Name: Key

Economics of Development
Spring 2018
Exam 1

Total exam 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 assumes there are diminishing marginal returns to capital in the production of output.	True or (False)
Sen identifies one of the main themes of the first generation of development economics the effort to endogenize total factor productivity growth.	True or (False)
Neutral technological progress leaves unchanged the marginal rate of technical substitution for a given input bundle, but changes the amount of output produced using that input bundle.	(True) or False
According to the theory of comparative advantage, every country has to have a comparative advantage in the production of at least one commodity.	(True) or False
The 'Prebisch-Singer' hypothesis is based on the argument that the income elasticity of demand for manufactured goods is lower than the income elasticity of demand for primary products.	True or (False)
A 'steady state' outcome in a dynamic model is a type of equilibrium that is characterized by there being no force internal to the model that leads to further change in the state variables.	(True) or False
Solow designed his model to explain the cross country evidence suggesting there is 'conditional convergence' across countries in income per capita over time.	True or (False)
The value of exports of goods and services is a component of the current account.	(True) or False

2) Growth models

a. Contrast the functional form of the Solow model with that of the Romer model in either formulas or words describing the specific formulas.

Solow: $Y_t = A_t K_t^{\beta} \cdot L_t^{1-\beta}$

-or-

National output at time t is a Cobb-Douglas production function with capital stock at time t and labor stock at time t as variables

Romer: $Y_{it} = A_{it} K_{it}^{\beta} \cdot L_{it}^{1-\beta}$ with $A_{it} = \left(\frac{1}{N}\sum_{i=1}^{N} K_{it}\right)^{\beta} \cdot A$

So that $Y_{it} = A \cdot K_{it}^{\beta+\beta} \cdot L_{it}^{1-\beta}$ or $A \cdot \bar{K}^{\beta}$

b. Describe the nature of the spillover in the Romer model and why this particular specification can be used to explain a failure to find unconditional convergence.

The spillover in the Romer model is due to the size of the economywide capital stock. Increasing capital stock (K_{it}) not only benefits firm i at time t but also impacts other firms positively. Convergence comes as a prediction in the Solow model due to diminishing marginal returns to capital when $y = dk^{\beta}$. Here there are potentially increasing marginal returns to capital $\Rightarrow$ divergence is possible.

c. What part of the Solow model does the Romer model endogenize? How?

Total Factor Productivity (TFP) A_t in the original model

3) 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=0.75, worker three has q=0.50, and worker four is q=0.25. 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, 0.75)	.75	(0.50, 0.25)	.125	.875
(1, 0.50)	.50	(0.75, 0.25)	.1875	.6875
(1, 0.25)	.25	(0.75, 0.50)	.375	.625

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 0.15 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.

i) If the cost of training is below what level of c will a firm decide to pay for increasing the skill level of the 0.75 worker in a (1, 0.75) pairing?

$y_{ij} = q_i \cdot q_j$. $0.75 = .75(1)$

$0.90 = (.75 + .15)(1)$

$0.90 - c \geq 0.75$

$c \leq .15$ will pay for training

ii) If the cost of training is 0.1 does it make sense to train the q=0.25 person in the (0.50, 0.25) pair if the training raises the skills of this worker by 0.15 to 0.40? Why or why not?

$y_{ij} = q_i \cdot q_j$. $0.125 = (.50) \cdot (.25)$

$0.20 = (.50) \cdot (.25 + .15)$

$0.20 - c \geq 0.125$

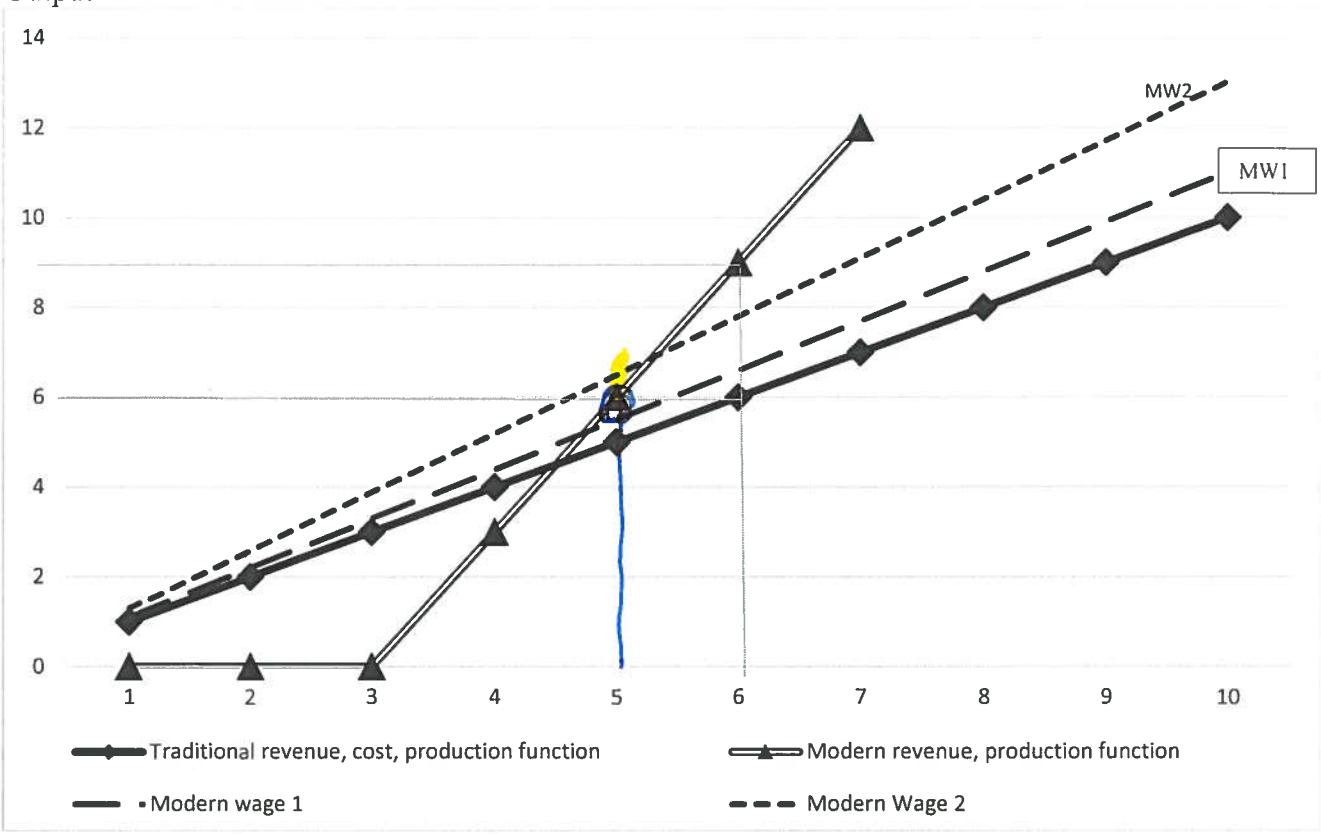
$c \leq 0.075$ will pay for training. It will not make sense to train

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

This you don't need in this case but it applies in other ways I have asked this question

Like seeks like overall in the O ring theory due to strong complementarity in production. In this case, returns to training are higher where workers skills/quality are higher. Those ahead get further ahead leaving the lower skill/quality workers behind

4) Big Push Model.



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 modern 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. 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. Where the modern production function reaches 600 units of output the revenue is greater than the cost, this point above. There is positive profit even if nobody else modernized.

b. 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?

In contrast, with modern wage 2, when modern production is 600 units the costs as represented by MW2 are above the revenue with the modern technology in the area shaded in yellow

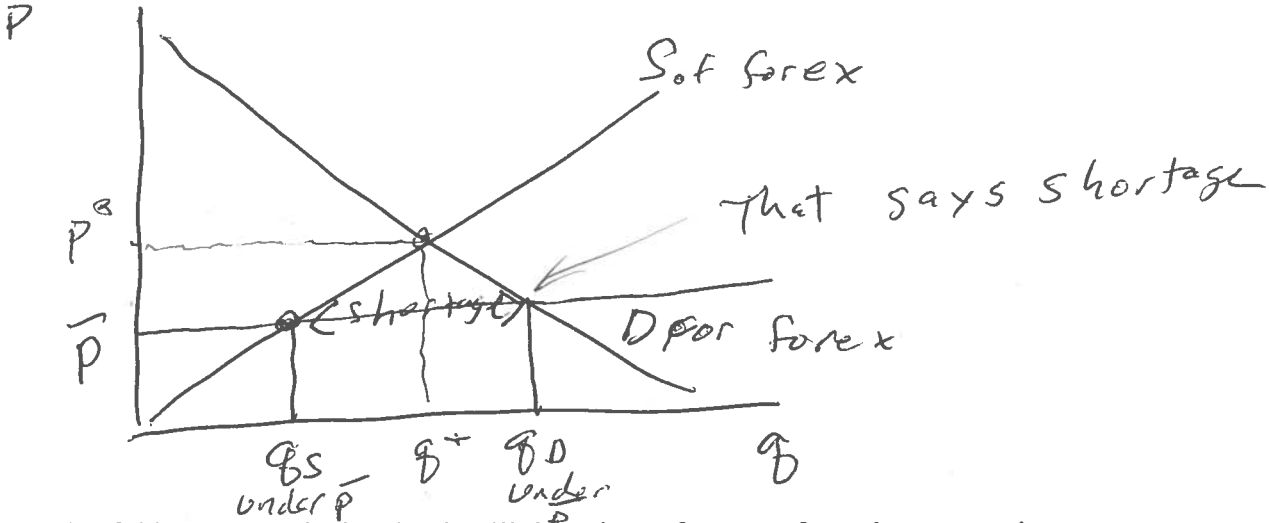
c. What is the nature of the spillover benefit to the other N-1 sectors of the economy of the sector represented in the figure modernizing?

By modernizing and increasing my workers' wages I am creating increased demand and buying power for the other sectors of the economy. They in turn will be helping me if they do the same (modernize + pay higher wages)

5) Exchange Rates

a. Illustrate on a supply and demand graph (supply and demand for foreign currency, price in domestic currency) an overvalued currency.

P is in domestic currency per $)



b. If this currency is devalued, will the prices of exports from the country increase or decrease in world markets? Why?

It will decrease the prices of exports in world markets. To put numbers on it, assign the value of 10 units of local currency = $1 (USD) for P^e, Assign the value of 5 local currency per USD to $\bar{P}$. Locally a Kilo of rice we export is worth 5 local currency units. At $\bar{P}$ that means 1 Kilo costs 1 USD. At P^e 1 Kilo will be worth $0.50 (2 Kilos @ 5 = 10 local) so 50 cents each.

c. Will devaluation be more likely to increase or decrease the current account balance? Why?

Decrease, It will make the price of what you import ↑ and the price of what you export ↓ with respect to world markets.

6) Growth models

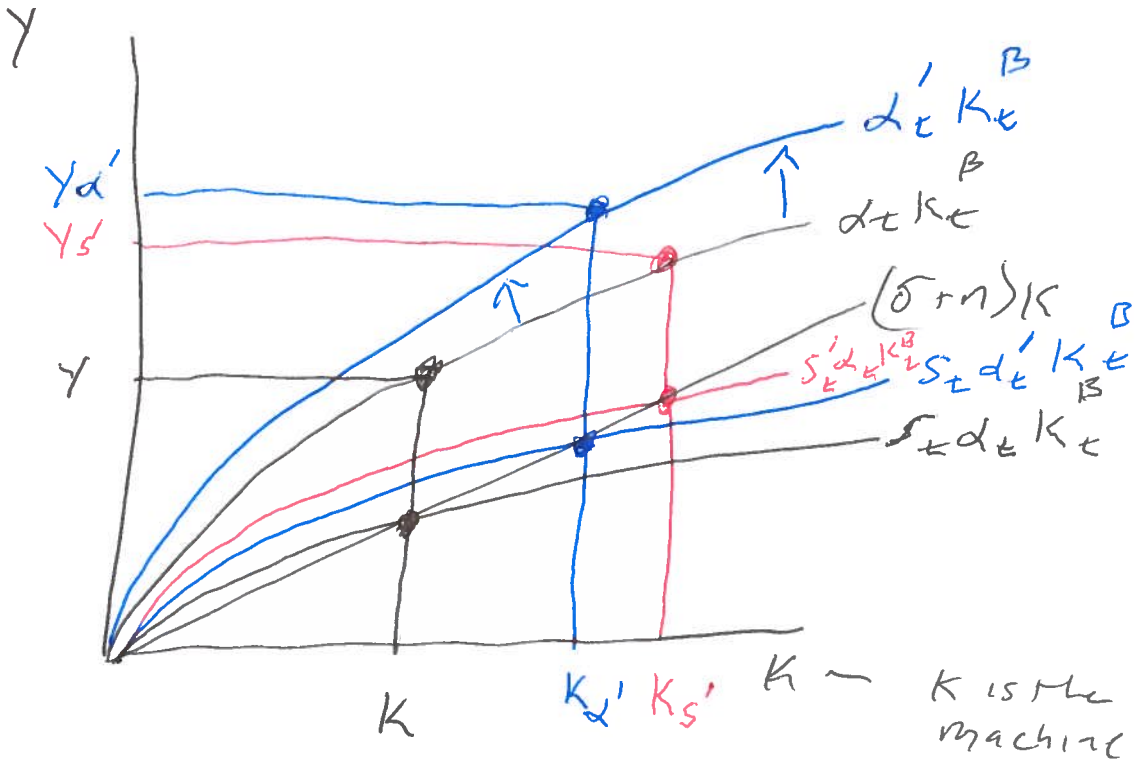
a) How do you increase the growth rate of an economy according to the Harrod Domar model?

$\frac{\Delta Y}{Y} = \frac{S}{K}$ with Y as natural income, S as the savings rate and K as the increment to capital output ratio $\frac{Y}{K}$. Increase S, increase income growth

b) Describe Solow's critique of this explanation.

It is unstable as the growth of the labor force is not a factor. Unless the growth of K ~~and~~ is the same rate at which L grows, you could have machines (K) grow slower than the labor force, leading to unemployment, or machine grow faster than the labor force, driving up wages and leading to inflation

c) Illustrate using graphs how Solow contrasts income growth from technological innovation with that which results from an increased savings rate.



S to S' is increased saving rate

α to α' is increased Total Factor Productivity

7) Maxwellia workers can produce 10 units of beans per unit of labor and 16 units of millet per unit of labor. Neighboring Eggersstan workers can produce 9 units of beans and 8 units of millet per unit of labor.

a. If there are 100 laborers in Maxwellia and 100 in Eggersstan, 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.

	Beans	Millet
Maxwellia	10·L, 10(50) = 500	16·L, 16(50) = 800
Eggersstan	9·L, 9(50) = 450	8·L, 8(50) = 400
TOTAL	950	1,200

b. Identify the crop in which each country has a comparative advantage.

$\frac{M}{E}$ is $\frac{10}{9}$ in productivity for beans, $\frac{16}{8}$ for millet.

$\frac{E}{M}$ is 90% as productive for beans, 50% for millet.

M has comparative advantage in millet, E in beans

c. Illustrate by moving 3 of Maxwellia's workers and 5 of Eggersttan's workers to the commodity for which they have comparative advantage how it is possible to increase total production of the two goods without using any new resources.

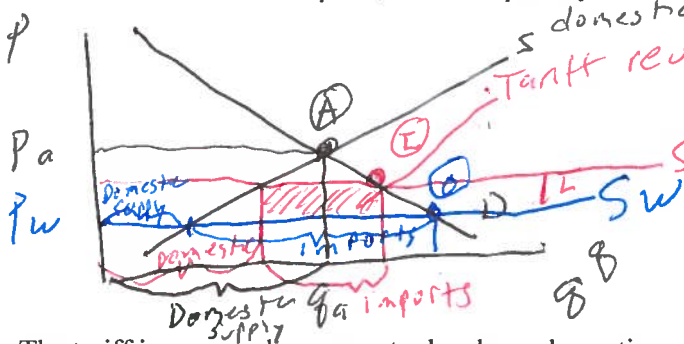
	Beans	Millet
Maxwellia	10(47) = 470	16(53) = 848
Eggersstan	9(55) = 495	8(45) = 360
NEW TOTAL	965	1208

d. After specializing in the commodity in which each country has comparative advantage identify a way to exchange 32 units of beans for 42 units of millet from the country having a comparative advantage to the other.

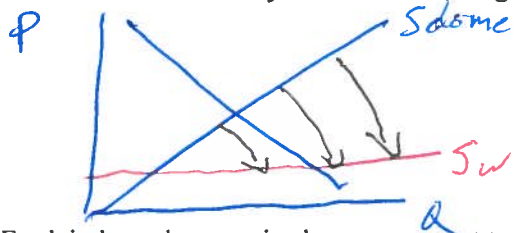
	Beans	Millet
Maxwellia	470 + 32 = 502	806
Eggersstan	495 − 32 = 463	402
NEW TOTAL	965	1208

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.



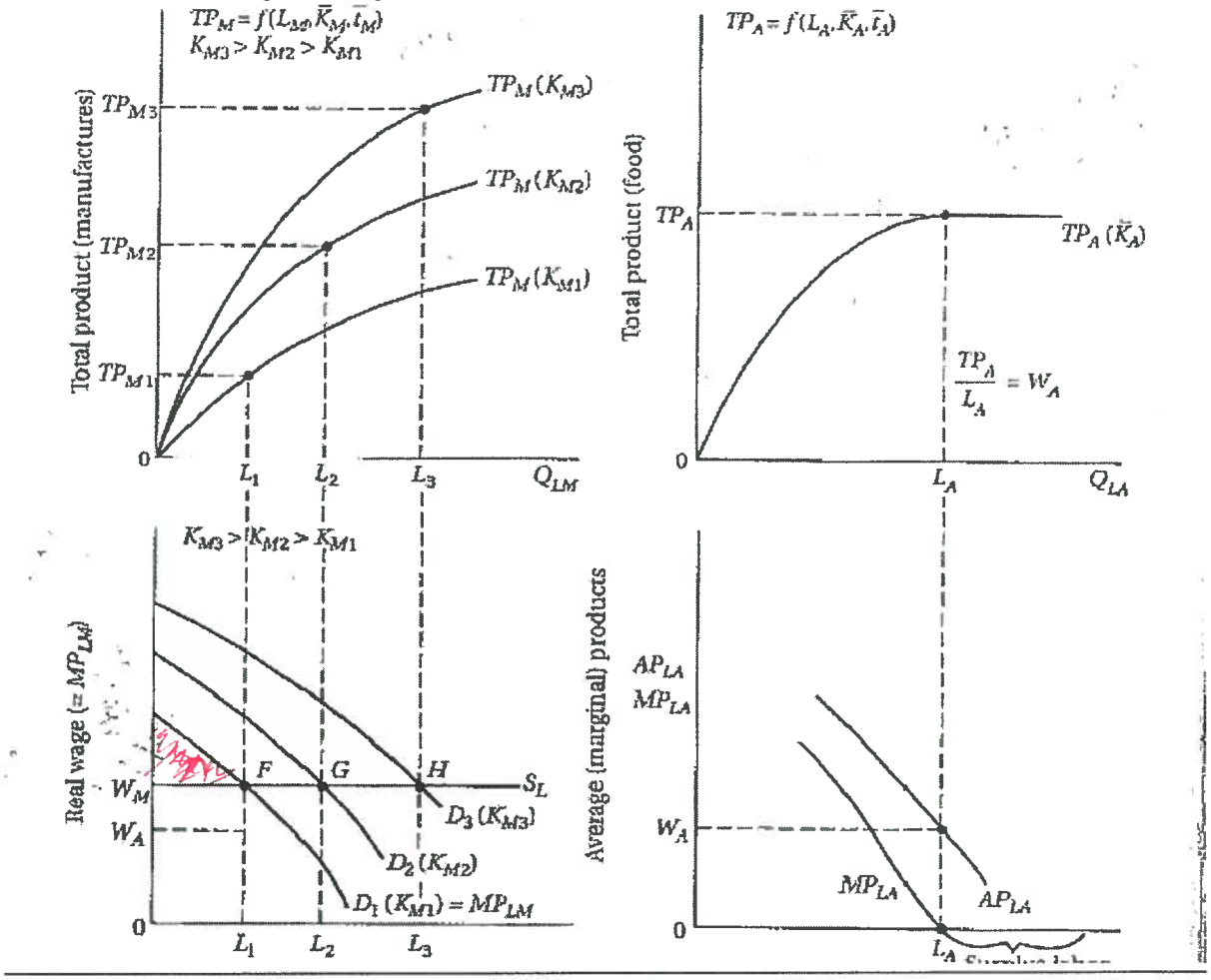
Sdomestic would rotate down towards Sw over time as firms learn by doing (making MC less per unit as they get better at it)

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".

Part 1, the firm does not have an incentive to become more efficient since there is no competition

Part 2, the government has an incentive to continue the tariff policy as it generates government revenue. It might also be noted that removal of the tariff will mean workers lose jobs potentially as the domestic supply becomes lower.

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



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 structural transformation of an economy from subsistence 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 area is bound from above by D_1 for labor. D_1 values for a given L reflect the value of the marginal product for a given worker. However we are paying them W_M each, so the difference is profit per unit. They keep coming because $W_M > W_A$. We take the profit and invest in increasing capital stock, so $K_1 \rightarrow K_2$, Demand shifts $\rightarrow$ production function shifts up, and it can repeat.

10) Define:

a. The Human Development Index.

A measure of human well-being that creates an index value for a given country based on measures capturing education, health, and income. HDI = $\frac{1}{3}$(health index) + $\frac{1}{3}$(education index) + $\frac{1}{3}$(income index)

b. Dumping.

Domestic monopolists use monopoly profits at home to subsidize lower prices in international markets to kill off international competitors. When they are driven out of business, the Domestic monopolist can charge the monopoly price worldwide.

c. An "import substitution industrialization" strategy.

Replace comodities that are currently being imported with the same product & commodity produced domestically to develop local manufacturing. This can be behind an import ban, quota, tariff. The domestic producers will learn by doing as they grow and eventually will be able to compete internationally

d. Transfer pricing.

Since multinational corporations have production processes that involve production of a given final product with manufacturing tasks in different countries, declare value added as low in high tax rate countries and high value added in low tax rate countries to minimize overall tax burden

Work Page: