

Final.  
Name: KEY

Spring 2023  
Economics of Development

Each question is worth three points; sub-questions are allocated an equal share of the total points per question. Total exam is 30 points.

1) Agriculture.

a) Describe the three main types of agrarian systems found in the developing world and note in which geographic region is each one most commonly associated.

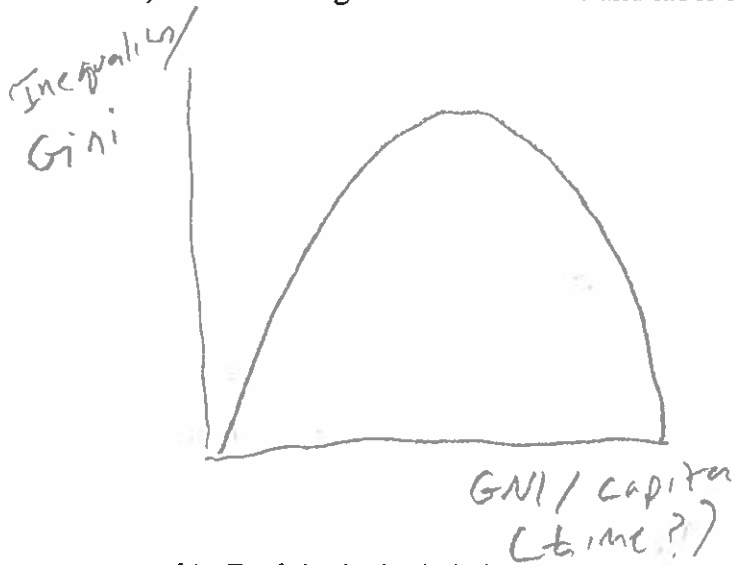
- 1) Latifundio - minifundio. Large land holdings surrounded by small farms. The residents of the small farms often work on the large farm. Latin America
- 2) Absentee landlord / Sharecropping. Land owners rent out, or enter into sharecropping agreements with farmers who will cultivate using the land. Asia
- 3) Land abundant shifting agriculture. Plots are farmed for a few years and then are left fallow to recover before being used again. Africa.

b) What is the implication of the inverse relation between farm size and productivity for a program designed to redistribute land from large land holdings to smallholders?

The inverse farm-size  $\rightarrow$  productivity relationship finds that output per unit (of land / labor) is higher on smaller farms than it is on larger farms. This implies that redistributing land from large landowners to smaller landowners could lead to increased agricultural output and reduce inequality.

2) Kuznets curves.

a) Draw the original Kuznets curve and label everything clearly.



b) Explain the logic behind the shape of this curve.

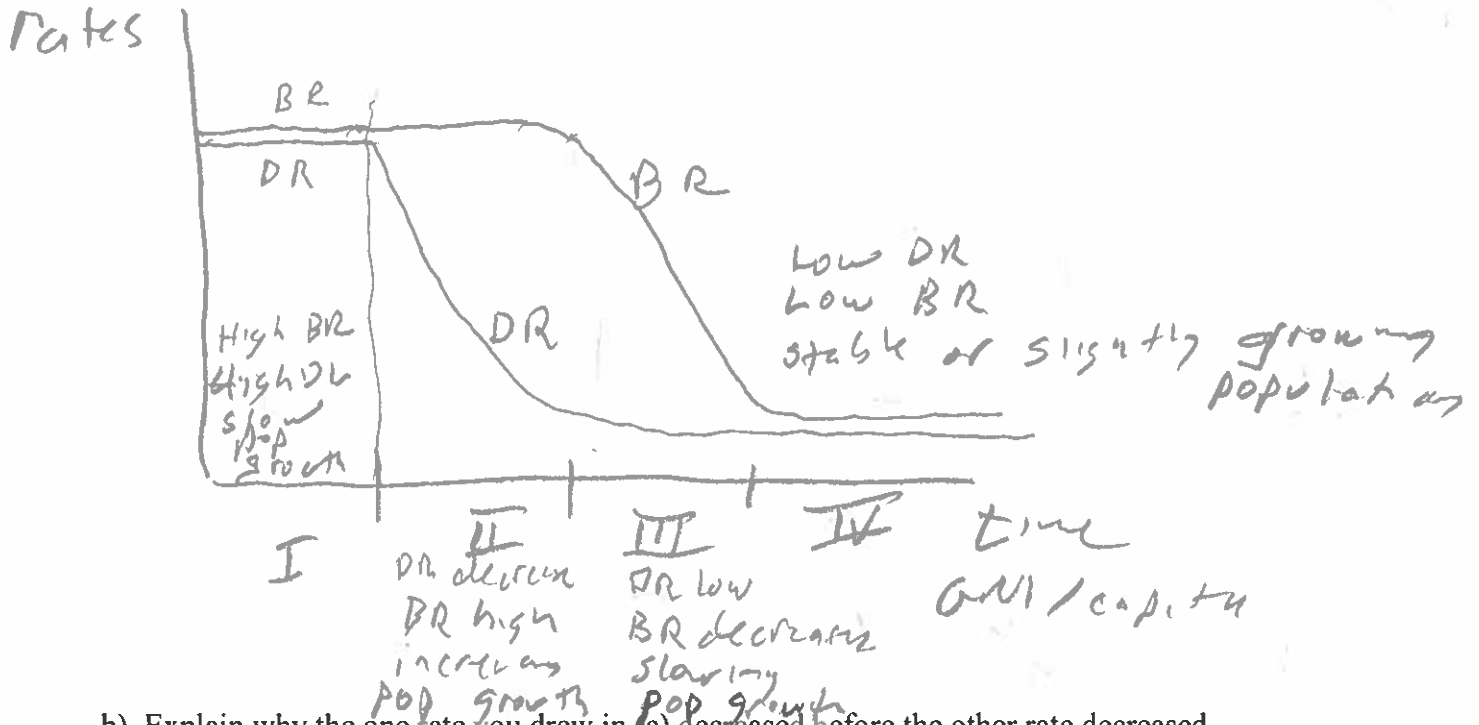
We begin as poor and equal subsistence farmers. A part of the population becomes wealthier, perhaps by moving into the manufacturing sector as in the Lewis model, while others remain in subsistence agriculture. Eventually all benefit from economic growth and inequality (and poverty) decrease.

c) Explain how this was adapted to create the Environmental Kuznets Curve.

The label on the "y-axis" of inequality / Gini is replaced by an environmental bad. The idea is that as incomes increase initially, there will be negative environmental impacts. As growth continues, these harms can be halted and then addressed. The environmental quality increases over time as incomes continue to grow.

3) Demographic Transition.

a) Draw a figure illustrating the demographic transition and note the different stages.



b) Explain why the one rate you drew in (a) decreased before the other rate decreased.

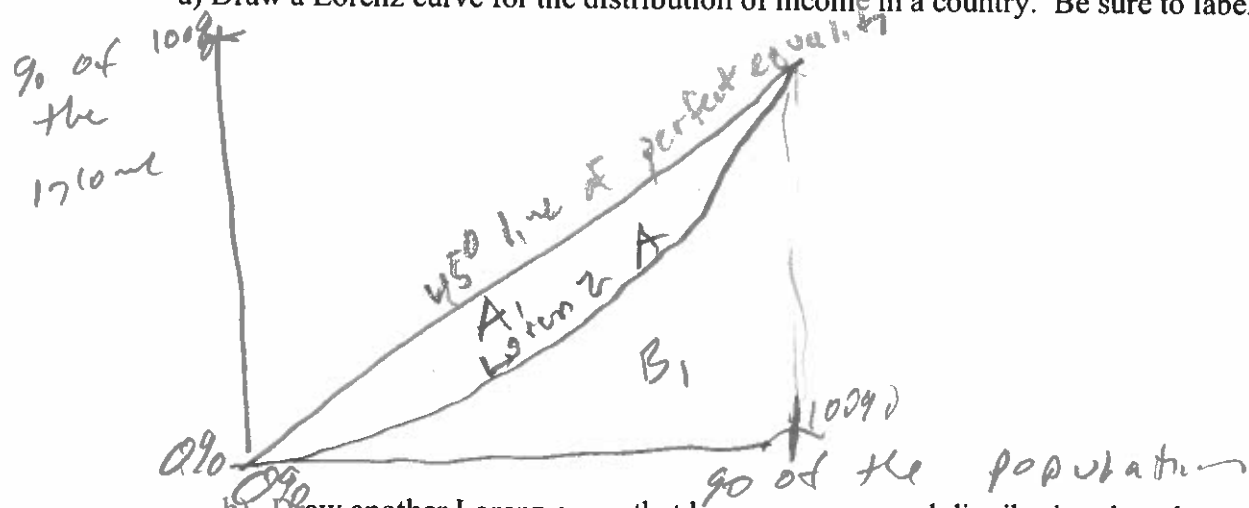
DR declines before BR due to availability of medical technology. BR decreases after a lag of a generation as societal attitudes/context change with regard to the desired number of children.

c) Explain why there is concern that a country could get stuck in stage 2 of the transition.

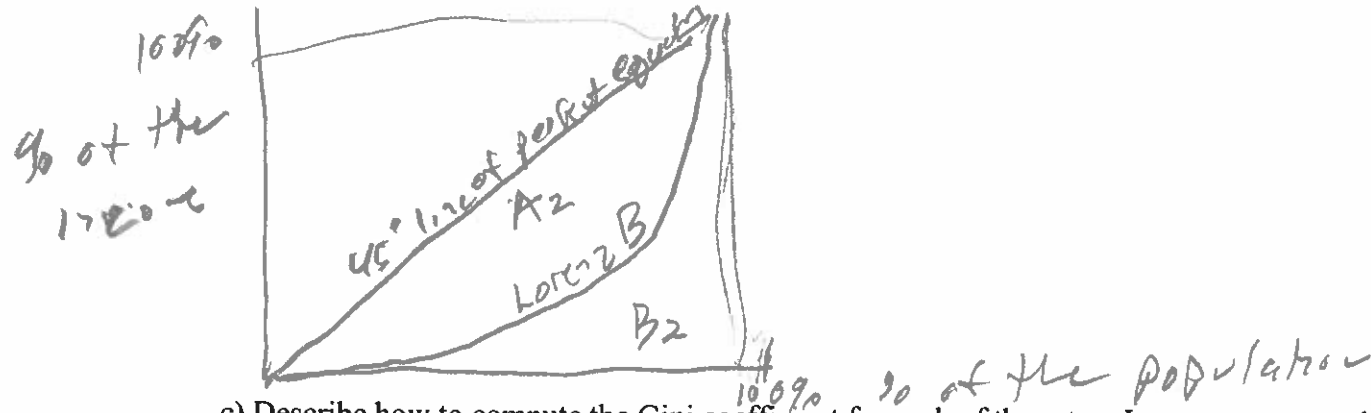
If it is driven by increasing GDP per capita, the "capita" could increase faster than the GDP as we move through stages II to III.

4) Inequality.

a) Draw a Lorenz curve for the distribution of income in a country. Be sure to label the axes.



b) Draw another Lorenz curve that has a more unequal distribution than the one in (a).



c) Describe how to compute the Gini coefficient for each of these two Lorenz curves, and argue whether the coefficient in (b) will be greater than (a) or vice versa.

$$\text{Gini for part a is } = \frac{A_1}{A_1 + B_1} = 2A_1$$

$$\text{Gini for part b is } = \frac{A_2}{A_2 + B_2} = 2A_2$$

Gini will be higher for part b because area  $A_2 > A_1$ .

5) Environmental Issues.

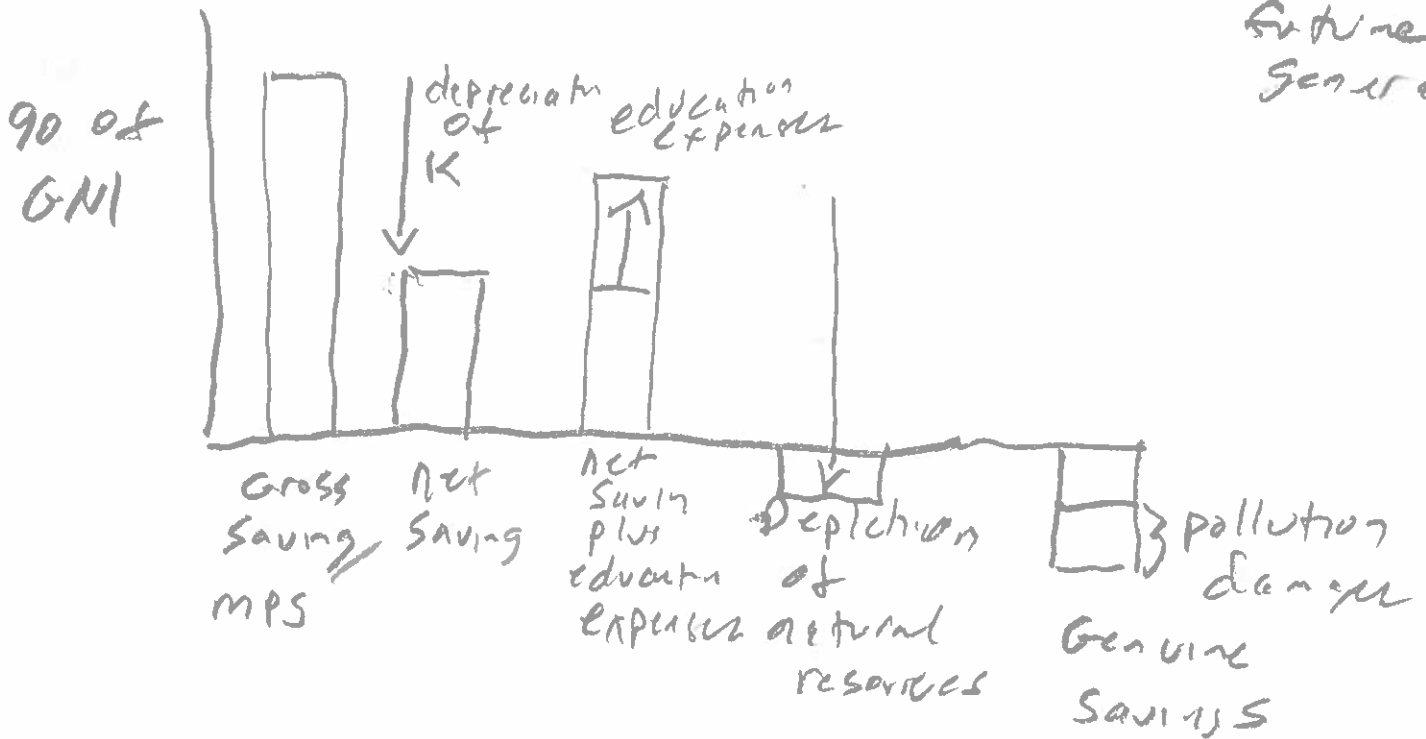
a) What is the difference between 'strong' sustainability and 'weak' sustainability?

**Weak** - Natural capital can be converted into financial capital to be passed on to future generations and as long as financial capital does not decline over time this is sustainable.

**Strong** - different kinds of capital (natural, financial, physical) should each be non-

b) Briefly explain the adjustments made to the value of gross saving to arrive at a measure of genuine savings in the World Bank's *Where is the Wealth of Nations?*

decrease to pass on to future generation



6) True or False

Statement	Circle whether the statement is true or false	
There is a positive correlation between income per capita and the share of the population that lives in urban areas in cross sectional comparison of countries.	True	False
The finding that taller people were paid higher wages in the informal sector in Brazil was explained by the theory of "Urban Giantism".	True	False
The world population growth rate over the past decade is the highest ever experienced in human history.	True	False
The share of female employment in agriculture is higher than the male share of employment in agriculture in developing countries.	True	False
The informal sector is not present in rural areas.	True	False
The value of military equipment transferred from OECD countries to developing countries is included in the OECD measure of official development assistance (ODA).	True	False
Estimates of current global population are in the 14-14.2 billion people range.	True	False
Overnutrition is a kind of malnutrition.	True	False
The United States is the largest donor of ODA of any country in the world in terms of ODA as a share of Gross National Income.	True	False
Per Capita food production is decreasing by around 1% per year overall for the world.	True	False
The majority of the world's population lives in countries characterized by the World Bank as 'developing countries'.	True	False
"Bread and Circuses" was the name of a World Bank program to assist highly indebted poor countries reduce their debt burden.	True	False

7) Hidden momentum of population growth

a) Fill in the following tables. Fr stands for the total fertility rate of the associated age cohort during their reproductive years. Assume all future youth cohorts will have a total fertility rate of 2 in their reproductive years. Total population is for males and females; assume 50% of the population is female. The number in each cell of the table in rows a,b, and c should describe the number of females in each cohort in a given generation.

Country A

	Generation 1	Generation 2	Generation 3	Generation 4
a. Pre-reproductive cohort, Fr=2	3000	3000	3000	3000
b. Reproductive cohort, Fr=3	2000	3000	3000	2000
c. Post reproductive cohort, Fr=4	1000	2000	3000	3000
Female Population	6000	8000	9000	9000
Total population	12000	16000	18000	18000

1 36  
36  
72

Country B

	Generation 1	Generation 2	Generation 3	Generation 4
a. Pre-reproductive cohort, Fr=2	3600	3600	3600	3600
b. Reproductive cohort, Fr=4	1800	3600	3600	3600
c. Post reproductive cohort, Fr=6	600	1800	3600	3600
Female Population	6000	9000	10800	10800
Total population	12000	18000	21600	21600

1 3600 18  
3600 90  
3  
10800  
2  
21600

b. Describe how your findings on total population for the two countries by the fourth generation illustrate the concept of **the hidden momentum of population growth**.

Even though both countries reached TFR = 2 for the pre-reproductive cohort, the size of the pre-reproductive cohort is higher in country B than in country A even if total population is the same in A and B. There are more pre-reproductive females who will replace themselves in B than in A.

8) Poverty measures.

Person number	Income per day	
1	\$0.09	1.81
2	\$0.54	1.36
3	\$0.78	1.12
4	\$1.26	0.64
5	\$1.35	0.55
6	<del>\$1.86</del>	0.04
7	\$3.39	1.90
8	\$5.97	
9	\$7.08	
10	\$7.68	

TOTAL INCOME \$30.00

a) What is the headcount (H), the headcount index (HI), the total poverty gap (TPG), the average poverty gap (APG), the average income shortfall (AIS), and the normalized average income shortfall (NAIS) if the poverty line is defined as \$1.90 per person per day?

H= 6

HI= 60%

TPG= \$5.52

APG=  $\frac{5.52}{10} = \$0.552$

AIS=  $\frac{5.52}{6} = \$0.92$

NAIS=  $\frac{\$0.92}{\$1.90} = 48.4\%$

b) If we take \$1.00 from person 7 and give it to person 6, is there any change to the headcount index? Is there any change in the total poverty gap?

Yes, It will decrease HI by 10% to 50%

It will decrease TPG by 0.04 to \$15.48

c) What share of total income is held by the highest quintile and what share is held by the lowest quintile (before the redistribution of part b - go to the table above to calculate)?

Highest=  $\frac{\$7.08 + \$7.68}{\$30} = \frac{14.76}{30} = 49.2\%$

Lowest=  $\frac{\$0.09 + \$0.54}{\$30} = \frac{\$0.63}{\$30} = 2.1\%$



## 9) Poverty Measures

a) What is the formula for the Foster Greer Thorbecke Poverty Measures?

$$P_d = \frac{1}{N} \sum_{i=1}^H \left( \frac{Y_p - Y_i}{Y_p} \right)^\alpha$$

with  $p$  a measure of poverty

$$d = 0, 1, 2$$

$N$  is the population  
 $H$  is the headcount in poverty according to poverty line  $Y_p$   
 $Y_i$  is household  $i = 1, \dots, N$  income

b. Explain what aspect of poverty is measured when the parameter for alpha is 0, when it is 1, and when it is 2.

$d=0$  is the headcount index which measures the extent of poverty

$d=1$  is the normalized average poverty gap and measures the depth of poverty

$d=2$  is the severity of poverty index which is sensitive to how income is distributed among the people below the poverty line.

c. What is the difference between 'structural poverty' and 'transitory poverty'?

- structural poverty is when your assets are not sufficient to generate income above a given poverty line
- transitory poverty is poverty that will place an individual above a given poverty line for some periods and below this poverty line in other periods.

10) Migration Models (3 points)

a) Describe the Harris-Todaro model of migration.

A migrant will compare expected wage if they migrate to expected wage if they stay where they are. They will migrate if  $E[W_{migrate}] > E[W_{stay}]$

b) Explain how this model relies on the concept of expected wages.

If  $p_{re}$  is the probability a migrant will get wage  $e$  if they migrate and  $p_{ru}$  is the probability they will migrate and be unemployed with wage zero.

$$E[W_{migrate}] = W_e \cdot p_{re} + 0 \cdot p_{ru}$$

c) Identify two policy implications of the model for a government which desires to reduce urban unemployment rates.

— Reducing urban unemployment can occur if we invest in rural areas to increase  $E[W_{stay}]$

— Urban employment expansion that reduces  $p_{ru}$  and increases  $p_{re}$  could induce additional migration that increases urban unemployment

Extra Credit (get them all, get 1 bonus point).

Fun with Acronyms: Write out what the acronym stands for

NARS	National Agricultural Research System
MPS	Marginal Propensity to Save
CIMMYT	International Maize and Wheat Improvement Center Centro Internacional de Mejoramiento de Maíz y Trigo
HIPC	Heavily Indebted Poor Countries
ICOR	Incremental Capital Output Ratio

