

Name: KEY
Spring 2016

Economics of Development
Exam 1

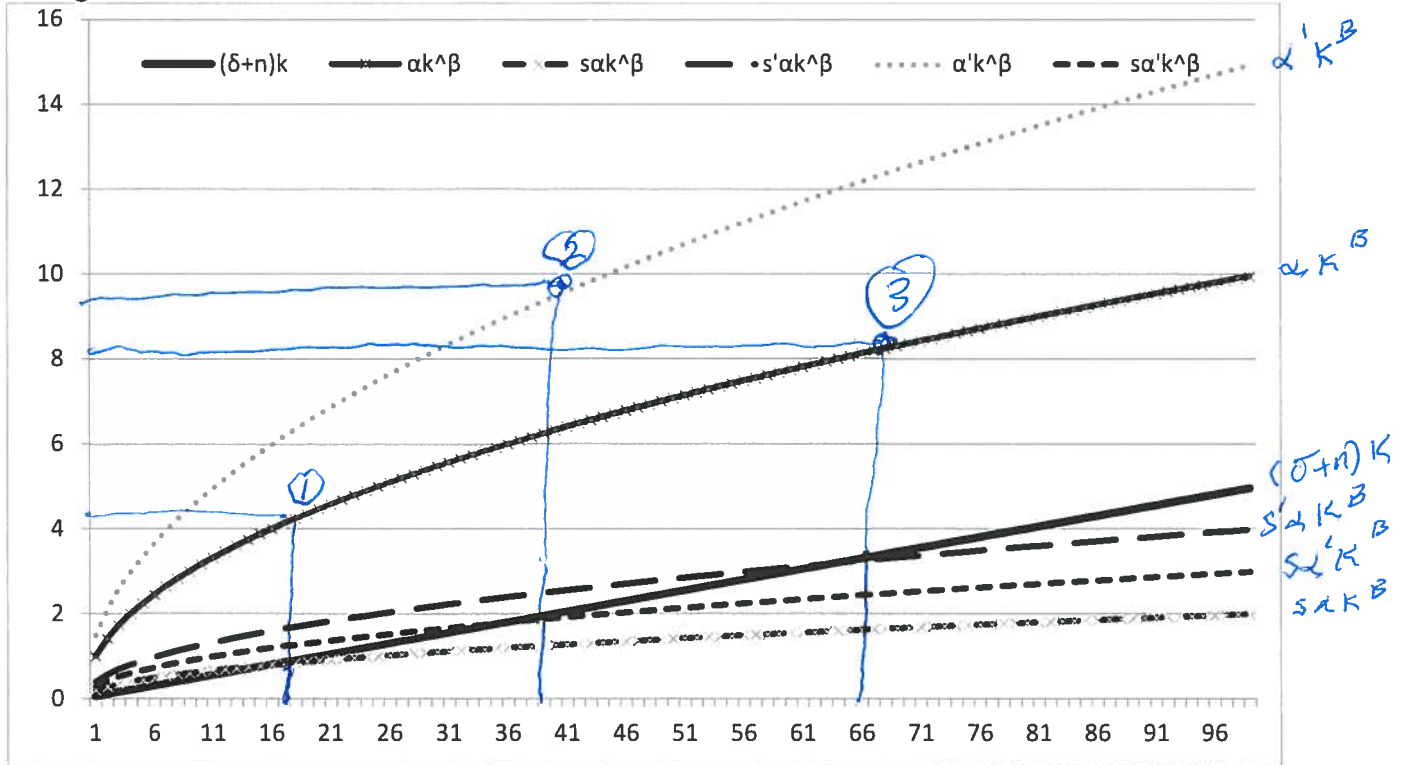
Total quiz is 30 points. Each question is worth three points. Each sub question is worth an equal share of these three points.

1) Circle to indicate whether the statement is true or false.

Statement	Is the statement True or False?
The Harrod-Domar model predicts increasing the savings rate will increase the growth rate of an economy.	True or False
Sen states that one of the main themes of the first generation of development economics was rapid capital accumulation leading to savings and investment..	True or False
Neutral technological progress changes the marginal rate of technical substitution for a given input bundle without changing the amount of output produced using that input bundle.	True or False
According to the theory of comparative advantage, every country has to have one commodity in which their marginal product of labor is higher than any other country.	True or False
The 'Prebisch-Singer' hypothesis is based on the argument that the income elasticity of demand for manufactured goods is higher than the income elasticity of demand for primary products.	True or False
Transfer pricing is when a firm that has monopoly power in a home country sells uses the monopoly profits to sell at a lower price in foreign markets to drive out competitors.	True or False
The Lewis model assumes the marginal product of labor in the manufacturing sector is zero but the marginal product of labor in the agricultural sector is greater than zero.	True or False
Solow designed his model to explain how long run steady state growth in income was conceptually possible.	True or False

2) Growth theories.

In the graph, k is capital per worker on the x axis, output per worker is defined as $y = \alpha k^\beta$ on the y axis with α capturing technological knowledge and β the share of national income controlled by owners of capital, n is population growth rate, δ is the depreciation rate, and s is the savings rate.



a) Growth from technological progress is represented on this graph in what way?

Change from α to α' in the savings function and the production function. Move from (1) to (2)

b) Growth from a higher savings rate is represented on this graph in what way?

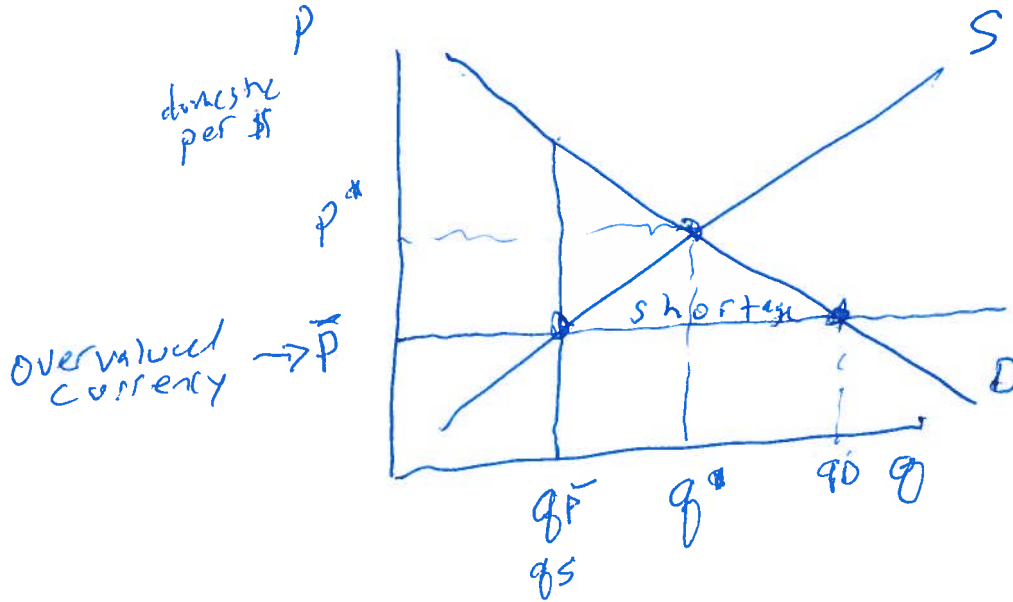
Change from s to s' in the savings function. Move from (1) to (3)

c) In class we discussed why the creators of the Harrod-Domar model created their model. We then discussed why the Solow model was created. Finally, we discussed how the Solow model led to the literature on (unconditional) convergence. Summarize these discussions, indicating how Harrod-Domar, Solow, and the convergence literature are intellectually related.

- ① Harrod-Domar was developed in reaction to the experience of the great depression. It was based on Keynesian economics, and was an attempt to see how steady state growth in income could be possible.
- ② Solow found Harrod-Domar to be too unstable as there was no link to the size of the labor force. If labor grew faster than income/capital there was a danger of widespread unemployment. If capital grew faster than labor then there was a danger of inflation.
- ③ The Solow model features diminishing marginal returns (B) to machines per worker. That means the value of the marginal product of capital is highest where capital (and income) are lowest. Capital should flow to where capital is scarce leading to unconditional convergence.

3) Exchange rates and trade strategy.

- a. Illustrate on a supply and demand graph the impact of an overvalued domestic currency on the demand for US dollars where the price is units of domestic currency per dollar, and the supply and demand curves are of US dollars.

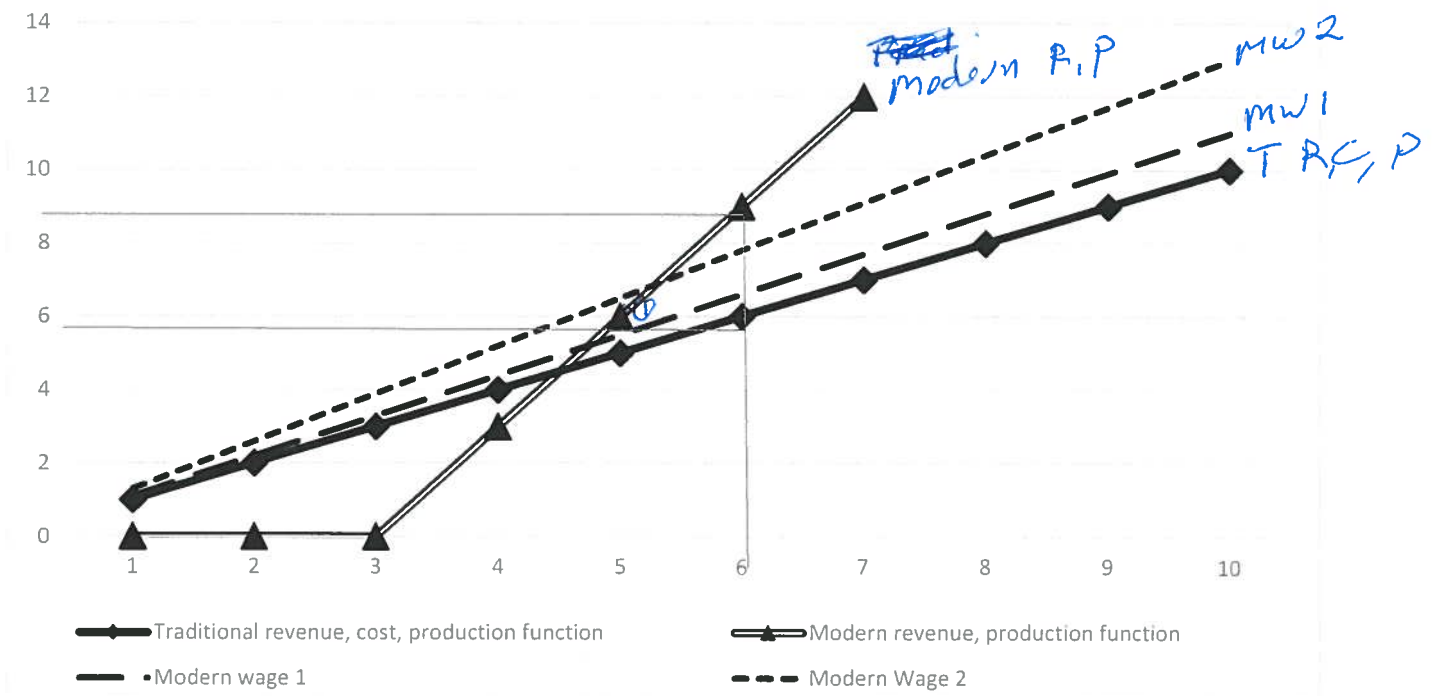


- b. Explain how an overvalued currency impacts importers and exporters differently.

It helps importers as it makes the price in local currency of imported goods lower than it would be at the exchange rate at P^* . It hurts exporters as it makes the price of exports higher than it would be at P^* .

4) More models

Output



The x-axis is labor in one of N sectors of the economy measured in hundreds. 600 workers are currently employed using traditional technology, and they make 600 units, where output is measured in hundreds as well. Each worker is paid 1 per unit of work and each unit of output produced sells for 1 in the traditional sector. The line with the diamond markers is the traditional revenue, cost, and production function. The double line is the modern revenue and production function. It costs the equivalent of 300 workers to bring in the technology, but each worker is more productive with the modern technology than the traditional technology. Possible cost curves reflecting different wages in the modern sector are represented by the dashed lines.

a. What is the name of this model?

The Big Push

b. Will coordination be needed to have all N sectors in the economy modernize if the modern wage is represented by modern wage 1? Why or why not?

No. The firm in this case can reduce the labor force from 600 to 500 and still produce 600 units. At the point $(L=500, Q=600)$ on the modern revenue function the cost at modern wage 1 is below the revenue, so even if only this firm modernizes, the economy can absorb what they are producing and they make a small positive profit (the firm)

- c. Will coordination be needed to have all N sectors of the economy modernize if the modern wage is represented by modern wage 2? Why or why not?

Yes. If only this firm modernizes, the buying power from other sectors will not increase, so if the firm reduces from 600 workers to 500 workers, the cost is greater than revenue at $(L=500, R=600)$ on the modern production/revenue curve.

- d. What is the nature of the spillover benefit to the other $N-1$ sectors of the economy of the sector represented in the figure modernizing?

By paying workers in the modern sector higher wages, the buying power of consumers expands so the economy can grow and more can be produced and purchased.

We have not fully covered this

5) Below are a set of statements describing development strategies. Identify by putting a check in the box whether a given statement is part of Williamson's "Washington Consensus", the World Bank's "Poverty Reduction Strategy", or neither of these.

	Williamson's Washington Consensus	World Bank's Poverty Reduction Strategy	Neither of these.
The strategy is partnership oriented – coordinating participation of bilateral, multilateral, NGO, government, and civil society institutions.		✓	
The strategy includes tax reform that broadens the tax burden but lowers the taxation rates.	✓		
The strategy identifies integrated rural development as a means to realize the millennium development goals			✓
The strategy liberalizes foreign direct investment flows	✓		
The strategy promotes securing property rights.	✓		
The strategy involves public and private partnerships for infrastructure development in the transport sector.			✓
The strategy is country driven and participatory.		✓	
The strategy redirects public expenditure to fields with high economic return and the potential to improve income distribution	✓		
The strategy is designed to reduce debt stocks below 2/3rds of the value of annual exports.			
The strategy is medium to long term in focus.		✓	

6) New Growth Theory.

- a. What are forward and backward linkages, and how can they explain why 2% of the US land area produces 50% of GDP?

Forward linkage - The firm is near the consumers of what it produces.

Backward linkage - The firm is near the producers of inputs that it uses in production.

Like firms share input sources and want to be near consumers, so that there is a tendency for like firms to locate in the same area.

- b. What are spillovers, and what role do they play in the Romer model? Illustrate using the formal model that Romer developed.

Spillovers are a positive externality.

$Y_t = \alpha K_t^\beta \cdot L_t^{1-\beta}$ in the Solow ~~model~~ model

$Y_{it} = \alpha_t \cdot K_{it} \cdot L_{it}$ for $i=1, \dots, N$ firms

$\alpha_t = A \bar{K}_t$ where $\bar{K}_t = \frac{1}{N} \sum_{i=1}^N K_{it}$

α will be higher where average capital stock is higher so capital could flow to where capital is abundant rather to where capital is scarce

7) There are four workers in the economy who differ in their labor quality as defined by their 'q' value. Q is defined on a scale of [0,1] with higher q being higher quality. Worker one has q=1, worker two has q=0.8, worker three has q=0.6, and worker four is q=0.4. Production takes place using two workers, with output of combining workers i and j defined by $y_{ij} = q_i * q_j$.

a) Fill in the following

Combination 1	Resulting output 1	Combination 2	Resulting output 2	Total output (1+2)
(1, 0.8)	0.80	(0.6, 0.4)	.24	1.04
(1, 0.6)	0.60	(0.8, 0.4)	.32	.92
(1, 0.4)	0.40	(0.8, 0.6)	.48	.88

b) Say production can be increased by paying for training that will increase the q of a given worker. The cost of this training, c, can be expressed in terms of output y. Training that costs c raises the skills of a worker as represented by a 0.1 increase in their q value. As you may recall from class, training will be given to the lower q worker in a given pair so you can just focus on that. What is the maximum cost c a firm would be willing to pay for the training that will increase the skill level of the 0.8 worker in a (1, 0.8) pairing?

$f(1, .8) = 1 \cdot .8 = .8$
 Training at a cost of c increases the value of the .8 person to .9
 $f(1, .9) = 1 \cdot .9 = .9$ $(.9 - .8) = .10$ so up to a cost of .10

c) Continue with the training details from part b. What is the maximum cost c a firm would be willing to pay for the training that will increase the skill level of the 0.4 worker in a (0.6, 0.4) pairing?

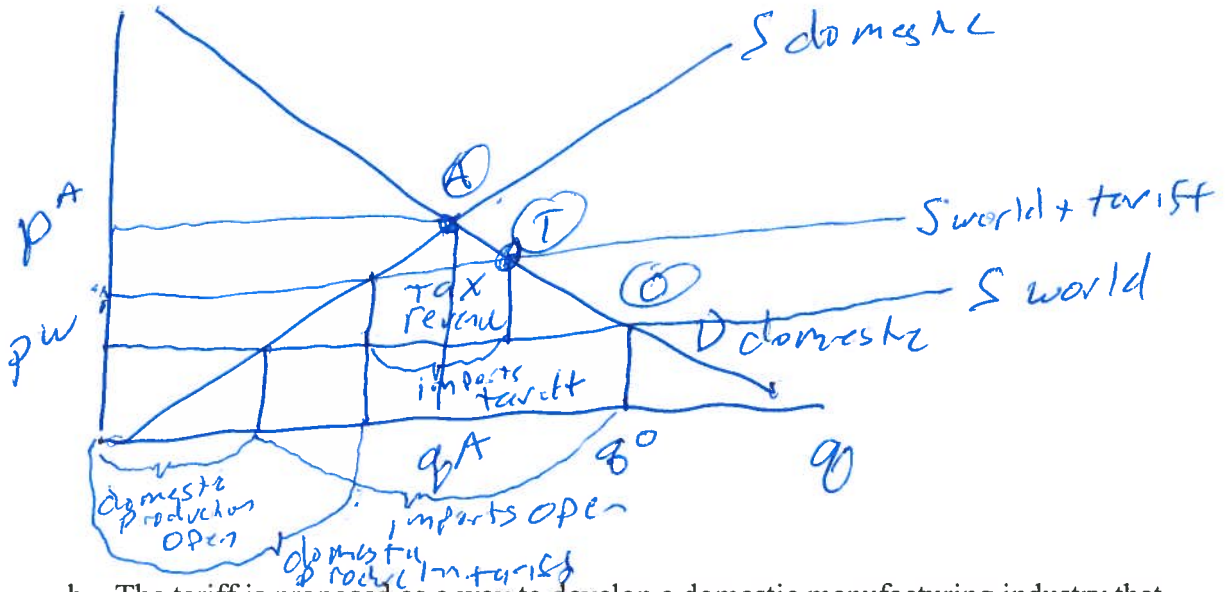
$f(.6, .4) = .6 \cdot .4 = .24$
 Training at a cost of c increases the value of the .4 person to .5.
 $f(.6, .5) = .6 \cdot .5 = .30$
 $(.30 - .24) = 0.06$ so up to a cost of .06

d) Contrast your answers to (b) and (c) to illustrate why the O-ring theory can be used to explain a lack of 'convergence'.

Training will be targeted to the higher producing pair since the returns are greater, leading to further divergence of the outcomes: $(1, .8) = .8$ increase to $(1, .9) = .9$ while $(.6, .4)$ stay at .24

8) Illustrate the following:

- a. Place a tariff on the imported commodity such that the selling price with the tariff is higher than the international price but less than the domestic price if no imports are allowed. Show the level of domestic supply, the level of international supply, and the tax revenue generated. Contrast the autarky outcome, the open market outcome, and the tariff outcome. Y axis is price, x axis is quantity.



- b. The tariff is proposed as a way to develop a domestic manufacturing industry that will become more efficient as the domestic industry 'learns by doing'. What would 'learning by doing' look like on your graph to (a) – what part of the graph would change over time? You can verbally describe the change or draw the change.

Over time, $S_{domestic}$ should rotate towards S_{world} as firms learn by doing and ~~reduce~~ reduce the marginal cost of production.

- c. Explain how the promise by government to remove the tariff after 10 years and the industry has improved efficiency in the sense of your answer to (b) potentially illustrates "the commitment problem".

The protection is generally revenue for the government and is preventing competition in production. There are incentives for government to continue to collect revenue and for producers to not innovate and reduce the costs of production. The promise to remove the tariff made ex ante may not be credible.

9) Tunakaajuu (T) producers produce 20 units of coffee and 10 units of potatoes per unit of labor. Neighboring Kulimachini (K) workers can produce 10 units of coffee and 4 units of potatoes unit of labor.

- a. If there are 100 laborers in Tunakaajuu and 100 in Kulimachini describe the level of production of each commodity in each country in autarky if each country divides up their labor force with half of the work force allocated to each commodity.

	Coffee	Potatoes
Tunakaajuu	20(L), $20 \cdot 50 = 1000$	10(L) $10 \cdot 50 = 500$
Kulimachini	10(L), $10 \cdot 50 = 500$	4(L) $4 \cdot 50 = 200$
TOTAL	1500	700

- b. Identify the product in which each country has a comparative advantage and explain why this is the product in which they have a comparative advantage.

Coffee - (K)

$$\frac{T}{K} = \frac{20}{10} = 2 \text{ times}$$

$$\frac{K}{T} = \frac{10}{20} = \frac{1}{2} = .5$$

Potato - (T)

$$\frac{T}{K} = \frac{10}{4} = 2.5 \text{ times}$$

$$\frac{K}{T} = \frac{4}{10} = \frac{2}{5} = .4$$

- c. Move 5 Tunakaajuu workers to the commodity in which they have comparative advantage and 12 Kulimachini workers to the commodity in which they have comparative advantage. What levels of each commodity are now produced in each country?

	Coffee	Potatoes
Tunakaajuu	45(20) = 900	55(10) = 550
Kulimachini	62(10) = 620	38(4) = 152
TOTAL	1520	702

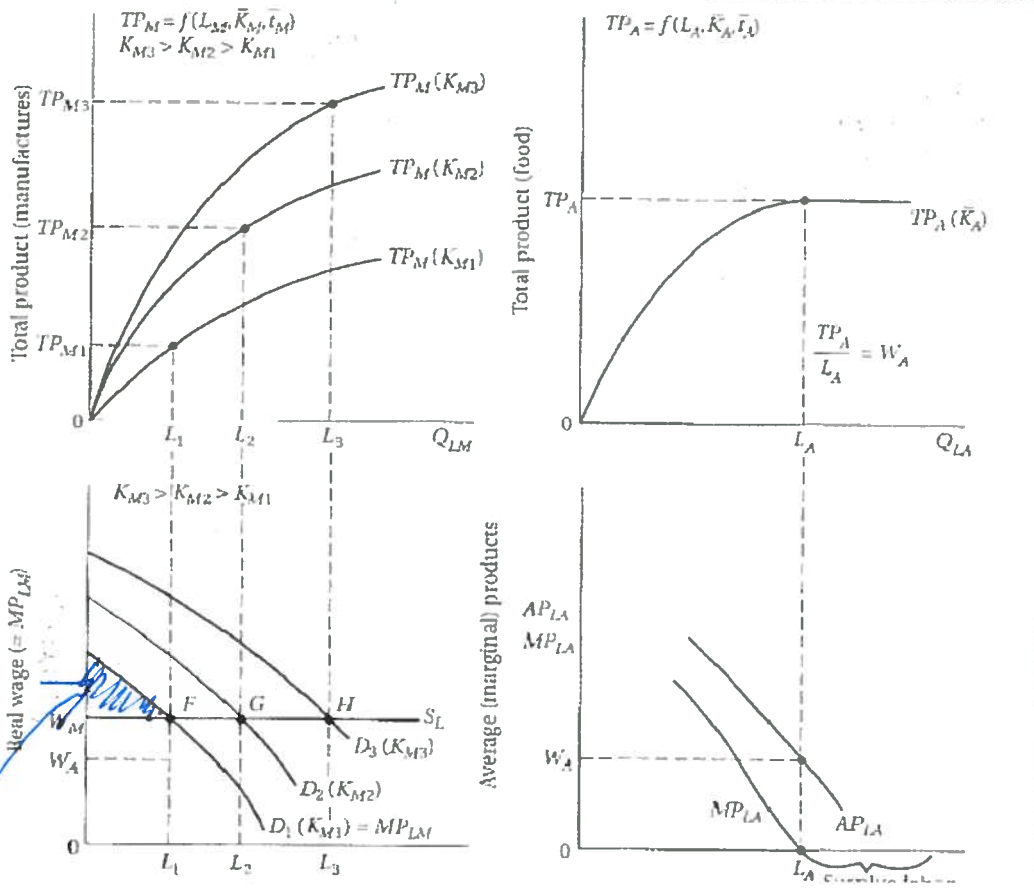
- d. Trade 111 units of coffee from where coffee has a comparative advantage for 49 units of potatoes from where potatoes have a comparative advantage. How does the amount of each commodity in each country now compare to what you found in (a)? Why did this happen?

	Coffee	Potatoes
Tunakaajuu	900 + 111 = 1011	550 - 49 = 501
Kulimachini	620 - 111 = 509	152 + 49 = 201
TOTAL	1520	702

Specialization and trade make it possible to increase production of both coffee and potatoes without using more resources.

10) Consider the following set of figures taken from the textbook and answer the questions below.

FIGURE 3: The Lewis Model of Modern Sector Growth in a Two-Sector Surplus-Labor Economy



a) What is the name of this model and what qualitative / structural change in the economy of a country is this model designed to describe?

Lewis model of a transition from agriculture to manufacturing.

b) Where specifically does the money come from to invest such that the capital stock increases from K_{M1} to K_{M2} ? Shade in the area and describe why this area is profit.

The demand for labor reflects the value of the marginal product of labor, so in this triangle the $VMP_L >$ the MC of labor at W_M . So there is profit that can be invested in machines so we go from K_{M1} to K_{M2} and so on.