

A Model of Optimal Brain Drain

Presented by

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Research Question

- **What is the effect of Human Capital Flight, or Brain Drain on the source country?
(Is Brain Drain always bad? If not, how?)**

the current State of the Debate

- **The first wave:** arguing that Brain Drain is unfair and always harmful to the source country (zero-sum game). (Bhagwati 1976 among many others)
- **The second wave:** rising with new insight from “New Growth Theory”, arguing that Brain Drain, or possibility to emigrate may motivate human capital accumulation, and thus may increase domestic human capital stock. (Mountford 1998, Vidal 1998, Stark et al. 1997, Beine et al. 2001, Stark 2004)

the fact

- As the data from the first wave literature shown, brain drain or human capital flight from the developing countries to the developed countries is considerable, but by time test, we see no evidence that developing countries collapse by this process.
- It is ambiguous that Brain Drain is necessarily harmful to the source country (ex: Taiwan’s case)

A Model of Optimal Brain Drain

A. Assumptions

1. Workers' talent distribution (heterogeneity assumption)

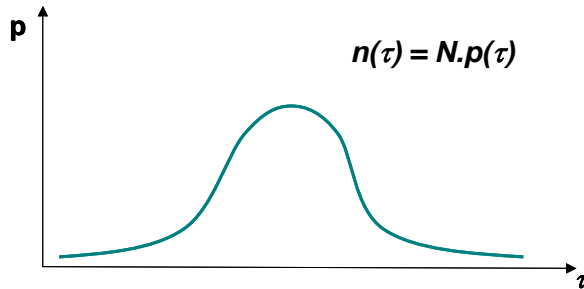


Figure 1. Probability distribution function of a worker's talent

Assumptions (cont.)

2. Human capital formation: $h = h(c, \tau)$.

Given τ , h increases in c , but the increasing rate is diminishing.

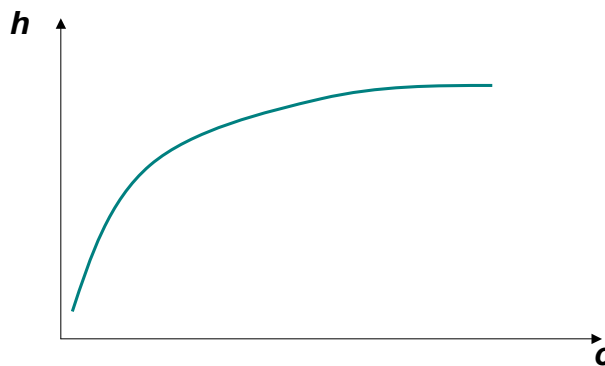


Figure 2. Human capital accumulation as a function of education expenditure (given τ)

Assumptions (cont.)

3. Life-Income: $U = h - c$, and worker's life-income maximization behavior:

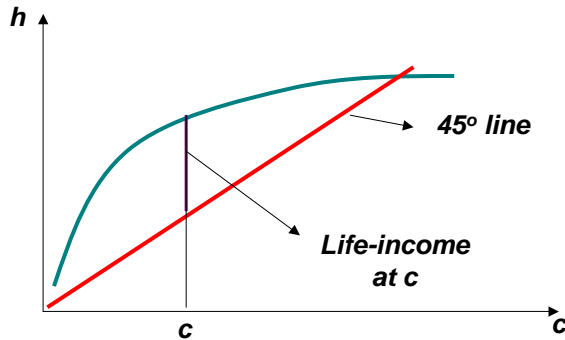


Figure 3. Life-income depends on education expenditure c

Assumptions (cont.)

4. Emigration (working abroad):

- with the same human capital stock, a worker can earn more if he successfully going abroad:

$$\text{Income (emigrate)} = w \cdot h \quad (w > 1)$$

5. Uncertainty of success

Probability of successful emigration $\pi < 1$

6. Expected Life-income with possibility of emigration:

$$U_2 = (1-\pi)h + \pi \cdot wh - c = (w-1)h + h - c > (h-c) = U_1$$

Solution

A. Choice of human capital investment without possibility of emigration:

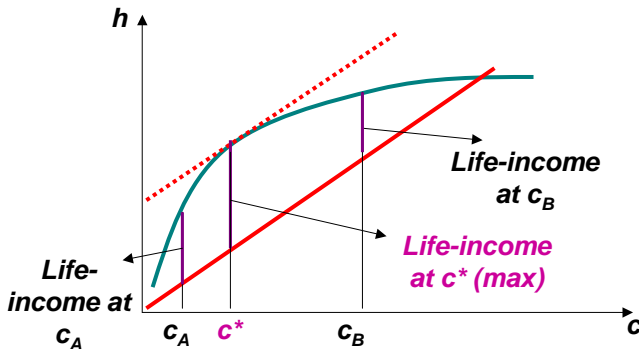


Figure 4. Life-income Maximization and the choice of education expenditure

Solution (cont.)

- The above solution is actually the solution of FOC.
- As the solution is for an individual worker at a given talent $t \Rightarrow$ we c^* can be expressed as a function of t , for all workers:

$$c^* = c(t)$$

- since $h^* = h(c^*, t) \Rightarrow$ we can also express h in terms of t , or:

$$h^* = h(t)$$

Solution (cont.)

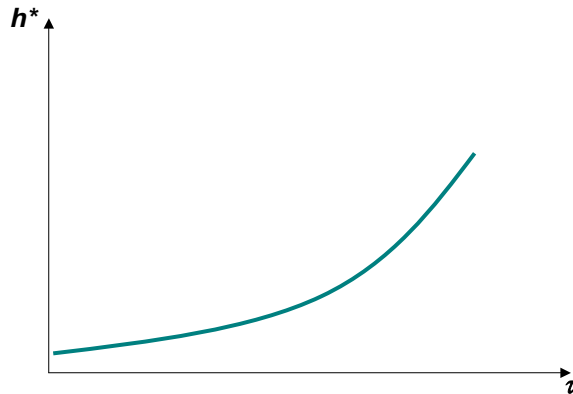


Figure 5. Optimal human capital accumulation as a function of talent

Solution (cont.)

- However, the number of workers at talent τ is $n(\tau)$. Therefore, from the economy's point of view, the human capital stock at given degree of worker's talent is $n(\tau) \cdot h^*(\tau)$.
- Thus, we can draw the *society's* human capital stock as a function of worker's talent. (Figure 6)
- We can calculate the *total society's human capital stock* by calculate the *area* under the curve.

Solution (cont.)

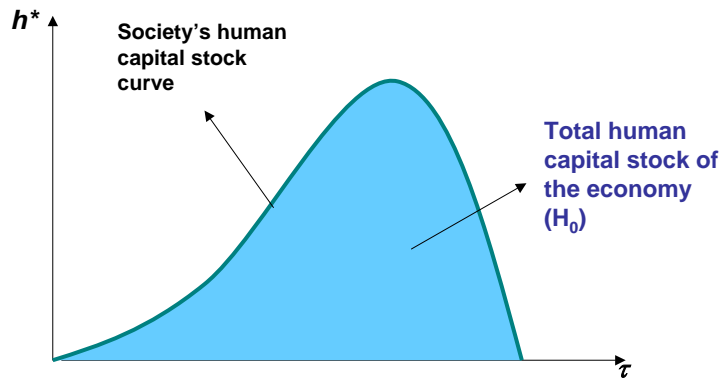


Figure 6. Total human capital stock of the economy

Solution (cont.)

- **B. Choice of human capital investment with possibility of emigration:**

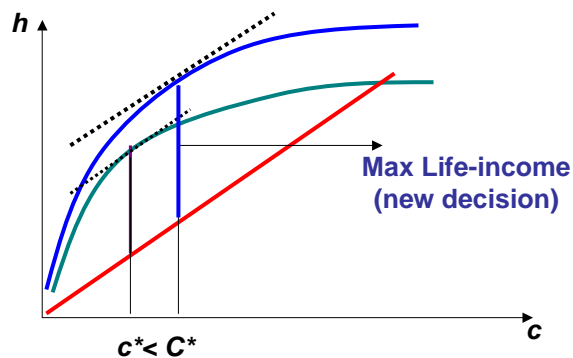


Figure 7. Life-income Maximization with possibility of emigration

Solution (cont.)

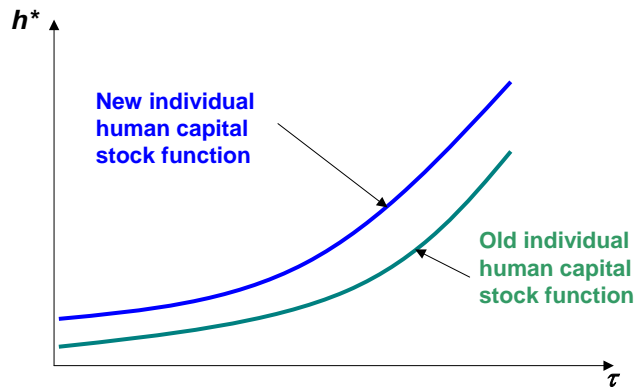


Figure 8. Optimal human capital accumulation as a function of talent (with chance of emigration)

Solution (cont.)

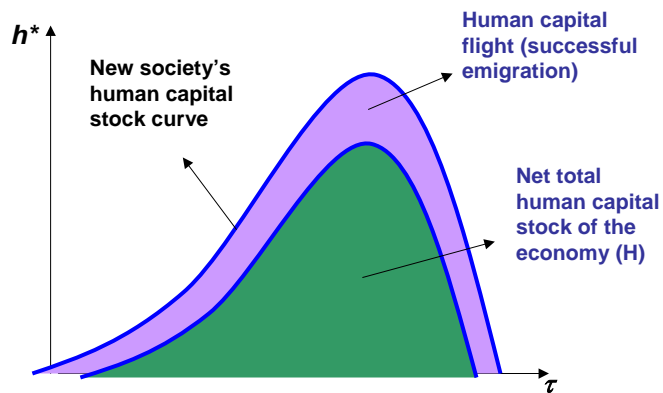


Figure 9. Total human capital stock of the economy with chance of emigration

Solution (cont.)

- Now, our task is to compare H_0 and H as π changes.
- If $H_0 > H$ for all π : “**brain drain trap**”
- If $H_0 < H$ for some $\pi < \pi^{**}$: human capital flight (brain drain) helps to increase human capital stock of the economy, or “**brain gain from brain drain**.”
- If there exists π^* so that maximize $(H-H_0)$: “**optimal brain drain**”

Solution (cont.)

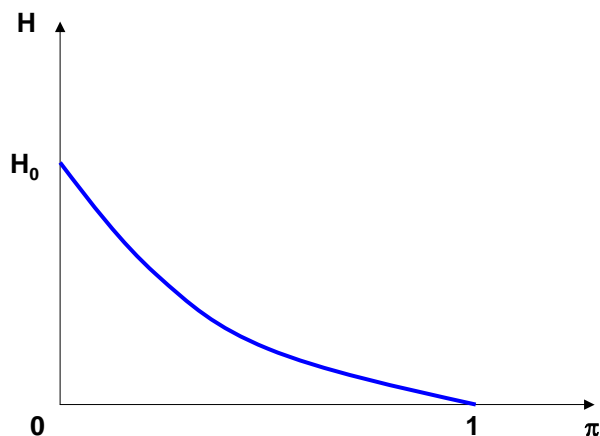


Figure 10. the economy in a “brain drain trap”

Solution (cont.)

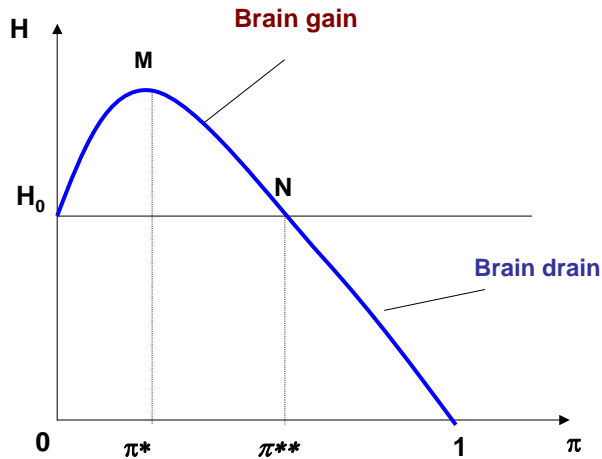


Figure 11. the existence of optimal brain drain

Policy Implications

- new way of thinking of brain drain or human capital flight to policy makers.
- if the country is in a brain drain trap, quality education and other trainings should be improved (human capital formation technology)
- Managing probability of going abroad can be considered as a policy tool affecting human capital formation, an alternative for education subsidy.

Conclusion

- An original contribution to a new line of “brain drain economics”.
- To enrich the methodology by solving the problem with assumption on workers’ heterogeneous talents.
- To show the case of “*brain drain trap.*”
- If there is positive effect, there exists a unique value of emigration probability to maximize the gain from brain drain - or the “*optimal brain drain*” value.
- Relevant policies on education and emigration for the source country are then suggested.

**Thank you
and
your comments are
welcome**