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Heterogeneous Firms, Trade and Inequality

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Abstract

There is a long tradition of trade theories to concern the effect of trade on the distribution of income within a country; however the traditional H-O model fails to explain the increasing inequality in both developing and developed countries. This model combines the concept of fixed trading costs a la Melitz (2003) with financial market imperfections and agents' heterogeneity in initial wealth to link the inequality with trade. The model shows that trade increases inequality in both developed and developing countries and has larger impact on inequality in developing countries where the imperfections are severer and therefore fills the gap between theories and empirical evidences.

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1 Introduction

There is a long tradition of trade theories to concern the effect of trade on the distribution of income within a country. The original paper written by Heckscher (1919) intended to introduce the proportional theory to analyze the effect of trade on the distribution of income. Ohlin (1933) 's incorporation of Heckscher (1919) 's concept with Walrasian general equilibrium model and Samuelson (1948)'s simple 2x2x2 framework showed how trade generates the tendency of factor price equalization. Under this establishment, if capital is distributed unequally among agents, trade increases inequality in rich or capital abundant countries but dampen's the inequality in poor or capital scarce countries through increasing wage to rental ratio in the poor and reducing it in the rich countries.

However, real world seems to contradict with the theories. Casual look at data and rigorous empirical studies imply positive relationship between trade and inequality not only in developed countries but also in developing countries. Surprisingly, it is more positively correlated in developing countries. Figure 1 shows the inequality within countries over time constructed by Bourguignon and Morrisson (1999). They decompose the inequality among world population¹ into inequality within countries and inequality between countries. The inequality within countries which coincides with the trend of world trading volume ² shown by Figure 2 increases over time except for the war period. By using a penal data across roughly 100 countries from 1960 to 1990, Barro (2000) rigorously shows that inequality increases with openness³. By adding an interactive terms, he also shows that the impact on inequality is larger for low income countries.

Theories explaining the failure of traditional trade model by arguing that trade causes increase of skilled-labor wage relative to unskilled labor wage. It can be caused by the trade-induced skill-biased technology progress (Thoenig and Verdier, 2003; Acemoglu, 2003), by the inflow of capital to developing countries when capital and labor are complementary (Cragg and Epelbaum, 1996) or by the moving of industry to developing countries which is relatively more labor intensive for developed countries while it is capital intensive for developing countries (Feenstra and Hanson, 1997). The purpose of this paper is to investigate this problem by escaping from the traditional H-O model. It adapts the framework of Melitz (2003) which build on the recent empirical findings that there exists fixed exporting costs (Roberts and Tybout, 1997) affecting export decisions of producers. It also incorporates the imperfections of borrowing contract a la Galor and Zeira (1993) which generates the wedge between borrowing and lending rate. The model then shows a sorting effect that wealthier agents are easier to overcome the fixed costs to export and non-exporters are poor agents. The ability to export implies that gains from trade are concentrated on wealthier agents and increase of income inequality. If developed countries are also better in financial markets, the effect on inequality is weaker as the empirical findings shown by Barro (2000). The paper therefore

¹The inequality is measured by Theil index.

²It is measured by world export over world GDP.

³The inequality is measured by Gini coefficient and the level of openness is measured by the ratio of export plus import over GDP.

differs from the recent study on how trade affects the wage gap between skilled and unskilled labors incorporating Melitz (2003) framework that only considers the effect of real side on export decisions (Yeaple, 2005).

The model then not only explain the evolution of distribution of income but also generates some interesting empirical implications that are needed to be tested. The model implies that wealthier agents are more likely to be exporters which is different from the scope of the recent empirical studies focusing on the real side and showing that high-productivity agents are more likely to export. The causality can also go to the other direction that exporting decisions affect the financial constraints of a firm. The lack of consideration on the financial side might cause overestimation of the effect of productivity as the determinant of export decisions.

In the next section, we establish a basic model with agents heterogeneous in wealth and financial market imperfections. The model will show how the imperfections and fixed entry costs prevent poor agents from being entrepreneurs and cause inequality in the long-run. In Section 3, the model is extent to consider trade between countries symmetric in all exogenous variables and countries asymmetric in the degree of imperfections, variable trading costs, and saving rate. The asymmetric cases replicate the result observed by Barro (2000) that trade increases inequality more in the developing countries. It also reflects the fact that developed countries are net exporters of manufacturing goods.

2 Basic Model

2.1 Setup

There is a continuous number of agents with mass \bar{L} . It is a discrete time, non-overlapping model so an agent is substituted by a new one after one period. At time t , the distribution of wealth that agents endowed with is $G_t(K)$. Each agent has the following utility function:

$$U = \alpha \ln u_t + (1 - \alpha) \ln b_t \quad (1)$$

where b_t is the bequest at time t and u_t is a subutility comprises manufacturing goods (M) and a homogeneous agricultural good (A) treated as a numeraire:

$$u_t = \mu \ln M + A \quad (2)$$

where M comprises differentiated goods in the conventional way,

$$M = \left(\int_{j \in \Theta} m_j^{1 - \frac{1}{\sigma}} dj \right)^{\frac{1}{1 - \frac{1}{\sigma}}}$$

and $0 < \mu < \alpha < 1 < \sigma$.

One unit of labor is required to produce one unit of A ; however to produce m_j , agents have to invest h amount of capital. After the fixed investment, they produce one unit of m_j by using one unit of labor. Capital fully depreciates at the end of each period.

The market structure of the A sector is perfect competitive while that of the M sector is monopolistic competition. Financial sector is open and small compared with the rest of the world; therefore the natural return of capital, r , is fixed. It is assumed that borrowing and lending happen at the beginning of each period and borrowers return the interest with principal at the end of each period. The imperfections of the market is modeled as the possibility that borrowers might renege the contract; therefore lenders have to invest z amount of capital to monitor borrowers and prevent from default. With z investment, it costs borrowers βz amount of capital from avoiding monitoring, so β is the reverse measure of imperfections. The existence of the monitoring costs then generates the wedge between lending rate and the natural rate of return r .

Let i be the lending rate and d be the optimal amount of lending. d and i must satisfy the incentive and rationality constraints of borrowers and lenders:

$$di = dr + z \tag{3}$$

$$d(1 + i) = \beta z \tag{4}$$

Equation (3) describes that the return from lending should be equal to the natural rate of return after subtracting the monitoring costs; otherwise no one will lend capital or it will cause huge inflow of capital to the country until the net return is driven down to the natural level. Equation (4) describes the benefit from default should be equal to the costs to escape from monitoring; otherwise all borrowers default or the investment of z is too much. By combining these two equations we obtain:

$$i = \frac{1 + \beta r}{\beta - 1} > r \tag{5}$$

where $\beta > 1$ by assumption⁴. The result that $i > r$ confirms the conjecture that z will cause the wedge between borrowing and lending.

2.2 Equilibrium at Time t

We now consider the market equilibrium at a specific time interval, so the subscript of time is dropped. It is obvious from equation (1) that agents will spend α of income on consumption and leave $1 - \alpha$ of income as bequest. The α of income is used to maximize the subutility u . The quasi-linear setup of the subutility function guarantees that for each agent, μ amount of income will be spent on the M sector and rest of the income will be spent on the A sector. Some agents will work for A sector because of the assumption of $\mu < \alpha$. The demand of A therefore can be easily derived as $E - \mu\bar{L}$ ⁵.

⁴When $\beta < 1$, there is no financial markets because of the severe imperfections.

⁵ E is composed by wage bill \bar{L} and profit of firms which is either equal to the natural rate of return or endogenously above it as will be seen. Everyone will spend μ on M sector. Rest of income is spent on A which is either for consumption or bequest.

The demand function of good j in M sector can be derived by cost minimization and applying Shepard's lemma:

$$m_j = \mu p_j^{-\sigma} P_M^{\sigma-1} \quad (6)$$

where $P_M = \left(\int_{j \in \Theta} p_j^{1-\sigma} dj \right)^{\frac{1}{1-\sigma}}$. σ is therefore the elasticity of demand. Producer then chooses $p_j = \frac{\sigma}{\sigma-1}$ for profit maximization and the gross profit can be easily calculated as

$$\pi(N) = \frac{\mu}{\sigma N} \quad (7)$$

, where N is the number of goods in sector M at equilibrium.

The last condition of equilibrium is the free entry condition of sector M . Agents who internally finance the production will face fixed entry costs $h(1+r)$; therefore they will enter the market if and only if:

$$\pi(N) \geq h(1+r) \quad (8)$$

However, if the producers are partially self-financed ($K_j < h$), their entry costs are $h(1+i) - K_j(i-r)$. They will enter the market if and only if:

$$\pi(N) \geq h(1+i) - K_j(i-r) \quad (9)$$

From inequality (9) we obtain the lower bound of agents' capital endowment to enter the market:

$$K_j \geq \frac{h(1+i) - \pi(N)}{i-r} = \underline{K} \quad (10)$$

The lower bound will be higher when the market is more competitive (larger N) or when the imperfections is severer (larger gap between lending rate and natural rate of return).

The interesting case is that when marginal producers are partially self-financed. By substituting equation (7) into inequality (9) and when the inequality is binded we obtain:

$$\frac{\mu}{\sigma} \left(\bar{L} \int_{\underline{K}}^{\infty} g(K) dk \right)^{-1} = \underline{K}(r-i) + h(1+i) \quad (11)$$

As shown by Figure 3, the left hand side of equation (11) is increasing with \underline{K} and the right hand side of it is decreasing with \underline{K} . The intersection of the two curves determine the lower bound of wealth endowment of producers, \underline{K}^* . The corresponding equilibrium number of producers can be calculated as $\bar{L} \int_{\underline{K}^*}^{\infty} g(K) dk$ ⁶.

2.3 Dynamic

In this section we start analyzing the dynamic of capital accumulation. From equation (1), it is obvious that each agent will leave $1 - \alpha$ of income as bequest. We also assume the bequest can be transfer to capital immediately at the end of the period. So the evolution of capital through time can be summarize by the following equations:

$$K_{j,t+1} = (1 - \alpha)[1 + K_{j,t}(1+r)] \quad (12)$$

⁶The graph corresponds to the assumption that $g(K)$ is continuous.

for agents who are not engaged in M sector production or they are marginal producers in M sector,

$$K_{j,t+1} = (1 - \alpha)[1 + \pi(N) + (K_{j,t} - h)(1 + r)] \quad (13)$$

for agents who are fully self-financed in the production of goods in M sector and

$$K_{j,t+1} = (1 - \alpha)[1 + \pi(N) + (K_{j,t} - h)(1 + i)] \quad (14)$$

for agents who are partially self-financed in the production of goods in M sector.

The dynamic of capital of agents is shown by Figure 4. The figure is shown by the assumption that saving rate $1 - \alpha$ is not too high so the capital stock goes to infinity and the degree of imperfections is high enough to generate the inequality in the long-run⁷. This figure is referred to as low-competition because the marginal producers are partially self-financed, and because marginal producers face higher entry costs, the number of agents cannot be large enough to drive the profit to the normal return. It happens when the initial distribution of wealth is the one that the number of wealthy agents are not large enough so that even though all of the self-financed agents enter the M sector they cannot drive the return to the natural level. It also more likely happens when the distribution is more unequal. For poor agents with initial wealth smaller than \underline{K}_t^* , they will work in the A sector. Their path of capital accumulation is described by equation (12) and is shown by line \overline{AB} in Figure 4. For agents who are partially self-financed, their path of capital accumulation is described by equation (14) and is shown by line \overline{BC} in the figure. Because the marginal producers is facing higher entry costs and they earn normal return, the profit from producing differentiated goods must be so high that the self-financed producers earn more than normal return. Their path of capital accumulation is described by equation (13), and is shown by line \overline{CD} in the figure which is parallel to the line \overline{AB} but with higher intercept to reflect that they earn more than normal return of their capital investment in producing differentiated goods.

Because the marginal producers (their capital endowment at time t corresponds to point B) will decumulate capital in the next period, which forces them to face higher entry costs. Some of them or all of them have to leave the market and drive the profit of producers up. The increase of profit is reflected as the moving up of line \overline{BCD} . The process will continue with evolution of time until the marginal producers will not decumulate capital anymore. It corresponds to the dotted line in the figure. This is the long-run equilibrium in this economy. The wealthier agents' capital will converge to a higher level K_2^* while the poor agents' capital will converge to the lower level K_1^* .

3 International Trade

In this section, we consider two symmetric countries. The model with asymmetric degree of imperfections will be considered in the next section. The model will follow the idea of Melitz

⁷To generate the results shown in the figures, we have to assume that $\frac{r}{1+r} < \alpha < \frac{i}{1+i}$. It is true when the saving rate is low and when the degree of imperfections is high (low β).

(2003) that there exists fixed trading costs h_f and ice-berg transportation costs $\tau > 1$. It is also assumed that $h_f > h\tau^{1-\sigma}$ so the fixed trading costs are significant. I also assume that before opening up to trade, both countries have reach their long-run equilibria and there is no intersection of the varieties they produce in the M sector.

An agent will engage in trade only when the gross profit generated is high enough to cover the fixed entry costs. It is very easy to calculate the free entry condition of export:

$$\frac{\mu\tau^{1-\sigma}}{\sigma} [N_h + \tau^{1-\sigma}N_f]^{-1} \geq h_f(1+r) \quad (15)$$

if $K_2^* > h_f + h$, where N_h and N_f are the number of domestic producers and foreign producers respectively; otherwise, the free entry condition should be:

$$\frac{\mu\tau^{1-\sigma}}{\sigma} [N_H + \tau^{1-\sigma}N_F]^{-1} \geq (K_2^* - h)(1+r) + (h_f - K_2^* + h)(1+i) \quad (16)$$

The fixed entry cost of foreign exporters at a given difference between real return of capital and lending rate is shown in Figure 5. The x axis is $(r - i)$ and the Y axis is the entry costs. When the financial market is perfectly functioning, the fixed exporting costs are $h_f(1+r)$. When the imperfection increases, there are two effects operating. The equilibrium capital level of wealthy agents is higher, this reduces the need of costly external financing and reduces the fixed costs of exporting. The lending rate is higher and this increases the costs of external financing and increases fixed exporting costs. The latter effect dominant when the lending rate slightly larger than r and the fixed exporting cost is increasing with the level of imperfection. When the imperfection is high enough the need for outside funding is lower and the fixed exporting costs are decreasing. At a certain degree of imperfection, the fixed exporting costs can be fully self-financed by the wealthy agents, so it reaches the lowest level.

The entry costs of the marginal producers as a function of $r - i$ is also depicted on the same graph. It can be observed that when the imperfection is high enough, it is possible to earn profit from trade for wealthy agents. We focus on this interesting case (The left of point A). We therefore assume that

$$(h - K_1^*)(1+i) + K_1^*(1+r) \geq \tau^{\sigma-1} [(K_2^* - h)(1+r) + (h_f - K_2^* + h)(1+i)] \quad (17)$$

Then the mechanism to obtain equilibrium is very clear, and the result is summarized in Figure 6. Because the marginal producers just break even, it is impossible for them to increase profit by entering into foreign markets because of the fixed costs; therefore only wealthy agents enter. The entry of foreign producers will ultimately force poor entrepreneurs exit the market. Figure 6 considers the case when the mass of wealthy agents is not too large at autarkic equilibrium, so under trade the entrance of foreign exporters cannot drive all poor producers out of the market and the price index P_M remain the same at equilibrium. This case happens more likely when the financial market imperfections are severer or when the initial distribution of wealth is concentrated at poor agents. The wealthy agents can enjoy the rent in both market. This will unquestionably

increase the profit of wealthy producers because now they can obtain profit from not only domestic markets but also foreign markets and both of them contribute return higher than its natural level. The result is reflected as the elevation of line \overline{BCD} . The economy will contain non-exporters who are poor agents and exporters who are wealthy agents. All gains from trade are captured by the exporters who are wealthy agents.

3.1 Two Asymmetric Countries

We still have to extend the model to an asymmetric case that countries are different in the degree of imperfections (β). This reflects Barro (2000)'s result that inequality increases with trade volume and it increases more in the developing countries. It also coincides with reality that most North-South trade happens as inter-industry trade instead of the intra-industry trade described in the symmetric case. We first look at an extremely case that one country has perfect financial market. We then move on to analyze the case with two countries with some degree of imperfections.

3.1.1 Extreme Case

Suppose there are two countries, North and South. The North country has perfect financial market. The South country has some degree of imperfection. From the analysis of previous section, we immediately obtain the result that the gross profit of the marginal firm in the North is $h(1+r)$. The producers in M sector earn zero profit and everyone earns the normal return of capital either from international lending or through investing in M sector. In the long-run there will be no income inequality. Because there is no return of capital higher than r in the North, it is impossible for South to export M sector good since the lowest fixed costs are $h_f(1+r) > h(1+r)$, the gross profit of any firm can earn in the North markets. We therefore can conclude if there is possible for trade, South must export the agricultural good and import manufacture goods and vice versa for the North⁸.

For the South we consider the case that the degree of imperfection is high enough so it is profitable for firms in the M sector to enter the South market; we therefore assume the following condition is satisfied

$$(h - K_1)(1 + i) + K_1(1 + r) > \tau^{\sigma-1} h_f(1 + r)$$

Clearly this condition holds when β is low enough. We therefore assume that the imperfection in South is high enough that it is costly for them to produce enough number of varieties in the M sector. This lack of varieties must generate return of capital higher than its natural level and induce entrants of foreign producers. The process of entrants will continue as long as there are still

⁸With this logic, the reader might find the possibility that trade will not occur between two symmetric country with perfect financial market. It is true because the size of M sector market is fixed at μ which fixed the maximal number of varieties with certain fixed costs and fixed costs of increasing one more variety from foreign producers are always higher than producing the variety at home. There is no reason to trade.

extra profit. At equilibrium, the number of North exporters will be high enough to drive the gross profit of South to the level $\tau^{\sigma-1}h_f(1+r)$ and the above inequality is binded⁹. The reduction of gross profit in South implies that all of the marginal producers will be replaced by the exporters from North. The effect of this process on equilibrium distribution of wealth is shown by Figure 7. The reduction of gross profit also implies that the wealthy agent will suffer reduction of wealth. It is represented by the moving down of \overline{CD} . The capital level for partially financed producers to earn zero profit must be higher, so the \overline{BC} must also move down.

All of the poor agents will be workers and their entrepreneurship is replaced by foreign exporters. Wealthy agents remain in the M sector but earn lower profit and suffer decumulation of capital. Income inequality decreases in both nominal and real term. In North, since all exporters earn zero profit, the distribution of income remain equal.

In this extreme case, there will be inter-industry trade between North and South. North has the opportunity to penetrate South market even with higher entry costs and the size of market is constant because the financial market imperfection in South is severe enough such that the return of entrepreneurship is higher than its normal level. With the constant size of market, the entrant of foreign producers will cause exit of some domestic producers. The mechanism is similar to Melitz (2003) but the selection depends on wealth. Trade does not improve welfare in North but indeed has impact of welfare in South. We can think that although the entrepreneurship in South is costly because of bad financial institution, it can still obtain the finance to expand varieties indirectly through entrepreneurship from North which has smaller costs. South will enjoy gains from trade as well as less severe income inequality¹⁰.

3.1.2 General Case

In the extreme case, it seems that trade does not increase inequality at least in one country, witch contradicts the empirical observation of Barro (2000). In the following I will consider a more general case that both countries have some degree of imperfections, and will show that under certain conditions it is possible that trade will enlarge inequality in both countries while the enlargement is higher in developing countries. The intuition that trade increases inequality more in developing countries can be obtained from Figure 5. The fixed trading cost increases when β decreases and it starts decreasing when β decreases to a certain level. When β is low enough, the level of competition is so low that wealthy agents can accumulate enough capital and become partially self-financed exporters in the long-run. The low entry cost lets wealthy agents enjoy higher level of profit from export and widen inequality. On the other hand, when β is high, wealthy agents rely on external finance and face higher entry costs which is equal to the poor

⁹It must happen because the number of M producers in North is high enough to drive gross profit to $h(1+r)$. Only part of them to export is enough to drive gross profit in South to $\tau^{\sigma-1}h_f(1+r) > h(1+r)$.

¹⁰This can be easily shown mathematically. Let P_m and A be the pre-trade level of price index and consumption on agricultural good and their prime are the correspondence of the post-trade level. Then the change of welfare is $\mu(\ln \frac{\mu}{P'_m} - \ln \frac{\mu}{P_m}) + (A' - A) = \mu(\ln \frac{P'_m}{P_m}) + (A' - A) = \frac{\mu}{(1-\sigma)\sigma N_t}(\sigma N_t - (1-\sigma)N_f) > 0$.

Countries	β	i	K_1^*	K_2^*	Gross Profit
Developed	2.5	1.5	1	2.5	5.25
Developing	1.56	3.18	1	5.018	7.77

Table 1: Autarky

Countries	fixed export cost for rich	fixed cost for poor	gross profit from export	K_2^*
Developed	6.5	6.5	6.5	2.5
Developing	4.12	10.86	5.25	5.1

Table 2: Trade

agents, so all producers can be exporters and they obtain zero profit from export. Therefore, the impact on inequality can be higher on developing countries. Another force comes from variable costs, τ (or fixed cost h_f). When exporters in the developed countries face higher τ (or h_f) which is a reasonable assumption due to the fact that developing countries usually have higher degree of protection, the ability for exporters in the developed countries to capture foreign markets (or profit) is lower and the impact on inequality is smaller.

The following numerical example show the possibility mentioned previously. I set $\alpha = 0.6$, $\mu = 0.5$, $\sigma = 2$, $r = 0.5$, $h = 2.5$, $h_f = 2.6$ and $\tau = 1$. The initial mass of agents is 0.99 for poor and 0.01 for rich. Their initial capital endowment is 1.2 and 3 respectively. The results are summarized in Table 1(Autarky) and Table 2(Trade). For the developed countries, because the higher level of competition, the exporters, no matter how their equilibrium wealth level is, finance the exporting cost externally. Therefore all agents are equal when they enter the foreign markets. The fixed cost is lower than the gross profit of firms in the developing countries under autarky; therefore all firms export. It drives the gross profit of firms selling in the developing countries to 6.5. Exporters from developed countries earn zero profit. On the other hand, for wealthy agents in the developing countries, they can partially self-financed exporting cost; therefore the fixed entry costs is lower. Poor agents rely on external finance so they will not enter foreign markets. Although the gross profit in the native markets is driven down by the entrants of foreign producers, the exporting firms can obtain positive profit from export which compensates the loss in the home markets. The inequality therefore is enlarged by trade.

Another example show that when the variable costs are asymmetric, the inequality increases more in the developing countries. Let $\tau = 2$ for developed countries and $\tau = 1.1$ for developing countries. The results are shown in Table 3. In this example, wealthy agents in both countries can internally finance exporting costs and only wealthy agents enter foreign markets. The higher variable costs dampen the ability of exporters in developed countries to capture foreign market and therefore inequality increases at a smaller increment.

Finally, the last numerical example shown in Table 4 gives us another interesting case. I follow

Countries	β	gross profit adjusted by tau	K_2^*	increase of inequality
Developed	1.52	4.125	5.52	0.225
Developing	1.5	7.343	8.943	3.443

Table 3: Trade with Asymmetric τ

Countries	β	gross profit	K_2^*	increase of inequality
Developed	1.55	8.25	6.6	3.01
Developing	1.5	7.84	9.4	3.94

Table 4: Trade with Asymmetric α

Uzawa (1968) that developed countries are more impatient so their saving rate is lower. I set $\alpha = 0.6$ for developing countries and $\alpha = 0.66$ for developed countries. Variable costs are set to one. Other exogenous variables remain the same. Table 4 shows that wealthy agents in developing countries enjoy higher level of wealth increment. Developing countries are also net importers of manufacturing goods.

4 Conclusions

At this moment, I have built a dynamic model with agents heterogeneous in initial wealth and show the possibility that in the long-run the initial inequality can be persistent because of fixed entry costs and imperfect financial markets. The fixed trading costs will further enlarge inequality and it is severer or most likely to happen with high degree of imperfections. When countries are asymmetric with degree of imperfections and variable trading cost or asymmetric in saving rate, inequality will increase more in developing countries if the variable trading cost is higher in developing countries or if the saving rate is higher. The model is also suitable to consider trade and inequality across countries, which I mentioned in the proposal but ignore by following referee's suggestion, if we extend the model to consider endogenous growth. It is also important to empirically investigate the relationship between trading volume and inequality. The complete version of this research is suitable to be published in international journal.

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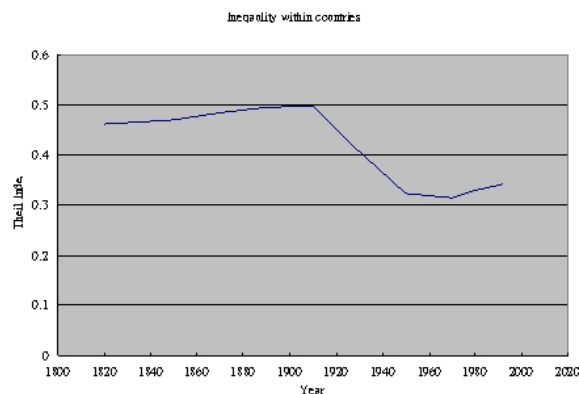


Figure 1: Inequality Within Countries

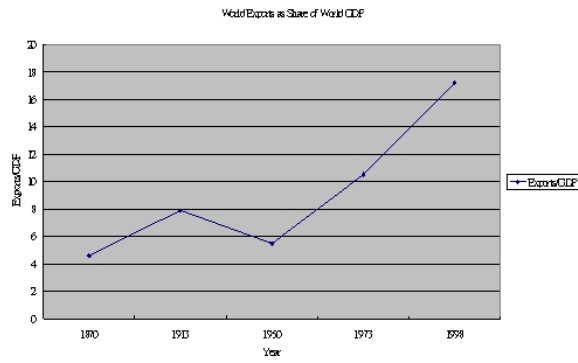


Figure 2: World Trading Volume

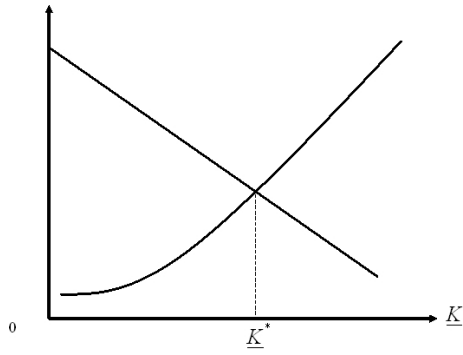


Figure 3: Equilibrium at Time t

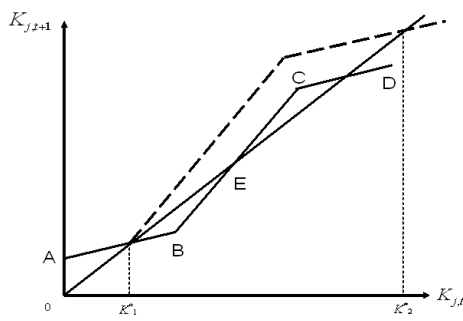


Figure 4: Dynamic: Low-Competition

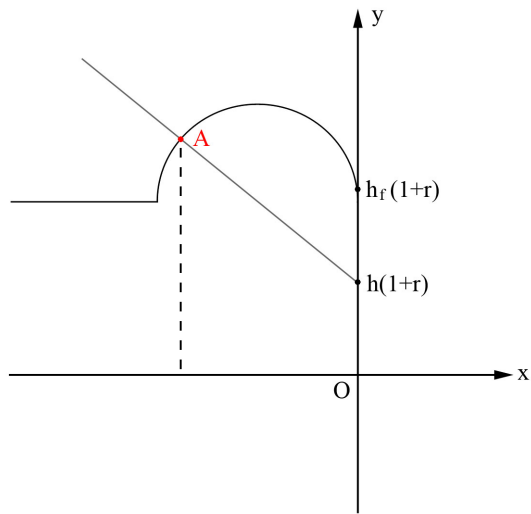


Figure 5: Profitability of trade

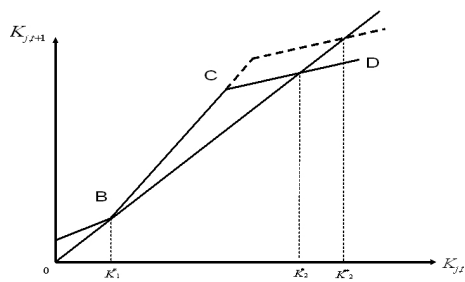


Figure 6: Open Economy under Low Competition

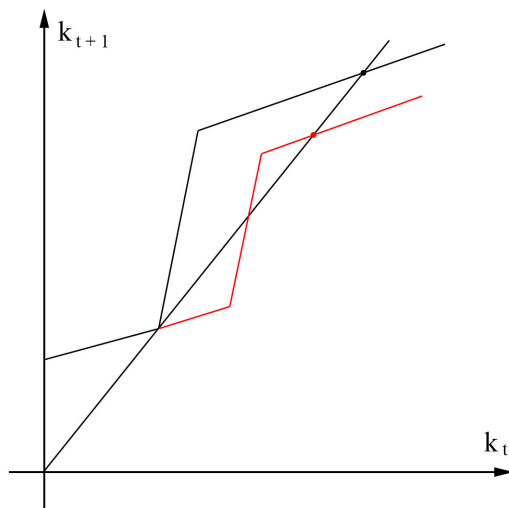


Figure 7: Asymmetric Open Economy: Extreme Case

赴國外研究心得報告

計畫編號	NSC 95-2415-H-002-040
計畫名稱	異質生產者與財務市場不健全下之貿易、成長與所得分配不平均之研究
出國人員姓名 服務機關及職稱	徐則謙 台灣大學 經濟系 助理教授
出國時間地點	美國紐約 2007 7/11-7/27
國外研究機構	哥倫比亞大學

工作記要：

指導教授 Ronald Findlay 於 2007 年七月初訪台。在哥大求學時的學長(Toshi)也同時訪台，互相交換研究心得並同時討論合作的可能性。與 Toshi 討論後決定合作撰寫有關貿易如何影響國家領土大小的文章，試圖以經濟模型解釋歷史上貿易與國家領土變遷間的關係。Findlay 教授在這方面給予許多寶貴的建議。

七月中赴美後與 Findlay 教授繼續討論該論文的相關問題，並相約合作撰寫有關明末台灣、南中國沿海與東南亞及歐洲海上貿易等有關經濟歷史的研究。台灣在明末清初時，在東西方的貿易上伴演相當重要的角色，其重要性不亞於現代的台灣。但國內外少有學者從經濟學的角度分析，也少有提出具體的數據佐證。該研究方案在經濟史上應有相當之貢獻。