3 Outsourcing and Economic Periphery

3.1 Debating Issues

Many Western countries worry about the rapid growth of Third world, which was led by the expansion of their manufacturing sectors. There is no exception to Taiwan. Locating at the margin of Mainland China, it is also debated that whether outsourcing to Mainland China makes Taiwan economic periphery or not. During the presidential campaign of 2004, there were significant differences in economic and trade policies between Pan-KMT alliance and Pan-DPP alliance. Are the divergence of Pan-KMT and Pan-DPP just due to their political conflict, or due to their lack of complete information about the economic and trade environment?

Almost 27% of global labor forces are owned by Mainland China. Relying on cheaper labor and high level of several investment-benefit,[7] Mainland China attracts many foreign manufacturing industries to set up multinational firms there. It is often thought that business moving offshore is a new opportunity but may be a new risk for Taiwan economy. In this chapter, I employ the theoretical model of Krugman and Venables (1995) to verify the effect of outsourcing to Mainland China on the issue of economic periphery.

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[7] Take Dongguan for example, there are "preferential land price" and "preferential tax treatment" favorable to foreign businesses.

3.2 Different Concerns Between Two Alliances Periphery or not?

One of the controversial debate "three links" and crisis of economic periphery discussed by the two alliances, Pan-KMT alliance and Pan-DPP alliance, was the very arguable issue during the presidential campaign of 2004.

Pan-KMT Proposals

Pan-KMT alliance pointed out the fact that Mainland China has already been the potentially strong economy in the world. Taiwan cannot exclude Mainland China from business consideration continuously, or economic periphery of Taiwan will probably happen owing to the economic disadvantages. Pan-KMT alliance considered that enhancing the Cross-Strait economic and trade relations cannot only increases the businesses efficiency, but also make Taiwan to be the global-logistics center for Taiwan enterprises. Meanwhile, they also claimed utilizing the plenty resources and the vast domestic-sale market of Mainland China well, Taiwan economy and trade will be promoted to be more liberal and international overall.

Summarily, increasing the economic interactions with Mainland China was heavily emphasized by Pan-KMT. The related Cross-Strait polices mentioned by them during the presidential campaign of 2004 were "to carry out the direct navigations of flights and shipping between Cross-Strait, to open the passage for Mainland China Tourists travel to Taiwan, to permit Taiwan businesses in Mainland China come back to enter the Taiwan listed and OTC market, to sign tax treaties with Mainland China to avoid double taxation, and to sign the protective contracts against investment-risk between Cross-Strait trades ".[8] All the policies show that "three links" is very necessary for Taiwan today. In addition, Pan-KMT alliance seems not anxious for the economic

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[8] For detail, please see "Industrial white paper" in presidential campaign of 2004 in Pan-KMT alliance, which is made an extraction in the Appendix I.

periphery confidently.

Pan-DPP Proposals

From the viewpoint of Pan-DPP alliance, their concerns are relatively conservative to Pan-KMT alliance. Pan-DPP alliance worries about the emergence of manufacturing agglomeration in Mainland China and the misery of economic periphery resulted in the long run. What they believes are "three links" is not the patent medicine; although Mainland China indeed a important market, 'three links" is not the only way; "three links" will directly encourage Taiwan industries to move offshore, making unemployment more serious thereafter".[9] At the same time, not only for economic consideration but also for political security, Pan-DPP alliance also believes that approving "three links" will hurt Taiwan national defense seriously either.

So even if the policy of "no hast, be patient" was given up by ruling party years ago and replaced it by the "proactive liberalization with effective management policy", Pan-DPP alliance is still undecided in whether to open "three links" or not. Besides, Pan-DPP alliance also claims another policy issue of "taking South-bound is better than taking West-bound", which stresses to reduce economic linkage with Mainland China and transfer foreign investments in Southeast. It is recognized as a helpful way for Taiwan to being anti-peripheral.

Both economic and political securities are taken into Pan-DPP alliance's considerations in forming the policies. Regulating businesses through legislated laws and policies, the ruling party tries hard to keep distances away from Mainland China.

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[9] Details of Pan-DPP alliance political opinions related to Cross-Strait economic relation, see "The Evaluation Report of Direct Navigation between Cross-Strait", which is extracted partly in Appendix II.

In Fact

Simply compare with these two different concerns of Pan-KMT and Pan-DPP parties, whether "three links" will induce Taiwan economic periphery and industrial hollowing-out is still arguable. Actually, we have to make clear of the concept of economic periphery and industrial hollowing-out before commenting on it.

It sounds as if economic periphery and industrial hollowing-out voiced by Pan-KMT and Pan-DPP alliance were an abstract speaking without a complete, accurate description. Practically, economic periphery and industrial hollowing-out mean the same thing what usually be called in Western speaking "deindustrialization" (Krugman and Lawrence, 1994). Deindustrialization is the trend of declining in domestic manufacturing sectors, including of a great reduction in employment share and value of manufacturing production. (Chou, 2002; Krugman and Lawrence, 1994)

Next, Pan-KMT alliance considers that opening "three links" will be helpful for increasing Taiwan competitiveness in the international market and Pan-DPP alliance stays at the opposite position. Through the full view of introducing Krugman and Venables (1995) subsequently, we can know that "three links" on economic periphery (or not) is just one of the points in the process of a dynamic development. Due to the lower-wage effect, businesses will re-move out from the core (Mainland China) and come back to Taiwan again in a possible long run time frame. That is, it is too early to conclude it.

In next sections, I use a series of figures illustrations and data simulations as the main tools to make exposition of whether outsourcing induces economic periphery of Taiwan. Policy suggestions in the 3.3.3 section are the main purposes I construct in this chapter.

3.3 Literatures Survey

Krugman (1998) ever pointed out that after technical tricks of incomplete competition were overcome by strategic assumptions at 1970s, the economic geography then began to be thought highly of. Although there were few literatures with the concept of economic geography before 1970s, the analogous thought, which emphasized the importance of location in economic decision, has happened however. Such concepts are "producer will tend to choose sites with good access to markets and a large market attracts producers, which further increase the size of that markets, which attracts still more producers."

Further, Hecksher-Ohlin theory is also the famous theory that can be applied to explain the centralization of production in international trade theory. In the discoveries of H-O theory, each country produces a main product based on their comparative advantage and production centralization is possible under trade liberalization.

In model developing, Krugman (1991) assumed a two-region model with two produced goods, one was an agricultural goods with C.R.S technology and the other was a manufactured goods with I.R.S technology. What unearthed from this article was that transportation costs, economies of scale, and share of consumers consume in manufactured goods all hold the powers to force industries to cluster. Krugman and Venables (1995) and Venables (1996) extended the model in Krugman (1991) to a two-country model, where labors is immobile. These conclusions obtained were the same as Krugman (1991). In discussing the respect of the causes of core and periphery pattern, Krugman and Lawrence (1994) considered that the composition of domestic spending has shifted away from manufactured goods. Specifically speaking, domestic deindustrialization can mainly attribute to inner problems rather than trade liberalization and foreign competition. Grossman and Helpman (2002)

discussed the determinants of choosing outsourcing locations and obtained that market thickness, communication cost (for searching a partner), transportations cost and the contracting environment in partner's location all have influence on decision making. When market thickness is large enough to provide strong forward and backward linkages, or searching a partner is costless, or contracting environment is better, the foreign firms will more prefer to outsource there. Once a country has a larger manufacturing sector, it will attract more firms to locate and core and periphery pattern forms. Chou (2002) also explored that changes in consumption pattern and rapid growth in productivity are the reasons for deindustrialization through time-series regressive model in Taiwan case.

In order to make explanation of the problems noted above, I will employ the theoretical model in Krugman and Venables (1995) to analyze these phenomenons in this chapter. In 3.3.1, I describe the basic story of this model first; next at 3.3.2, I show model assumptions and derive it in the order; in 3.3.3, I will illustrate the economic implications meaningful to explain the proposals of "core and periphery "for the two alliances. Data simulations done in 3.3.3.2 try to answer whether strong capital mobility to Mainland China makes Taiwan economic periphery in the long run. Other factors considered of core and periphery pattern are discussed in 3.3.3.3 as well. 3.3.4 is the concluding remarks.

3.3.1 Basic Story of Krugman and Venables (1995)

Suppose in a world with only two countries, North and South, which are identical in endowments, preference and technology. Agricultural and manufactured goods can be produced in both countries with production technology of constant return to scale and increasing return to scale, respectively. Suppose for some reasons one country has the larger manufacturing sectors than the other. The basic story now starts.

Let's focus attentions on changes of transportation cost in three stages, and we can see what will happen as transportation cost falls over time. Initially, transportation costs are too high to trade between two countries; each country is perfectly self-sufficient without any trade, and producing both manufactured and agriculture goods. That's the first stage.

Now visualize a little reduction in the transportation cost, and bilateral trade now may happen probably. However, as long as transportation costs are high enough, there will be no specialization in anyone country. In addition to bilateral trade, there is another special situation worthy to discuss. Due to the reduction in transportation cost, the country that has the larger manufacturing sectors becomes more attractive for firms to locate their production, that is, it brings about the effect we call "backward linkage", other things being equal. Meanwhile, the country with larger manufacturing sectors indicates lower costs of producing final goods when firms obtain intermediate inputs, in other words, there exists the "forward linkage" which further induce to an extra shift of manufacturing, other things being equal. If the reduction in transportation cost is more enough to fall below some critical point, then the world economy will spontaneously re-adjust itself into a pattern of "core and periphery". That's the second stage.

Transportation cost continues to fall, making the importance of access to the markets and suppliers decline as well, entering the third stage. The original inferior position of peripheral country will be offset and improved by the lower wage rate which dominates the effect of transportation cost reduces. At this point, manufacturing will have an incentive to move out from the core to the periphery once again, forcing a convergence in incomes and economic structure finally. Here the basic story completes.

3.3.2 Assumptions and derivation of Krugman and Venables (1995) Model

We make assumption that North and South are symmetric in endowments, preference (Cobb-Douglas) and technology (Cobb-Douglas) before. So we illustrate the Northern economy only for convince. Through illustrating the adjustment of demand side and supply side, the equilibrium of the reduction in transportation cost could be found.

Demand side

A representative consumer makes the optimal decisions that minimize the expenditure subject to his/her Cobb-Douglas utility keeping constant and obtains the budget constraint equals to $wL = Q_A^{(1-\gamma)} Q_M^{\gamma} V$.

Among these, L is labor endowment in North with wage rate w and Q_A is the price of agriculture, which is the numeraire so Q_A equals to 1; Q_M is the price index for manufactures, γ is the share of manufactured good in consumers' expenditure, and V is indirect utility of a representative consumer.

$$Q_M = \left[np^{1-\sigma} + n*(p*t)^{1-\sigma} \right]^{\frac{1}{(1-\sigma)}} \tag{3-1}$$

Q_M is the price index for manufactures composed by different manufactured goods in to CES utility function, which was formed by elements n (varieties produced in the North sold at price p) , $n*$ (varieties produced in the South sold at price $p*$) , transportation cost rate t (when cross-border transactions happen) , and σ (the elasticity of substitution between varieties of manufactured goods. Assumed that it's bigger than 1) into equation (3-1) .

Supply side

In accordance with value of marginal product equals to the wage rate w, the equilibrium condition on Northern wage is equation (3-2).

$$w \geq 1 \tag{3-2}$$

The optimal choice for a manufacturing firm is to minimize the production cost subject to its Cobb-Douglas production function keeping on some level, and gets the production cost as equation (3-3).

$$TC = w^{1-\mu} Q_M^{\mu} [\alpha + \beta(y + x)] \tag{3-3}$$

μ is the share of manufactured goods used to produce output. Each firm produces outputs $(y + x)$ for domestic sale and exports, α is fixed cost of production and β is variable cost per output.

Provided that firms set output price by marking marginal cost up through a factor $\sigma/(\sigma - 1)$, so we can get the relationship as equation (3-4).

$$p\left(1 - \frac{1}{\sigma}\right) = w^{1-\mu} Q_M^{\mu} \beta \tag{3-4}$$

Equilibrium

E in equation (3-5) is denoted as spending on manufactured goods in Northern country.

$$E = \gamma w L + \mu(y + x)pn \tag{3-5}$$

The demand for one kind of variety for North and South are described as equation (3-6).

$$y = p^{-\sigma} Q_M^{\sigma-1} E, \quad x = p^{-\sigma} t^{1-\sigma} (Q_M *)^{\sigma-1} E* \tag{3-6}$$

In the equilibrium, the zero-profit condition, derived from free entry and

exit of firms, makes all firms' output-scale equal size shown in equation (3-7) . The zero-profit condition becomes equation (3-8) through replacing y and x with equation (3-6) into equation (3-7) and makes the right-hand side of equation (3-7) normalized to 1.

$$y + x = \frac{(\sigma - 1)\alpha}{\beta} \tag{3-7}$$

$$1 = p^{-\sigma}\left[Q_M^{\sigma-1}E + t^{1-\sigma}(Q_M *)^{\sigma-1}E *\right] \tag{3-8}$$

If the transportation costs fall to level that was called "critical transportation cost", industries will start to move offshore. Equation (3-9) is the computation of critical t.

$$t^{\sigma-1} = \left(\frac{1+\mu}{1-\mu}\right)\left(\frac{\sigma(1+\mu)-1}{\sigma(1-\mu)-1}\right) \tag{3-9}$$

It goes to show that equilibrium solutions Q_M, w, p, n, E can be solved by equations (3-1) (3-2) , (3-3) , (3-4) , (3-5) , (3-8) . Analogous equations are for solutions $Q_M *, w*, p*, n*, E*$ of foreign region. Suppose that the North has the larger manufacturing sectors for some reasons and different types of equilibrium solutions could be obtain by using different parameters setting. Some numerical simulations and figure illustrations made in Krugman and Venables (1995) are used for exposition here.

When find out the solutions n and $n*$, we can understand the competitive relation between firms. First, given the market size and resources, any industry has to compete on two aspects, market share (with foreign firms in the same industry) and factor-resources (with other domestic industry for input). Each relationship can be shown through Figure 3.1 and Figure 3.2, respectively. Curves *NN* and *SS* in Figure 3.1 are the zero profit loci for Northern and Southern firms and clearly showing the competitive relations on market shares between domestic and foreign firms.

The horizontal axis *n* in Figure 3.1 is the amounts of domestic firms and the vertical *n** is the amounts of foreign firms. For setting these two countries symmetric, curve *NN* is chosen to be steeper than *SS*. Dynamic adjustments directed by the arrows are that: firms in the home country will increase for sharing positive profit at the left –hand side of *NN* and decrease for reducing loss at the right-hand side of *NN*. For the same reason, the amounts of firms in foreign country will decrease when below *SS* and increase when above *SS*.
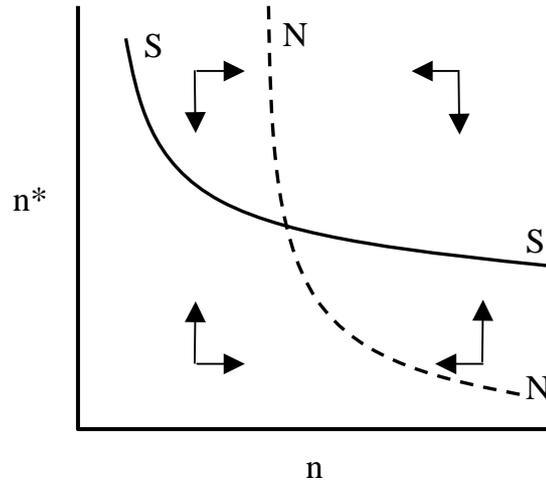

Figure 3.1 Zero Profit Loci For North And South

As transportation reduces, high t : Symmetric Equilibrium

$L_M L_M$ and $L_A L_A$ in Figure 3.2 are the labor demand curves in manufacturing and agriculture in North subject to Southern wage fixed at $w^* = 1$. Labor demand curve $L_M L_M$ is computed from the equation $wL_M = (1-\mu)np(y+x)$ and simulated by the parameters in Table 3.1. The shape of $L_M L_M$ in symmetric solution depends on the dynamic equation:

$$\frac{d\tilde{w}}{dL_M} = \left(\frac{\tau-1}{\tau\gamma L}\right)\frac{(\mu-1)\left[\sigma(\mu-1)+1\right]-\tau(\mu+1)\left[\sigma(\mu+1)-1\right]}{2\sigma(\sigma-1)(1-\mu)+(\tau-1)\left[\sigma(\mu+1)-1\right]} \begin{matrix}>\\=0\\<\end{matrix} ;$$

$d\tilde{w}/dL_M$ is the slope of $L_M L_M$ and $t^{1-\sigma} = \tau \in (0,1)$.

Table 3.1 Simulation Parameters of Figure 3.2

Parameter		μ		t	Critical t [10]
Value	0.6	0.5	5	3	1.899

γ is the share of manufactured good in consumers' expenditure, μ is the share of manufactured goods used to produce output, is the elasticity of substitution between varieties of manufactured final goods, t is the transportation cost.

Equilibrium point S is the only one intersection of $L_M L_M$ and $L_A L_A$. It ensures there is two industries co-exist in both countries. Going for maximum wage, it is believed that any initial labor force % in manufacturing lower than z* will induce more workers to participate into manufacturing; any initial labor force % in manufacturing higher than Z* will induce workers to leave away the manufacturing labor market. S is the stable equilibrium. Under the equilibrium point S, we know that North and South are symmetric and both produce manufacturing and agriculture products.
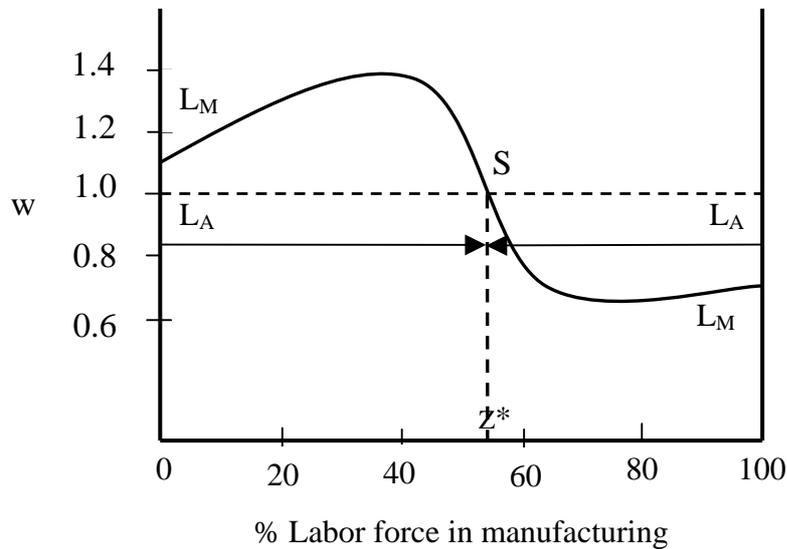

% Labor force in manufacturing

Figure 3.2 Transportation cost =3

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[10] To substitute parameters, =0.6, μ =0.5, =5 into equation (3-9).

As transportation reduces, intermediate t : Multiple Equilibrium

Next, suppose the transportation and communication costs reduce to a lower level ($t = 2$) , a change of $L_M L_M$ shape can be seen in Figure 3.3, and parameters setting is in Table 3.2.

Table 3.2 Simulation Parameters of Figure 3.3

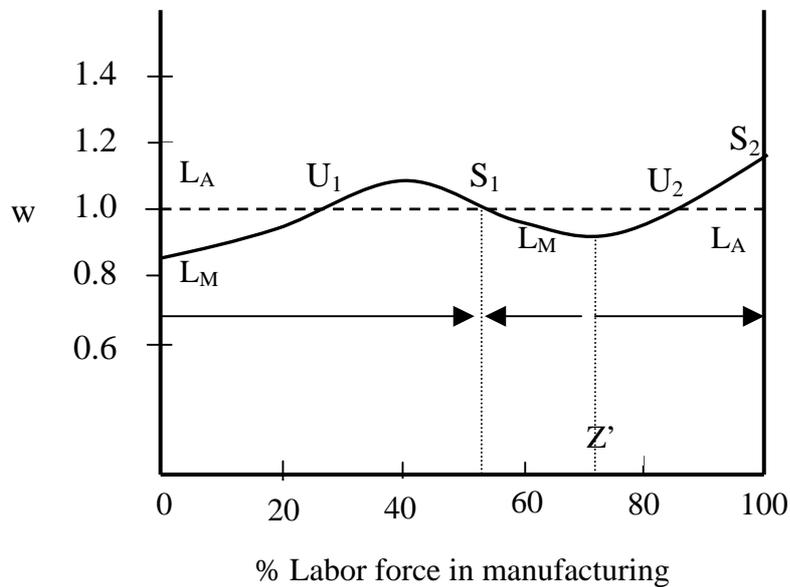| Parameter		μ		t	Critical t
Value	0.6	0.5	5	2	1.899

Figure 3.3 Transportation cost=2

$L_M L_M$ now has three intersections with $L_A L_A$ two equilibriums are unstable (notations U_1 and U_2) and others are stable (notation S_1 and S_2). When labor force % in manufacturing sectors is smaller than Z* (such as the equilibrium points U_1 and S_1), then the final equilibrium point will be S_1; it means that the demand linkages are not strong enough to destroy the stabilization of symmetric. However, if labor force % is higher than Z* (such as the equilibrium points U_2), then there are incentives for all labor force in the North to devote into manufacturing. So S_2 will be the final, stable equilibrium and asymmetric development occurs.

Asymmetric Equilibrium

When transportation costs level below the critical value (t=1.899), the process of industries moving overseas gradually finishes to a stable situation, using the parameters in Table 3.3, a surprising thing shall be observed in Figure 3.4.

Table 3.3 Simulation Parameters of Figure 3.4

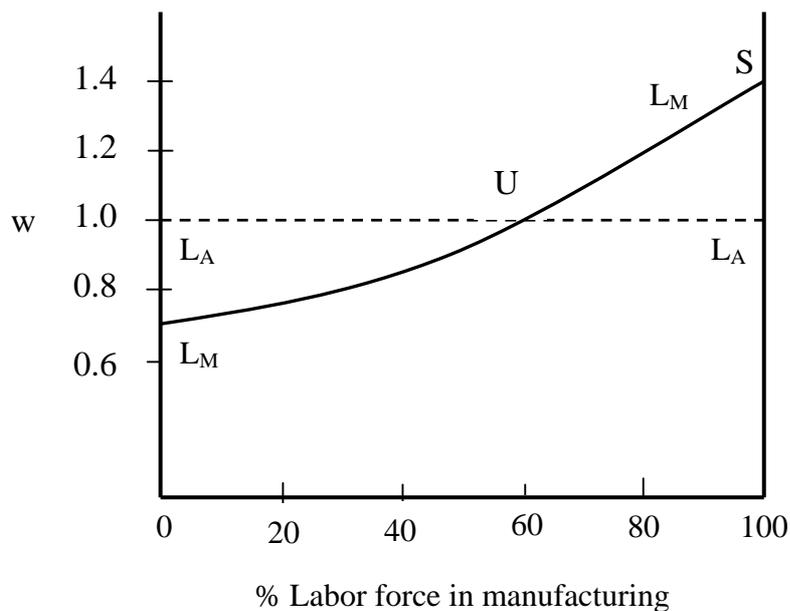| Parameter		μ		t	Critical t
Value	0.6	0.5	5	1.5	1.899

% Labor force in manufacturing

Figure 3.4 Transportation cost=1.5

The demand curve $L_M L_M$ now is perfectly monotonous in positive slope, causes the point S to be the equilibrium. Such the situation reflects the powerful effects of the "backward" and "forward" linkages", which support manufacturing production to agglomeration, that is, a "core-periphery" pattern arises.

However, even if transportation cost falls below the critical t, the core and periphery pattern will not be the final result. Such the situation we have already described in the basic story that, if transportation cost continues to fall, the importance of access to the markets and suppliers will decline too, making manufacturing firms move out from the core to the periphery once again and forcing a convergence in economic structure finally. For the reason, we can thus know that "economic periphery or not" is just a process of the transportation cost reducing, rather than the final result.

3.3.3 Economic Implications

3.3.3.1 Overall Economic Structure of Taiwan and Mainland China

Economic Structure and Labor-Force Utilization of Cross-Strait Economy

The gorgeous economic growth rate of Mainland China[11] induced by its manufacturing-sectors expansion has made a very good show since the "reformation and openness policy" started by Deng Xiao Pin at 1979. Compared with the year 1979, the overall economic structure of Mainland China and Taiwan were somewhat a little change.

Take a look at Table 3.4, a clear comparison between the domestic production structure of Taiwan and Mainland China is made. It tells us two facts. First, the main economic structure of Taiwan today is *Service*, while that in Mainland China is *Industry*. The second fact is that, during the past 23 years, Taiwan has headed into Service sectors with decreasing share in Agriculture and Industry sectors gradually (which the decreasing in Industry share is one of the indexes that be used to measure the extent of deindustrialization), while Mainland China has developed both its Industry and Service sectors with the reducing share in Agriculture over time.

Table 3.4 properly accords with the current trend that the importance of Industry in Mainland China increases over time and most of Industry are probably coming from foreign investment such like Taiwan and Western countries. Depending on its cheaper labor forces and plenty natural resources, Mainland China has already become the key-production center of the whole world.

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[11] According to National Bureau of Statistics of China, economic growth rate of Mainland China was 8% in 2002, 9.9% in 2003.

Table 3.4 Structure of Domestic Production

Taiwan	Agriculture (%)	Industry (%)	Service (%)
Year 1979	4.2	41.2	54.6
Year 2002	1.86	31.05	67.10
Mainland China	Agriculture (%)	Industry (%)	Service (%)
Year 1979	31.2	47.4	21.4
Year 2002	15.23	51.15	33.62

Data sources   1. Directorate General of Budget Accounting and Statistic Executive Yuan
          http://www.dgbasey.gov.tw/dgbas03/bs5/quarter.htm
2. Monthly Bulletin of Statistics of the Republic of China,
          http://www.dgbasey.gov.tw/dgbas03/bs7/Bulltin/se.htm
3. National Bureau of Statistics of China
          http://210.72.32.6/cgi-bin/bigate.cgi/b/g/g/http@www.stats.gov.cn/index.
          htm

The corresponded utilization of labor forces for Taiwan and Mainland China is shown on Table 3.5. The largest percentage of labor forces of Taiwan is devoted into Service sectors, while the most labor forces of mainland China are engaged in Agriculture (rather than in the main sectors, Industry) . Labor forces of Mainland China concentrate in Agriculture may reveal that: productivity in Agriculture sectors is relative low and Mainland China has just gone into the process of economic transition in recent two decades, therefore it still needs more time to release such a great quantity of labors in Agriculture sector originally into Industry or Service sectors.

Table 3.5 Percentage of Labor Forces Devote Into Each Sector

Taiwan	Agriculture (%)	Industry (%)	Service (%)
Year 1979	12.85	40.83	46.32
Year 2002	7.50	35.24	57.26
Mainland China	Agriculture (%)	Industry (%)	Service (%)
Year 1979	69.8	17.6	12.6
Year 2002	50	21.4	28.6

Data sources   the same as Table 3.4.

Transportation Costs of Traveling Between Taiwan and Mainland China

As the legislative regulation mandated by Taiwan government, all regular transportation between Taiwan and Mainland China have to transit at another country. So transportation costs between Cross-Strait increases thereafter. Components of transportation costs are complex, which is including of real time and distances cost, opportunity cost, other customs cost, and etc..

For example, the flight-distances of turning point at Hong Kong is 3.3 times to that of direct navigations from Taipei to Shanghai, 1.8 times to that of direct navigations from Taipei to Beijing. Not surprisingly, an indirect navigation will spend more costs on fuel costs, flight-safety cost, operational costs, traveling time, and ticket costs resulted from the extract distances. Institute of Transportation (1994) ever estimated that operational costs of shipping industry could be saved 64% if direct navigation is approved. The research of "The Evaluation Report of Direct Navigation Between Cross-Strait"[12] (2003) evaluated that transportation costs of flights could be saved 40% and that of shipping could be saved 14.5% if Cross-Strait direct navigation are carried out. Moreover, estimated by Uni-President Enterprise Corporation, material costs could be saved 20% through direct navigation; while almost 60% transportation costs of the Far Eastern Group and the Formosa Plastics Group could be saved.[13]

At the viewpoint of time costs, indirect navigation is fairly time-consuming for travelers. According to flight schedule of Dragon Airlines Corporation, the estimated saving in traveling time is in Table 3.6. Among these total columns, the direct flight time in the third and sixth column were obtained in the "Document Issued on Three Direct Links Across Straits"

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[12] The file of this complete report is too huge to be attached to the appendix of my thesis, so I extract some parts in Appendix II from it.

[13] See the electronic magazine on internet   http://www.winwin.com.tw/win307/main5.htm

announced by Taiwan Affairs Office of State Council[14]. Notice that Table 3.6 is a data estimation of flight time saved, in fact, direct flight can also save time cost in customs we do not compute in here.

Table 3.6 Flight Time between Cross-Strait Travels

	TPE HK SHA	TPE SHA	Saving Time Estimated	Taipei HK BEJ	Taipei BEJ	Saving Time Estimated
Flight time	4 hrs	1 hr 15min	2 hrs 45min	4 hrs45 min	2 hrs	2 hrs 45min
Total traveling time	6 hrs	3 hrs	3 hours	7 hrs	4 hrs	3 hrs

Notes: TPE is Taipei, HK is Hong Kong, SHA is Shanghai, and BEJ is Beijing.

In addition, China Airlines also calculated the saving traveling time approximately few years ago that 4hours and 30 minutes, 3 hours and 5 minutes, and 3 hours and 25 minutes are saved from Taipei to Shanghai, Beijing, and Xiaman, respectively.

3.3.3.2 Policy Implications through Data Simulations

In policy debating, both Pan-KMT and Pan-DPP alliance discuss deindustrialization conceptually without any definite index. In this section I take the flight traveling time as an example and try to discuss whether deindustrialization will form. Before make explanation of each party's proposal, I first revise slightly in the symbol $L_A L_A$ into $L_N L_N$ to denote there are three sectors in reality economy, that is, Agriculture, Manufacturing (suppose the same meaning as Industry) and Service. Agriculture and Service sectors are combinative classification into the Non-Manufacturing, symbolized $L_N L_N$. Figure 3.5, Figure 3.6 and Figure 3.7 are obtained thereafter.

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[14] Please see on the webpage   http://www.gwytb.gov.cn:8088/

Policy Implications for Pan-KMT Alliance

Through the introduction of Pan-KMT alliance's proposal previously, their recognition of economic and trade environment after "three links" may look like Figure 3.5 by guess. Pan-KMT alliance believes that if "three links" policy is going to be announced and performed in future, the equilibrium point will locate at point S and tells that an even development will happen between Taiwan and Mainland China, instead of Taiwan economic periphery.
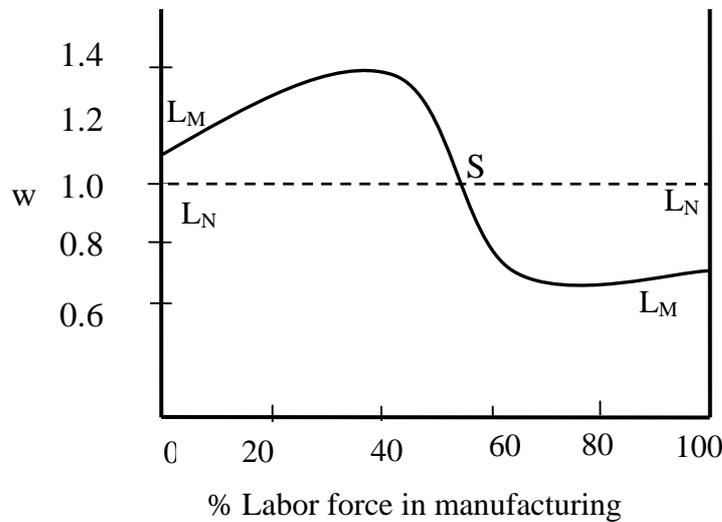

Figure 3.5 Pan-KMT Recognition of Economic and Trade Environment

However, it seems inappropriate too optimistic to ignore the hidden suggestions of such an equilibrium. The appearance of this symmetric solution only exists at certain parameters setting-mode like Table 3.1. In other words, we should make further discussions on the conditions that when the symmetric solution will form. Suppose the all parameters of Taiwan are the same as Table 3.1 and transportation cost t=3 is the benchmark before "three links". According to Krugman and Venables (1995), such a stable, symmetric equilibrium could be acquired within the range $t \in (t', 3]$, where the value of t' is the switch point that makes stable and symmetric regime change to multi-equilibrium regime. The value t' is not pointed out in Krugman and Venables (1995). For convenience, I assume that $t' = 2$.

If t drops from 3 to a further lower level than 2, the unstable solution may arise. Therefore, in order to get such symmetric solution surely, the reducing percentage of transportation costs after opening direct navigations must have to smaller than 33.33%, which is derived from the formulation that $[(3-2)/3] \times 100\% = 33.33\%$. In other words, as long as the transportation costs before "three links" is smaller than 1.5 times to that after "three links", the stable, symmetric equilibrium like Figure 3.5 exists.

We can take Table 3.6 in data simulations for practical example.[15] The original total traveling time is 6 hours or so from Taipei to Shanghai, and 7 hours or so from Taipei to Beijing before direct navigation is permitted. Suppose the total traveling time is more than 4hours from Taipei to Shanghai, 4 hours and 40 minutes from Taipei to Beijing after direct navigations, the reduction in transportation costs induced by opening "three links" is not powerful enough for core and periphery to emerge. As a result, equilibrium point S presents the belief of Pan-KMT alliance that the policy of opening "three links" is helpful rather than harmful to Taiwan.

Table 3.7 Simulated Total Traveling Time if Pan-KMT Assertions Are Correct

=0.6	μ =0.5	=5	$T^* > 66.67\%\ t$
Total traveling time Destination	*Before* "three links" is permitted	*After* "three link" is carried out	
TPE to SHA	6 hrs	4 hrs < T^{*16} < 6 hrs	
TPE to BEJ	7 hrs	4 hrs 40 min < T^* < 7 hrs	

Policy Implications for Pan-DPP Alliance

Through the policy of Pan-DPP Alliance, the imaginary figure after "three

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[15] Although traveling time does not equal to the transportation cost, but there are close relationship between them. That is to say, traveling time can directly represent the concept of transportation cost to a large extent..

[16] T* means simulated total traveling time.

links" is also guessed as Figure 3.6.[17] Stable, asymmetric equilibrium S forms in this figure and uneven development between countries occurs. In other words, "three links" means lower the transportation cost and Taiwan will possibly suffer a serious situation of economic periphery if "three links" is allowed.
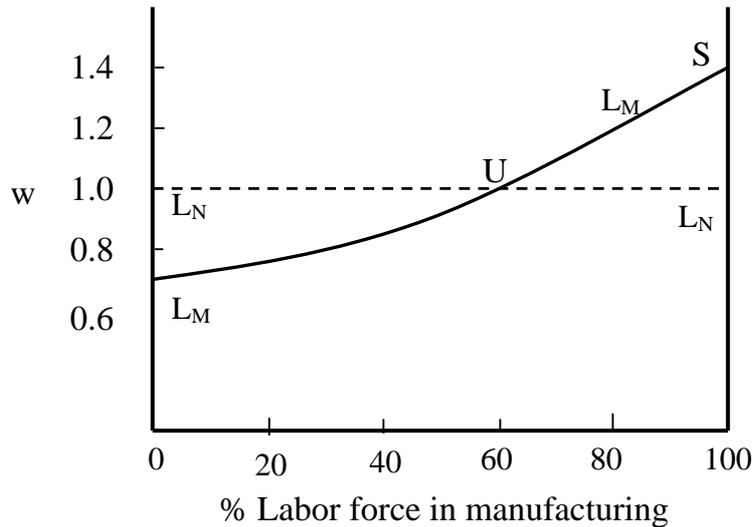

Figure 3.6 Pan-DPP Recognition of Economic and Trade Environment

It should not be so pessimistic to rule it for the same reason. The appearance of this asymmetric solution occurs at certain parameters setting like Table 3.3, so we can make further explanation on the conditions. Suppose parameters σ, μ, ρ are the same with Table 3.3 and transportation cost $t = 3$ is the bench mark before "three links". Such an uneven development may be found within the range $t \in (\underline{t}, 1.899]$. That is, if transportation costs fall below $t = 1.899$, production agglomeration will develop.

However, if t drops from 3 to a further lower level than $\underline{t}$, the importance of industries to access to suppliers and markets in Mainland China declines as well. The original inferior position of Taiwan shall be offset and improved by the lower wage-rate effect which dominates the effect of transportation cost reduces. In the level below $\underline{t}$, manufacturing industries in

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Mainland China have a strong incentive to re-move out and come back to Taiwan again. Then the phenomena of manufacturing agglomeration in Mainland China will consequently disintegrate.

Therefore, in order to get such asymmetric solution, the reducing percentage of transportation costs after opening direct navigations must have to bigger than 36.7% but smaller than $[(3-t)/3]\times100\%$. Table 3.8 is the simulated numerical example if the Pan-DDP proposals are correct and "three links" is indeed harmful to Taiwan economy.

Table 3.8 Simulated Total traveling Time if Pan-DPP Assertions Are Correct

=0.6	μ =0.5	=5	$t^* \leq 63.3\% \ t$
Total traveling time Destination	*Before* "three links" is permitted	*After* "three link" is carried out	
TPE to SHA	6 hrs	$T^* \leq 3$ hrs 48 min	
TPE to BEJ	7 hrs	$T^* \leq 4$ hrs 26min	

An Intermediate Opinion and Data Simulations

On a line of political spectrum, Pan-KMT alliance takes the right side to stress the importance and necessary of opening "three links", while Pan-DPP alliance takes the opposite opinion. Theoretically, an uncertain outcome will possibly happen also. That is, transportation cost will reduce to a certain level that cannot say "three links" is completely beneficial or harmful neither. It must depend on its initial conditions. There is no unique equilibrium solution in Figure 3.7 after "three links" is allowed.
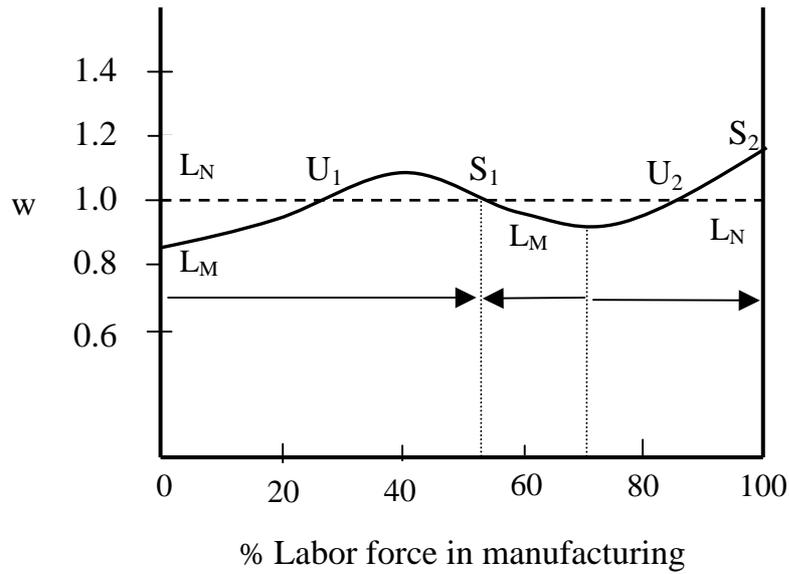
Figure 3.7 An Intermediate Recognition of Economic and Trade environment

Suppose transportation cost reduces within such range that makes equilibrium point uncertain, the stable, symmetric equilibrium S_1 observed would only happen at the negative slope of demand curve. A data simulation is also done. Suppose the all parameters of Taiwan are the same as Table 3.2 and transportation cost $t = 3$ is the benchmark before "three links". The multi-equilibrium result could be gotten within the range $t \in (1.899, 2]$. If t drops from 3 to a further lower level than 1.899, the stable, asymmetric solution may arise. Therefore, the reducing percentage of transportation should be controlled in larger than 33.33% but smaller than 36.7%. Numerical simulation is illustrated in Table 3.9.

Table 3.9 Simulated Total traveling Time in An Intermediate Opinion

=0.6	μ =0.5	=5	63.3% $t < t^* \leq 66.67\%$ t
Total traveling time Destination	*Before* "three links" is permitted	*After* "three link" is carried out	
TPE to SHA	6 hrs	3hrs 48 min< $T^* \leq 4$ hrs	
TPE to BEJ	7 hrs	4hrs26min< $T^* \leq$ 4hrs40min	

3.3.3.3 Other Factors Considered

Note that numerical simulations in Table 3.7, Table 3.8 and Table 3.9 were just made under the parameters set by Krugman and Venables (1995). As a matter of fact, it will be so different from the reality because of different parameters. Next, as transportation cost reduces over time, it seems the formation of economic peripherization may occur after opening "three links", which is foreseen by Pan-DPP alliance. However, on the other hand, theoretical illustrations give us a complete view that a reduction in transportation cost should be observed as one point in the dynamic development. That is to say, even if suffering economic periphery today may be improved by the effect of lower wage rate tomorrow. Economic periphery (or not) is just one of the process rather than the final and absolute outcome. As a consequence, the controversial differences in Cross-Strait opinions between Pan-KMT and Pan-DPP alliances should not be the disputations in its quality.

Furthermore, there are several linkages of the formation of uneven development. So reduction in transportation costs is not the only contributory factors to "core and periphery" pattern thereafter. As we have ever mentioned, both theoretical parameters μ (factor in supply side) and σ (factor in demand side) are also playing important roles that would cause uneven development situation to appear.

μ is the share of intermediate input in producing manufactured goods. Specifically speaking, we can say μ is the percentage of non-labor price in wage-cost structure equally. The more intermediates with high price needed in production (the higher the industrial nexus is) and the lower percentage in using with labors, μ will get larger. σ is defined as the elasticity of substitution for varieties of manufactured good, or more specific, it can mean the pricing power, profitable ability of a manufacturing industry or consumers' special taste in manufactured goods. It also stands for economies of scale in

Krugman (1991). i.e., When the substitutes available for a manufactured good is few and the extent of economies of scale is large, σ will be small and the pricing power of the manufacturing firms will be relatively strong.

Next, what we are curious to know is how does critical t change with different μ and σ. First, t is the function of μ and σ and we can change equation (3-9) into logarithmic form in equation (3-10). After that, we then differentiate t with μ and σ respectively to obtain the static analyses of t.

$$t^{\sigma-1} = \left(\frac{1+\mu}{1-\mu}\right)\left(\frac{\sigma(1+\mu)-1}{\sigma(1-\mu)-1}\right) \qquad (3\text{-}9)$$

$$\Rightarrow (1-\sigma)\ln t = \ln\left(\frac{1+\mu}{1-\mu} \cdot \frac{\sigma(1+\mu)-1}{\sigma(1-\mu)-1}\right)$$

$$\Rightarrow (1-\sigma)\ln t = \ln(1+\mu) - \ln(1-\mu) + \ln[\sigma(1+\mu)-1] - \ln[\sigma(1-\mu)-1] \quad (3\text{-}10)$$

Differentiate equation (3-10) with μ :

$$\frac{dt}{d\mu} = \frac{2t}{\sigma-1}\left[\frac{1}{1-\mu^2} + \frac{\sigma(\sigma-1)}{(\sigma+\sigma\mu-1)(\sigma-\sigma\mu-1)}\right] > 0 \qquad (3\text{-}11)$$

Equation (3-11) will be positive according to assumptions described by Krugman and Venables (1995) that $\sigma > 1$ and $\sigma(1-\mu)-1 > 0$. Therefore we can know increase in μ accompanies increase in critical transportation cost, which means that the stronger the industrial nexus is, making the importance of transportation cost become unimportant relatively, the higher probability "core and periphery" pattern will forms. For examples, if an industry with high proportion of intermediates in production which could be produced both in Taiwan and Mainland China, then the lower-price (cost) effect will lead firms to cluster in Mainland China. For example, electric & electronic related industries, machinery equipment and repairing component industries are the industries with higher μ .

Differentiate equation (3-10) with :

$$\frac{dt}{d\sigma} = \frac{t}{\sigma - 1}\left[\frac{-2\mu}{(\sigma + \sigma\mu - 1)(\sigma - \sigma\mu - 1)} - \ln t\right] < 0 \qquad (3\text{-}12)$$

Equation 3-12 will be negative according to assumptions that $\sigma > 1$ and $\sigma(1 - \mu) - 1 > 0$. It is the negative relationship between and t that when a change in the demand shock makes larger, means consumers' demand for manufactured goods becomes more diverse and delicate. Therefore, lager can support more domestic firms to exist and hence "core and periphery" pattern less likely to form. An interesting analogy can be made with respect to United States and Japan. Common observations show that demand for final goods in United States is fairly simple and uncomplicated in United States tens to be small . U.S is a market for economies of scale. Demand in Japan is quite various, complicated and diverse in Japan tens to be large . Japan is a market for economies of scope. If demand for final goods in Taiwan is much closer to that in Japan, that is, more delicate and diverse demand, then the economy can support domestic firms stay at home. Reducing in t becomes relative harmless and peripheralization is less likely to form.

Because of critical transportation cost t is a compositive parameter of μ and σ, we know that "three links" or not is not the independent decision in policy discussions. Economic and trade policies of μ and σ should be taken into consideration at the same time. For example, suppose an industry with high μ, what could be employed to avoid "core and periphery" pattern is not only to prohibit direct navigation, but also to include increase in σ that offers more varieties or changes consumers' consumptive pattern. Different industries should be applicable for different policy arrangement. This reinforces what we have proposed in Chapter 2.

Other Points of View

Besides, there are also several views to support that even if the transportation cost between Taiwan and Mainland China is low enough to make Taiwan economic periphery, Taiwan should not panic. First, in practical operations, businesses always keep their core in home such like works needs high technique and R&D innovations for security. Second, many jobs that can be only done face-to-face do not move offshore. Third, exporting routine and low-level technical works to host countries can re-devote more educated workers into higher value industries, which will make economy more efficient as a whole.[18]

There are still some policy issues taken place in reality world tariff, some protectionist policies on import industry and government interventions (Krugman and Venables, 1995; Feenstra, 1998) . All the policy issues noted above possess an equivalent effect of raising transportation costs. Therefore, even though the absolute transportation cost is low enough, the real transportation cost will be increased by tariff, protectionist policies, and government regulations, however. For example, capital and citizen mobility between Taiwan and Mainland are highly regulated by government. As a result, all investments in Mainland China must be approved by MOEA and take the indirect form. People who travel between across Taiwan Strait must have turning point in Hong Kong or else.

Finally, production centralization is possible under trade liberalization if according to the conclusions of H-O theory. However, production concentrates in a specific region is infrequently seen in reality because the postulations of H-O theory are not always available. That is, as long as the transportation costs are not low enough and some protectionist polices do exist, the phenomenon of industries clustering does not occur.

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[18] See Business Week, February 3, 2003, p.36-45.

3.4 Concluding Remarks

Through model explanation, we know that the debating issues during presidential campaign of 2004 did not tell a complete story. In fact, as transportation costs reduce over time, asymmetric development and inequality of nations will really happen. However, it is just a point in the process of a dynamic development, not the final outcome. Due to the lower-wage effect, businesses will flow out from Mainland China and come back to Taiwan again.

Among the discussions of "three links or not", both Pan-KMT alliance and Pan-DPP alliance only focus their cores on transportation cost. Actually, t is a compositive parameter of share of intermediate input and elasticity of substitution for varieties of manufactured goods. When share of intermediate input is relatively high so that the industrial nexus is strong, it will make core and periphery pattern more likely to form. When elasticity of substitution for manufactured is high that transportation cost t is less important, the symmetric development will be kept.

When trying to debate whether outsourcing induces economic periphery and industrial hollowing-out, we have to understand characteristics of different kinds of industry first so that we can judge a policy issue more objective. For example, if the crisis of periphery comes from high share of intermediate input, trying to improve the technological level should be a good way to lower the industrial nexus with Mainland China, such industries are electric & electronic related industries, machinery equipment and repairing component industries.