market wage because the employee will have a greater incentive to hold on to the job since he will not earn the same wage at another job; thus, the employee will work harder and the employer will receive a greater amount of work per dollar spent on wages (the employee is more efficient)
5. labor legislation – some LDCs have suppressed unions, blocked attempts to increase labor wages, etc.; however, in other cases, labor parties, etc. have implemented pro-labor legislation and have implemented minimum wages above the market-clearing level

- the Harris-Todaro model of internal migration:

- in the models of the 3 labor markets above, both the urban informal and formal sector wages are higher than the rural wage – this suggests that workers are willing to migrate from rural areas to urban areas to earn a higher wage; for example, in the two-sector labor-surplus model, workers are willing to migrate if a small premium over the rural wage is offered (see question 23 on the first exam)

- the Harris-Todaro model describes urban to rural migration – the number of migrants in time period t is a function of the difference between the urban expected wage and the rural wage:

$$M_t = h(pW_u - W_r)$$

M_t = the number of rural to urban migrants in time period t

p = probability of finding an urban job

W_u = urban wage

W_r = rural wage

when considering whether to migrate from the rural sector, the laborer will compare what he can be expected to earn in the city with what he earns in the rural sector; the urban expected wage is the weighted average of the wages that the laborer can be expected to earn (the urban expected wage is the probability of finding a job in the urban sector multiplied by the urban wage plus the probability of not finding a job in the urban sector multiplied by the wage without a job):

$$\text{expected urban wage} = pW_u + (1 - p)0 = pW_u$$

p = probability of finding an urban job

W_u = urban wage

$1 - p$ = probability of not finding an urban job

0 = wage if laborer does not find an urban job

- an illustration of the Harris-Todaro model:

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- suppose the the urban wage is twice the rural wage ($W_u = 2W_r$), then migration will continue as long as the expected urban wage is greater than the rural wage ($M_t > 0$ if $pW_u > W_r$)
- as long as the probability of finding a job in the urban sector is greater than 0.5 ($p > 0.5$), the expected urban wage is greater than the rural wage ($pW_u > W_r$) and migration continues ($M_t > 0$)
- another illustration of the Harris-Todaro model:
 - suppose the the urban wage is three times the rural wage ($W_u = 3W_r$), then migration will continue as long as the expected urban wage is greater than the rural wage ($M_t > 0$ if $pW_u > W_r$)
 - as long as the probability of finding a job in the urban sector is greater than 1/3 ($p > 1/3$), the expected urban wage is greater than the rural wage ($pW_u > W_r$) and migration continues ($M_t > 0$)
- the probability of finding a job in the urban sector (p) is given by the formula:

$$p = \frac{E_u}{E_u + U_u}$$

p = the probability of finding a job in the urban sector

E_u = the number of urban employed

U_u = the number of urban unemployed

this formula for the probability of finding a job in the urban sector is based on the simplifying assumption that the urban sector is an open lottery and that all workers have the same chance of landing a job; E_u is the total number of workers who will get a job (which is equal to the number of jobs available) and $E_u + U_u$ is the total number of people looking for jobs

for example, if there are 500,000 people employed in the urban sector and 500,000 looking for a job, then the chances of getting a job in the urban sector is:

$$p = \frac{500,000}{500,000 + 500,000} = \frac{1}{2}$$

if the probability of finding a job is $\frac{1}{2}$ ($p = \frac{1}{2}$), then as long as the urban wage is greater than twice the rural wage ($W_u > 2W_r$), migration will continue ($M_t > 0$)

- details about the Harris-Todaro model:
 - this model does not indicate how the function h , which relates the difference between the urban expected wage and rural wage to the number of migrants in time period t , works
 - this model assumes that workers are risk-neutral (they weigh good outcomes and bad outcomes equally); if the workers are risk-averse, then the probability of getting a wage equal to zero might prevent them from migrating even if the expected urban wage is greater than the rural wage
- the Harris-Todaro model can be modified to make it more realistic:
 1. workers who are already employed have a greater chance of keeping their jobs than newcomers have of getting them; the probability of getting a job can be set higher for incumbent workers than newcomers

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2. if the prospect of earning nothing is frightening enough then some workers considering migration will not simply compare the expected urban wage to the rural wage, but will also discount the expected urban wage to take into account their risk-aversion to earning nothing
3. if workers who do not receive jobs in the urban formal sector can find work in the informal sector, then the expected urban wage can be modified (it will be higher if the informal sector is considered):

$$\text{expected urban wage} = pW_u + (1 - p)W_i$$

p = probability of finding a job in the formal sector

W_u = formal sector wage

$1 - p$ = probability of not finding a job in the formal sector (equal to the probability of finding a job in the informal sector)

W_i = informal sector wage

wages for other sectors could also be added in

- implications of the Harris-Todaro model:
 - even if there is unemployment in urban areas, people will migrate if the urban wage is sufficiently higher than the rural wage; migrating is like buying a lottery ticket, and even if these workers do not find a job in the urban formal sector, they could fallback on another job or their family in the countryside
 - if the number of urban employed and unemployed is in equilibrium and the urban wage increases, then the difference between the expected urban wage and rural wage increases – because the probability of finding a job has not changed, migration will increase until the probability of finding a job decreases and the expected urban wage again equals the rural wage

for example, initially if the urban wage (W_u) is twice the rural wage (W_r), then the probability of finding a job in the urban sector (p) is $\frac{1}{2}$ at equilibrium; if the urban wage increases to three times the rural wage, then with p still equal to $\frac{1}{2}$, the expected urban wage rises to $pW_u = (\frac{1}{2})(3W_r) = 1.5W_r$; because the expected urban wage is greater than the rural wage, migration will continue until $p = \frac{1}{3}$ (because when $p = \frac{1}{3}$, the expected urban wage and rural wage are equal $pW_u = (\frac{1}{3})(3W_r) = W_r$)

if initially $E_u = U_u = 1$ million, the U_u will rise to 2 million so that

$$p = \frac{1,000,000}{1,000,000 + 2,000,000} = \frac{1}{3}; \text{ thus, an additional 1 million people will migrate}$$

in this model raising the urban wage has the effect of attracting more people into the city and increasing unemployment, which can be socially undesirable

- the rationality of rural to urban migration:
 - some countries, such as China, have restricted rural to urban migration
 - in other developing countries, people migrate to the city even though they live in poor shantytowns or camp out next to garbage dumps; however, people are migrating freely and may prefer to live in the city because they have a higher

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standard of living there than in the countryside or because their children receive a better education

- there is disagreement over what services government should provide and whether it should restrict migration
- the rate of labor absorption by industry:
 - the employment growth of industry in developing countries lags behind the growth of output and capital in industry; for example, between 1965 and 1983, the value of industrial output in LDCs grew at an average rate of 7.1% per year but employment in industry grew at an average rate of only 4.3% per year (about 40% less than the growth rate of output)
 - the equation relating the output and employment growth rates of industry is:

$$\Delta E_i = \eta g(V_i) S_i$$

ΔE_i = annual employment growth in industry as percent points of the labor force

η = elasticity of employment with respect to the value-added

$g(V_i)$ = growth rate of industrial value-added

S_i = industrial employment as a fraction of total employment

the elasticity term, η , indicates how much more employment is added for each unit of increase in the value-added; for a given increase in output, the larger η is, the more labor is added

value-added refers to the value of output produced minus the value of inputs used

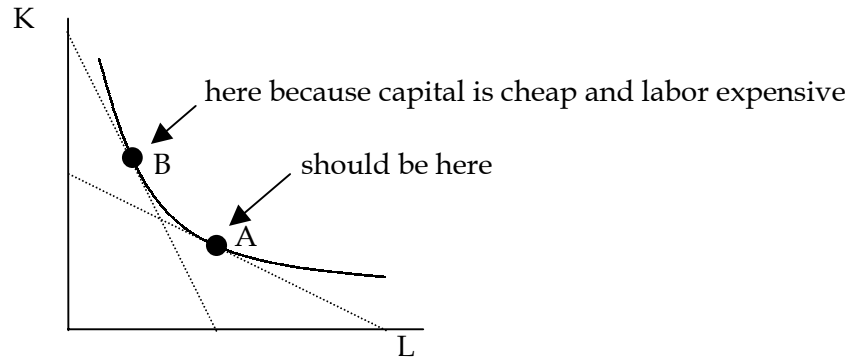
- η is estimated to be 0.6, the growth rate of output is given as 7.1%, and the fraction of the workforce employed in industry in 1965 is given as 9%, so in 1965:

$$\Delta E_i = 0.6 \times 7.1 \times 0.09 = 0.4$$

thus, in 1965, employment in industry as a share of the labor force increased by 0.4% (for instance, industry may have absorbed another 40,000 workers in a country in which the overall labor force size is 10,000,000)

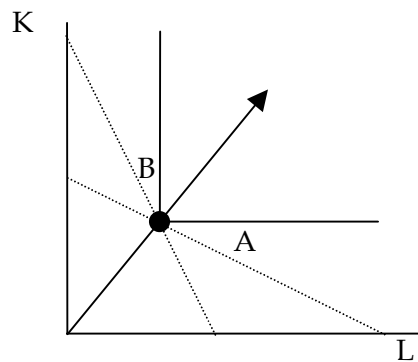
- 0.4% is a small amount and is of concern because industry, which has a high marginal productivity and high wages relative to the other sectors of the economy, is absorbing labor slowly
- labor absorption by industry and the elasticity of substitution:
 - according to the neoclassical model there are infinite combinations of capital and labor to produce a given output; in developing countries, the cost of labor is low relative to the cost of capital, so firms should use labor-intensive technology; however, there is concern that decision-makers are using capital-intensive techniques in developing countries because the prices of capital and labor do not reflect their scarcity:

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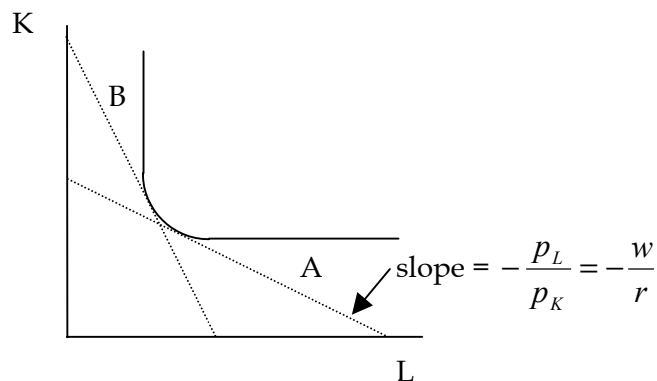
labor can be artificially expensive because government sets a minimum wage, foreign firms offer high wages to prevent accusations of exploitation, civil servant salaries are high, etc.; also, capital can be artificially cheap because of preferential borrowing, aid, a low interest rate, and an overvalued exchange rate

- alternatively, firms could use a high amount of capital and a low amount of labor because the isoquants are L-shaped (the capital to labor ratio is fixed):



in this case, the relative prices of capital and labor are irrelevant; the cheapest way to produce a given quantity is to use a fixed combination of capital and labor, regardless of their prices; if this is the type of technology used, then lowering wages would not create greater labor absorption

- is the lack of labor absorption due to problems with the price mechanism or because the technology is fixed?
- substitutability between capital and labor could be low; both countries A and B use similar technologies despite having different relative prices of labor and capital:



- what the isoquants actually look like is determined by the relationship between the inputs and the output; the elasticity of substitution indicates how rapidly the capital to labor ratio changes relative to the wage to rent ratio:

$$\sigma = \frac{\Delta(K/L)(w/r)}{\Delta(w/r)(K/L)} = \frac{\left[\frac{\Delta(K/L)}{K/L} \right]}{\left[\frac{\Delta(w/r)}{w/r} \right]}$$

$$\left[\frac{\Delta(K/L)}{K/L} \right] = \text{percent change in the capital to labor ratio}$$

$$\left[\frac{\Delta(w/r)}{w/r} \right] = \text{percent change in the wage to rent ratio}$$

nearly L-shaped isoquants have a low σ (for a given change in the wage to rent ratio, there is a small change in the capital to labor ratio)

L-shaped isoquants have a σ equal to 0 (for any change in the wage to rent ratio, there is no change in the capital to labor ratio)

neoclassical isoquants have a high σ (for a given change in the wage to rent ratio, there is a large change in the capital to labor ratio)

- there are two views on the elasticity of substitution:
 1. elasticity optimists – elasticities are high, if prices are right then labor-intensive technologies can be used
 2. elasticity pessimists – elasticities are low, changing price signals will not affect employment much
- where does technology come from?
 - elasticity pessimists argue that most research and development (R&D) is done in industrialized countries which develop capital-intensive technology for themselves; although these technologies are inappropriate for developing countries, LDCs must use them because they do not have R&D capabilities to invent their own techniques
 - however, developing countries could use technologies from earlier generations (30-40 years earlier) that are more labor-intensive; for instance, in the textile industry LDCs

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could use techniques used in Taiwan and Japan 20 years earlier; thus, LDCs should not necessarily use the latest, most sophisticated technologies because there might be more suitable techniques

- however, do decision-makers in the economy have the proper information to make these decisions? entrepreneurs from abroad might have the technological models that are necessary in the developing country