

From a disaster to a miracle

- North Korean Economy at a glance
 - A dual economy where most people maintain subsistent living, but a minority live much better than others
 - A tightly controlled, closed economy
- How to explain it?
 - It can be explained with a master-slave model
 - Model specification, solution & its characteristics
- Suggestions
 - Privatization
 - Physical capital accumulation (industrialization)
 - Human capital accumulation
 - Opening up & Learning by doing
- Would NK take the suggestions?
- Objective: To understand NK based on Lucas & Stokey

North Korea at a glance

- Basic facts
 - Land = some 11,000 km²
 - Population: 25 millions now vs. 10 millions in 1953
 - Income: about \$1,500 now vs. \$800 then* (*BOK and others)
 - Industry: primitive agriculture & fishery + some mining + rudimentary manufacturing + military
 - No finance, markets are not developed, outdated SOC
 - Trade = almost none
- Description
 - A tightly closed underdeveloped economy most of whose citizens remain very poor
 - But some citizens are very much well off
 - It appears to be an economy with many slave-workers tightly controlled by masters
 - Of course, there are many layers of control – a two classes model is a simplification

A master-slave model

- A straightforward application of Prof. Lucas' "Lectures on Economic Growth"
- Masters
 - Own x , land per master, and s , slaves per master
 - Produce output y , using x and s and use it for own consumption $c(l)$, child rearing $n(l)k(l)$, and feeds for slaves $sy(w)$. Thus the budget constraint is:

$$c_l + n_l k_l = y - sy(w) = y_l$$

where

$$y = Ax^\alpha s^{1-\alpha}$$

- A master solves the following problem:

$$v(x, s) = \text{Max}W\left[c_l, n_l, v(w/n, \frac{\eta}{1-\beta+\eta} \frac{sy_w}{k_w} \frac{1}{n_l})\right]$$

where,

$$c_l = y - sy_w - k_l n_l$$

* choice variables: $c(l)$, $n(l)$, $y(w)$

- Slaves

- Do not own anything other than himself and children
- Income is set by the masters at $y(w)$, which a slave uses for own consumption $c(w)$ and child rearing, $k(w)n(w)$
- A solution is given by:

$$c_w = \frac{1 - \beta}{\eta} k_w$$

$$n_w = \frac{\eta}{1 - \beta + \eta} \frac{y_w}{k_w}$$

- Master's solution

$$c_l = \frac{1}{\eta - \beta} k_l \quad n_l = 1 \quad y_w = \frac{1 - \beta + \eta}{\eta} k_w \quad \Rightarrow \quad n_w = 1$$

$$y_l = \frac{1 - \beta + \eta}{\eta - \beta} k_l \quad s = \frac{\eta}{\eta - \beta} \frac{(1 - \alpha)\beta}{1 - (1 - \alpha)\beta} \frac{k_l}{k_w} \quad sy_w = (1 - \alpha)\beta y$$

$$y = \frac{1 - \beta + \eta}{\eta} \frac{1}{1 - (1 - \alpha)\beta} k_l$$

Discussions

- Contrasting economic lots

	income	consumption	
Masters	$y_l = \frac{1-\beta+\eta}{\eta-\beta} k_l$	$c_l = \frac{1}{\eta-\beta} k_l$	
slaves	$y_w = \frac{1-\beta+\eta}{\eta} k_w$	$c_w = \frac{1-\beta}{\eta} k_w$	

- ‘Brave’ assumptions
 - Beta = 0.25, eta = 0.3, alpha = 0.4, k(w) = \$150, k(l) = \$500
- Outcomes
 - c(w) = \$375.00, y(w) = \$525.00, y(l) = \$10,500, c(l) = 10,000, s = 2.35, N(w) = 17.54 millions, N(l) = 7.46 millions, average income = \$3,501.4
 - About 7.5 million masters run an economy with a 17.5 million slaves
 - The slaves barely subsist
 - The masters live rather affluently
 - Of course, outcomes crucially depend on assumptions. For example, if beta falls to 0.2, then a master’s consumption declines to \$5,000. This would decrease the number of slaves, too.

What would happen, if the slavery is abolished?

- An egalitarian solution

$$y_e = \frac{1-\beta+\eta}{\eta-\alpha\beta} k \quad c_e = \frac{1-\beta+\alpha\beta}{\eta-\alpha\beta} k$$

- Note that,
 - $y(e)$ is larger than $y(w)$.
 - $c(e)$ is larger than $c(w)$.
 - But, $y(e)$ is most likely smaller than $y(l)$.
 - So is $c(e)$.
- With the same assumptions (but $k = \$325$), we have
 - $Y(e) = \$1,706.25$, $c(e) = \$1,381.25$

	income	consumption	child rearing
Slaves	525	375	150
Masters	10,500	10,000	500
Privatization	1,706.25	1,381.25	325

- Privatization would raise the slave's income from \$525 to \$1,706.25

Suggestions to make a miracle

- Suggestion 1: Privatize
 - This would raise the former slave's income by 3.25 times (from 525 to 1,706.25)
 - But a former master's income falls drastically (from 10,500 to 1,706.25)
 - And the average income falls, too
 - Would NK accept this proposal?
 - Not likely, because not only the master's income falls, but also the average income falls
 - It would be hard to persuade the masters
 - But with democracy, the reform package would pass, since the slaves are majority
 - Is there some way to implement the privatization policy?
 - There would be no long run growth → Privatization alone is not enough

- Suggestions 2: Accumulate physical capital
 - Would having physical capital make difference?
 - Solutions with physical capital added to the slavery model
 - The slaves' lot remain the same as before
 - The master's consumption remains the same as before
 - The output per a master is larger than before
 - Suppose the land's share falls from 0.6 to 0.3 and the slave's share decreases from 0.4 to 0.3, hence the capital's share is 0.4 → then output per a master becomes \$12,727.27 → A master now owns 1.82 slaves → A slave's income is \$ 525 → slaves' share is now \$955.5 → the master's income is now 11,771.77
 - Slaves are substituted with physical capital: physical capital per a master is \$1,272.73
 - This implies that there are 16.13 million slaves and 8.87 million masters
 - More people are now masters (How did they become masters?)
 - The implied average income is now \$4,515.64
 - It would be much better for the economy to use physical capital, in addition to land and labor
 - But for the slaves, things would remain the same
 - The master's lot marginally improves
 - But many more are now masters => The economy is one third capitalized
 - However, there would be no long run growth as yet

- What would the privatized economy with land, physical capital, and labor look like?

$$y_e = \frac{1 - \beta + \eta}{\eta - \alpha\beta} k \quad c_e = \frac{1 - \beta + \alpha\beta}{\eta - \alpha\beta} k \quad z = \beta v \cdot y$$

- When a mean value of $k(w)$ and $k(l)$ is assumed, i.e., when $k = \$325$, we would have
 - Income = 1,516.7 → This smaller than the land only privatized economy case
 - consumption = 1,191.7 → The same as above
 - Slaves with \$525 → free man with \$1,516.17, almost three folds increase
 - Masters with \$11,771.77 → free ordinary man with \$1,516.17
 - Note that this average income is much smaller than the average implicit in the master-slave economy: \$1,516.17 vs. \$4,515.64
 - We have assumed $k = \$325$, a mid point between $k(w)$ and $k(l)$. Note that when the child rearing cost k rises to \$967.97, then the average income of the privatized economy would rise to \$4,515,64. If child rearing costs increase as physical capital is added to the model, then the average income and consumption of the privatized economy would be larger than their counter parts for the land only free economy.
 - Notice that the masters would rather maintain the slavery system, even when physical capital is added to the model

- Suggestions 3: Human capital accumulation (Lucas, Stokey)
 - Human capital accumulation would be an important vehicle for long run growth
 - But whose human capital should be increased?
 - Slaves' human capital? → would be an important source for growth
 - Masters' human capital? → As long as they do not work, they do not need to accumulate work effort enhancing human capital. They need different sort of human capital for example, knowledge on how to run the slave economy better
 - Masters have incentives to equip the slaves with human capital → Slaves would become more productive, hence increases in output for masters and slaves
 - Not only the level, but also growth effects there will be. When masters equip slaves with ever increasing human capital, there would be persistent growth in output per master
 - More can be used for a master's consumption, child rearing, own human capital growth, and slaves' human capital growth. A slave's consumption may grow, too.
 - These conjectures are based on a model of slavery with slave's human capital accumulation determined by the masters (Being studied now.)
 - However, when slaves become better educated and trained, and when they become healthier, would they still remain as slaves?
 - They would most likely try to fight against the slavery
 - This would be too threatening to the masters
 - Masters would be very hesitant to educate the slaves: Indeed it is much better for the masters not to train the slaves
 - Can the masters keep the slaves from learning?
 - We need a model of 'an endogenous transition of the slave economy to a free economy.'
(A task yet un-tackled)

- Suggestion 4: Open up the system
 - Learning by doing would be intensified
 - There should be enough things to learn by doing ← Opening up is important
 - Persistent growth becomes possible
 - NK could follow the S. Korean, Chinese, or Vietnamese development paths, and thereby can make another miracle
 - But, can this be done without liberalization?
 - Not likely
 - When liberalization and opening up go hand in hand, things will most likely go right

- Thus our suggestion is: “Privatize and open up! And South Korea will assist NK’s efforts to make a miracle”
 - But the masters’ will not voluntarily forego the slavery system
 - The slavery system would work well only under a tightly controlled closed economy
 - Masters would like to have docile uneducated slaves
 - Risk taking innovative slaves are sources for troubles
 - How long would the slavery system be maintained?
 - Status quo vs. transition
 - Smooth transition vs. abrupt transition
 - Transition initiated by N. Koreans vs. ignited by outside pressures
 - Any precedents?
 - China (No internal warfare), Vietnam (Unification through a bloody war), Germany

No hope, then?

- NK will not experience long run growth unless it is privatized and enters into free international trade
- A liberalized open NK could become another miracle case, especially when S. Korea assists NK with money, knowhow, technology
- But our exercise shows that it would be very difficult to persuade the NK ‘masters’ to liberalize and open up
 - They will lose too much
 - A peaceful transition seems impossible
 - But how has China pulled it off? Can we learn from Chinese experiences?
- Can S. Korea and her allies buy out NK’s masters?