Voluntary Import Expansion and Direct Investment*

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Abstract:

In spite of the ubiquity, the voluntariness of Voluntary Import Expansion(VIE) and the effects of VIE in the presence of capital movement have not been taken up in the literature. By the use of a duality approach in a specific factor model, this paper analyses the voluntariness of a market share VIE in the presence of direct investment and the effects of direct investment in the presence of a market share VIE. It is shown that these results depend on the capital import effect and the price difference effect and that a VIE may be voluntary if it is accompanied by a direct investment. Further we show how a VIE and direct investment are related in determining the welfare of an importing country.

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1. Introduction

In addition to Voluntary Export Restraint (VER),Voluntary Import Expansion(VIE) has become another new protective trade policy since the 1980s. The most famous case of VIE is the 1986 Japan-US semi-conductor trade agreement. Its aim was to open the Japanese semi-conductor market and expand the share of US semi-conductor. One of the most important and well-documented facts in the world economy today is a proliferation of bilateral, result oriented trade policies such as VIE and VER which are inconsistent with the multilateral and rule-oriented trade policies of GATT/WTO.

Since the pioneering article by Bhagwati(1987), seminal papers have been written on the implications of VIE such as Cronshow and Markusen (1995), Ethier and Horn (1996),Greaney (1996, 1999),Irwin (1994),and Ishikawa (1999), among others. However in spite of its ubiquity in the real world, the voluntariness of VIE has not been taken up in the literature.[1] Specifically, few studies have so far taken up the welfare effects of a VIE in the presence of international capital movement.[2]

The most popular form of VIE is a market share VIE and it has already been used in the Japan-US semi-conductor agreement.[3] Market share VIE is considered as a result oriented trade policy that increases the market share of foreign goods by bilateral negotiations between the two governments. On the other hand, recent decades have witnessed an increase of both direct investment and fragmentation of production process and the international capital movements have become increasingly significant. It may be said that today a move towards result oriented trade by VIE and VER and an increase of international factor movement by direct investment are proceeding simultaneously among the developed countries. However few papers have tried to analyze the welfare effects of VIE in the presence of direct investment. The purpose of this paper is to make a modest contribution to fill this gap and analyze whether market share VIE is voluntary in the presence of direct investment.

In this paper, we are imagining the case of a developing country that is obliged to open its market by a market share VIE and is also accepting direct investment from foreign countries. Extending Dei(1985a), this paper considers the effects of VIE and shows that the voluntariness of

VIE depends on the capital import effect and commodity price difference effect. We show that a VIE may be voluntary if it is accompanied by a direct investment. It will be shown further that both direct investment and VIE promote imports and reduce the price of imports.

This paper is organized as follows. In section 2, we identify some important features of direct investment. Among these, we note that the investing country exports commodity in addition to make foreign direct investment. In order to consider this feature from a host country, in section 3 we construct a simple specific factor model where home country not only expands the market share of imports by the use of import subsidy but also accepts direct investment. In section 4, the model is represented in the form of changes of the variables. In section 5, we take the VIE as given and analyze how direct investment may affect welfare, commodity price, and volume of imports. In section 6, we consider the effects of a VIE in the presence of direct investment and show that a VIE can be voluntary. We also show the relationships between a VIE and direct investment in determining the welfare and show that both direct investment and VIE increase imports and reduce its price. In section 7, we compare our analyses with a previous analysis of VIE while in section 8, we take up some previous studies in capital import and welfare. Section 9 is the conclusion.

2. Features of Direct Investment

Direct investment has been playing important roles in international technology transfer as well as in determining the patterns of trade and production. Many papers have undertaken the economic analysis of direct investment such as by Ethier(1986), Findlay(1978), Helpman(1985), Krugman(1979), and Markusen(1984), among others, and the results of these papers are condensed in Markusen(1995) and Wong(1995). From these studies, at least the following four features have been identified on the foreign direct investment.

First, in order to make direct investments, multinational firms must have some advantages in the production process and direct investment is made in order to use these superior technologies in other countries. The existence of advantages in technology is a necessary condition for direct investment. Thus direct investment is an international movement of knowledge-based capital and it

plays a key role in international technology transfer. This aspect has been emphasized by Findlay(1978) and Krugman(1979), among others. Second, it is industry specific and the repatriation of proceeds may not be perfect. The industry specificity is related to the first feature and it is an important aspect that separates direct investment from the international movement of general capital. The partial repatriation can be explained by a fact that the subsidiary must become an independent firm in the host country. Third, since the technology has a public good nature, direct investment will be made as long as the value of marginal product of direct investment in the host country is positive. In the case of portfolio investment, the foreign investment will not be made if the return in the host country is smaller than that in the investing country. However this is not the case in direct investment and it is made as long as the value of marginal product in the host country is positive. Fourth, direct investment is made by the non-financial multinational firms and the multinational firms usually export commodity in addition to making direct investment. The fact that direct investment is made by non-financial firms is related to the first feature. On the other hand, the coexistence of factor trade and commodity trade in the case of direct investment is another important feature that separates it from the international capital movement. This aspect has been emphasized by Wong(1995). By the use of H-O model, Mundell(1957) showed that commodity trade and factor movement are perfect substitute.

We will introduce following features of direct investment into the model of VIE with direct investment. First, the home country not only accepts direct investment but also imports commodity, so that we consider a feature that both trade and direct investment exist. Second, while the repatriation of the proceeds is assumed to be perfect, we take up the specificity of direct investment and it is specific to the importing sector of home country.

3. A Model of VIE with Direct Investment

We are considering an open economy that is obliged to make VIE and is also accepting direct investment from a foreign country. We are concerned with the welfare effects of VIE in the presence of direct investment. Specifically we are concerned with two aspects.

i) whether direct investment in the presence of VIE by the use of import subsidy is welfare increasing, and

ii) whether a VIE in the presence of direct investment is voluntary to an importing country.

To take up these aspects, we set up a simple specific factor model of VIE with direct investment in duality approach.

Assume two countries, home and foreign, and each produces two commodities, 1 and 2. Assume that the first good is exportable and the second good is importable of home country and that while the first good is homogeneous the second good is a different good between the two countries like autos: US car and Japanese car. Contrary to the common wisdom, assume that at the initial free trade home country is importing a small amount of second good for which home country has comparative advantage. In the case of different goods, it is possible to import expensive foreign good. Let m_f denotes this market share of foreign goods under initial free trade. Now the government two countries have agreed to increase the market share of imports in home country. In order to increase the share of imports, assume that the home government pays an import subsidy and reduce the price of imports in home country.[4] Thus the level of expenditure of home country is smaller than the GDP by the cost of import subsidy. Perfect competition and full employment are assumed. The model of home country at the equilibrium under VIE is:

$$E(p,u) = G(p,K) - G_K(p,K)(K - \overline{K}) - (p^* - p)M ,$$ (1)

$$M(p,u,K) = E_p(p,u) - G_p(p,K),$$ (2)

$$\frac{M(p,u.K)}{E_p(p,u)} = m \geq m_f , \quad (1 \geq m \geq m_f \geq 0) .$$ (3)

Here E is the expenditure function and p and p^* are the relative price of the second good in terms of first good in the home country and the foreign country respectively. It is assumed that the first good is the numeraire and its price is assumed to be one and that as the result of import subsidy the relative price of second good of domestic and foreign good is same and denoted by p. The

level of utility is u and G is the GDP function. The total quantity of capital used specifically in the second sector is K. A mobile factor, labor, is assumed. However it is suppressed in the model because it is fixed and immobile between the two countries. The quantity of capital owned by the home country is $\overline{K}$, so that $(K - \overline{K})$ is the quantity of the direct investment from the foreign country. It is assumed that the direct investment is exogenous and is specific to the second sector and that full repatriation is made. The quantity of imports of the second goods is M and the market share of the foreign goods under a VIE agreement is m which is at least as great as m_f. As we discuss later, m is determined by some political processes exogenously.

Suppose that both functions E and G are continuously differentiable. Then $G_K \equiv \partial G / \partial K$ is the rental of direct investment, $E_p \equiv \partial E / \partial p$ is the demand for the second good, and $G_p \equiv \partial G / \partial p$ is the supply of the second good. Equation (1) is the budget equation, where $G_K(\bullet)(K - \overline{K})$ is the repatriation of proceeds of direct investment to the foreign country. Further, $(p^* - p)M > 0$ is the cost of the import subsidy that is collected from the public of home country as a tax and is given to the foreign firms. Equation (2) is the definition of import of the second commodity and equation (3) is the definition of the level of a VIE, which is at least as great as that under free trade. Assuming K, p^*, and m as the parameters, the model consists of three equations and three variables: p, u, M.

The literature on VIE has paid scant attention to the enforcement mechanism of VIE and this fact reflects the features of VIE as the trade policy.[5] We assume that home country is obliged to attain m by the use of import subsidy. Usually a VIE has been carried out through moral suasion by the government of importing country. In fact, in the case of the semi-conductor agreement between Japan and US, the US government did not take any actions and the Japanese government simply asked Japanese user to buy more American products.[6] However such moral suasion has no explicit enforcement power and the literature on VIE did not pay any attention to the mechanism. We introduce import subsidies by the home country as an enforcement mechanism. If the home country pays a specific import subsidy s, the cost of the import subsidy is $(p^* - p)M = sM$, which is subtracted from the GDP of home country.

On the determination of m, we can consider several approaches. Among them, at least two political economy approaches can be identified. One is based on the analysis of the behavior and objectives of the government of the importing country. In this case, the home government determines m so as to maximize a political objective function of the home government, where the arguments of the objective function of government will be the lobbying activities of the home firm and the foreign firm. The home firm will lobby in order to reduce m, while foreign firm will lobby to increase it. The home government determines the level of m so as to maximize its welfare.[7] Today, it is clear that foreign lobbying activity plays an important role in determining the behavior of domestic governments. Another approach is a game theoretic approach between the two governments. Suppose a two stage game and assume the governments and firms in each country as the players. Then m will be determined as a result of cooperative game between the two governments in the first stage.[8] In the second stage, the firms in the two countries compete in the domestic market at given m and import subsidy. In this paper, we assume that m is determined by the second approach.

4. Changes in Variables

In this section, we rewrite the model in the changes of the variables. Differentiating (1) (3) and arranging the result in a matrix form, we obtain:

$$
\begin{bmatrix}
E_u & (K-\overline{K})G_{Kp} & -(p-p^*) \\
E_{pu} & (E_{pp}-G_{pp}) & -1 \\
mE_{pu} & mE_{pp} & -1
\end{bmatrix}
\begin{bmatrix}
du \\
dp \\
dM
\end{bmatrix}
=
\begin{bmatrix}
-(K-\overline{K})G_{KK}\,dK \\
G_{pK}\,dK \\
-E_p\,dm
\end{bmatrix},
\qquad (4)
$$

where we define and assume: $E_u = \partial E/\partial u > 0$, $G_{Kp} = \partial/\partial p(\partial G/\partial K) = \partial/\partial K(\partial G/\partial p) = G_{pK} > 0$, $G_{KK} = \partial/\partial K(\partial G/\partial K) < 0$, $E_p = \partial E/\partial p = D_2 > 0$, $E_{pp} = \partial/\partial p(\partial E/\partial p) \le 0$, $G_{pp} = \partial/\partial p(\partial G/\partial p) \ge 0$. As we see below, the signs and values of G_{Kp}, G_{KK}, E_{pp}, and G_{pp} are crucial in determining the comparative static effects. In general, these signs depend on the

models and assumptions. However in the case of the specific factor model, we have: $G_{Kp} > 0$ and $G_{KK} < 0$. Furthermore since the E function is concave in p, we have $E_{pp} \leq 0$ and since the G function is convex in p, we have $G_{pp} \geq 0$. The term $(E_{pp} - G_{pp}) = \partial M / \partial p \leq 0$ is usually called the volume of trade effect.

Equation (4) shows how an increase in direct investment and/ or an increase in VIE influence the home welfare, commodity price, and the quantity of imports. Let the determinant of the coefficient of the left hand side of (4) be Δ. Under the above assumptions, $(K - \overline{K}) > 0$, and $1 > m > 0$, we see that $\Delta > 0$ as follows:[9]

$$
\begin{aligned}
\Delta = E_u \left\{ (m-1) E_{pp} + G_{pp} \right\} + E_{pu} G_{Kp} (K - \overline{K})(1-m) \\
- m E_{pu} G_{pp} (p - p^*) > 0 .
\end{aligned}
\tag{5}
$$

Using (4) and (5), we consider the effects of direct investment and VIE when both direct investment and VIE exist simultaneously.

5. Effects of Direct Investment

In this section, we take the VIE as given and analyze how an inflow of direct investment affects welfare, commodity price, and volume of imports. In other words, we consider the effects of direct investment in the presence of VIE. On the analyses of capital import and welfare, we have classical papers such as Bhagwati (1958), and Brecher and Alejandro (1977). Using the H-O model, they showed that a capital inflow in the presence of tariffs must be welfare reducing. On the other hand, using a specific factor model, Srinivasan(1983) showed that as the infra-marginal effect of capital import improves welfare, the overall welfare effects of capital import cannot be determined. In this paper, we show that an inflow of direct investment in the presence of VIE may be welfare increasing due to the infra-marginal effect of direct investment. Further, Wong(1995) has investigated the effects of different trade policies in the presence of international trade in goods and factor mobility in more general settings. However no literatures have tried to analyze the effects of direct investment

in the presence of VIE.

Assuming $dm = 0$ in (4), we obtain:

$$\frac{du}{dK} = \left\{ (K - \overline{K})(G_{KK}\left[(m-1)E_{pp} + G_{pp}\right] - (G_{pK})^2) + (p - p^*)mG_{pK}E_{pp} \right\}\Delta^{-1}, \text{(6)}$$

$$\frac{dp}{dK} = \left\{ (K - \overline{K})(1-m)E_{pu}G_{KK} + (p - p^*)mE_{pu}G_{pK} - E_uG_{pK} \right\}\Delta^{-1}, \text{(7)}$$

$$\frac{dM}{dK} = m\left\{ (K - \overline{K})(E_{pu}G_{pp}G_{KK} - E_{pu}(G_{pK})^2) + E_uE_{pp}G_{Kp} \right\}\Delta^{-1}. \text{(8)}$$

Now evaluating (7) at free trade situation, we obtain:

$$\frac{dp}{dK}\Big|_{p^*=p} = \left\{ (K - \overline{K})(1-m)E_{pu}G_{KK} - E_uG_{pK} \right\}\Delta^{-1} < 0. \text{(7')}$$

(7)' implies that at the free trade situation, an increase of direct investment reduces p. Thus we have: $(p^* - p) > 0$. From (6) (8), we obtain: du/dK 0, $dp/dK < 0$, $dM/dK > 0$. We obtain following results.

First, an inflow of direct investment may not be immiserizing. This result is contrary to the common wisdom in the analyses of capital import and welfare. Second, direct investment increases imports and reduces commodity price at given m. Third, the signs of these equations depend on capital trade aspect and commodity trade aspect and these are represented by the terms that contain $(K - \overline{K})$ and $(p - p^*)$ respectively. Since $(K - \overline{K})$ is the inflow of direct investment and $(p - p^*)$ is the price difference, they may be called as the terms of capital import effect and price difference effect respectively. The capital import effect produces a positive effect on welfare. This is due to the fact that an inflow of capital reduces the rental payment of existing foreign capital to the foreign country, which increases the welfare of capital importing country. This effect has been identified by Srinivasan(1983) and he named it as infra-marginal gain. On the other hand, when $(p^* - p) > 0$, the price difference effect reduces welfare because the home country imports by

paying the import subsidy. If the positive infra-marginal gain dominates negative commodity price difference effect, an increase in direct investment increases the welfare of home country. In such a case, the direct investment may be desirable. However if there is no infra-marginal effect, the direct investment in the presence of VIE with import subsidy is always immiserizing. Fourth, it should be noted that all equations (6)—(8) include m. This implies that the magnitudes of the effects of direct investment are influenced by the level of VIE, so that m is considered as a constraint that modifies the effects of direct investment.

From the above, we see that direct investment increases imports and reduces their price while its effects on welfare depend on the strength of the capital import effect and the price difference effect.

6. Effects of VIE

Consider the effects of VIE in the presence of direct investment which are the main topic of this paper. It is shown that in the presence of capital inflow, a VIE can be voluntary. Assuming $dK = 0$ in (4), we obtain:

$$\frac{du}{dm} = E_p \left\{ (K - \overline{K}) G_{Kp} - (p - p^*)(E_{pp} - G_{pp}) \right\} \Delta^{-1}, \tag{9}$$

$$\frac{dp}{dm} = E_p \left\{ E_{pu}(p - p^*) - E_u \right\} \Delta^{-1}, \tag{10}$$

$$\frac{dM}{dm} = E_p \left\{ (K - \overline{K}) E_{pu} G_{Kp} - E_u (E_{pp} - G_{pp}) \right\} \Delta^{-1}. \tag{11}$$

Now evaluating (10) at free trade situation, $p = p^*$, we obtain:

$$\frac{dp}{dm} \bigg|_{p=p^*} = -E_p E_u \Delta^{-1} < 0. \tag{10'}$$

(10)' shows that at the neighborhood of $p = p^*$, p is decreasing by a VIE, so that we have

$(p^* - p) > 0$. Under this assumption, we obtain from (9) (11) that du / dm 0, $dp / dm < 0$, $dM / dm > 0$. This yields the following results on VIE in the presence of direct investment.

First, it is clear that a VIE can be voluntary if it is accompanied by a direct investment. However, we see that since $(E_{pp} - G_{pp}) \leq 0$, the price difference effect reduces the welfare of the home country under an import subsidy. Thus if there is no direct investment, a VIE with an import subsidy is always involuntary for the home country. This provides an interesting suggestion that if a country is obliged to accept a VIE, it should also accepts direct investment. Second, an increase of VIE does increase imports and reduce the price of the second good. These results are the same as the case of direct investment. Third, it is interesting to note that the effects of a market share VIE on welfare and imports are influenced by the initial level of direct investment. Fourth, we see from (9) (11) that the effects of VIE on welfare, commodity price, and imports are proportional to E_p, which is the quantity of demand for the second good.

Now it is necessary to consider the relationship between VIE and direct investment in determining the change of welfare of home country. From (9), we define a new function:

$$\Theta(m, K) = (K - \overline{K})G_{Kp} - (p - p^*)(E_{pp} - G_{pp}). \tag{12}$$

Equation (12) shows the relationships between a VIE and direct investment that determines the effects of VIE on welfare.[10] Figure 1 shows the relationship between $\Theta(m.K)$ and K at a given m. In the Figure, above the $0K$ line, $\Theta(m, K) > 0$ so that we have $du / dm > 0$. Since $\partial \Theta / \partial K = G_{Kp} > 0$, this curve is positively sloped and we can find a critical value of K, $\hat{K}$ that produces $\Theta(m, K) = 0$. We see that $\Theta(m, K) > 0$ for $K > \hat{K}$ and $\Theta(m, K) < 0$ for $K < \hat{K}$. On the other hand, as m increases from m_1 to m_2 as a result of a VIE, the curve will shift down. This is due to the fact that as m increases, K must increase in order to obtain $\Theta(m, K) = 0$. When $m = m_1$, K should be $\hat{K}$ in order to produce $\Theta(m.K) = 0$, which also produce $du / dm = 0$. From the above, we see that as m increases, K must be increased in order to maintain the level of welfare to be constant.

7. Previous Papers on VIE

In this section, we take up a previous paper on VIE and compare it with our results. There are not many papers on the analyses of VIE. Among them, Greaney (1996) is the most seminal paper. We take it up because it deals with the effects of VIE on the profits of two firms which can be used as a criterion for the voluntariness of VIE.

Using a two-firm Bertrand duopoly model, Greaney analyzed the effects of a market share VIE and showed that a small increase in VIE increases the profit of the domestic firm while an equivalent import subsidy reduces the profit of the domestic firm. She also showed that a VIE increases the prices of two goods and that an equivalent import subsidy produces lower prices in home market compared with the initial Bertrand-

Nash equilibrium. On the enforcement mechanism of a VIE, she assumes that the domestic government pressures the domestic competitor to ensure that target is met, while in the case of import subsidy the domestic government subsidizes the foreign firm to reduce its variable cost. In the case of a VIE, she assumes that the government pressures are accompanied by a financial penalty.

In order to focus on the welfare effect of a VIE, we set up a model of market share VIE with import subsidies and analyze the welfare effects of VIE in the presence of direct investment. Our analysis has following features. First, we introduced an enforcement mechanism. Based on the experience of semi-conductor agreement, it is clear that a moral suasion on domestic producer has no enforcement power. On this aspect, Greaney suggests that an import subsidy is preferable because it reduces prices and has enforcement power. Second, while focusing on the effects of a VIE on the profits and prices of two firms, she did not take up the welfare of the domestic country as a whole. In contrast, we take up the voluntariness of a VIE in the presence of direct investment and showed that a VIE with an import subsidy reduces the welfare of the domestic country. Further we showed that if a VIE is accompanied by direct investment, it may be voluntary to the domestic country. Third, we showed that a VIE with import subsidy increases imports and reduces the price of imports, which are

the same as Greaney. Thus our analysis is another contribution in this aspect.

8. Previous Papers on Capital Import and Welfare

Since our analyses are related to capital imports and welfare, we compare our results with some previous works in the analysis of capital import and welfare. Different types of model can be considered depending on the emphases in the analyses. Even in the case of a small open economy with import tariffs or quotas, we already have many papers such as Dei(1985a), Hamada(1974), Jones(1984), Khan(1982), and Wong (1995) as well as Brecher and Alejandro(1977),among others. Except for Wong(1995), these papers dealt with the cases where the level of imports is reduced by import tariffs or quotas. In contrast, this paper considers the other side of the problem: the level of imports is expanded by a VIE with import subsidies. In this section, we compare our analyses with some of these papers and point out the differences and similarities.

Using a standard small country model, Brecher and Alejandro (1977) showed that when the host country imports capital intensive goods under incomplete specialization and when full repatriation of returns of investment is made, capital inflow must reduce the welfare of host country for a tariff- imposing small country. In their model, capital imports always reduce the welfare of the host country because the capital inflow reduces the quantity of trade. They also pointed out that if an alternative trade subsidy is used, the net inflow-impact would be positive. In contrast, this paper showed that a capital import would be beneficial. However we showed that a VIE without capital import is immiserizing. It is shown that the total effects depend on the capital import effect and commodity import effect.

Using the duality approach, Dei(1985a) analyzed the case of import quotas and showed that an inflow of capital improves the welfare of host country when import quotas are constant. In his analysis, the improvement of welfare is based on the reduction of the proceeds of payment of initial foreign capital induced by the additional importation of capital and the same result has been obtained by Srinivasan(1983). In this paper, we extended the analysis to the case of VIE by the use of import subsidies and added the commodity price effect in order to determine the welfare effects of capital

import and VIE. Furthermore, we considered the welfare effects of VIE with foreign investment.

Wong(1995) considered the effects of different trade policies in the presence of international trade in goods and factor mobility. He extended the analyses by considering the optimal policies for the home country when both commodity trade and capital movement exist. He also presented an approach how the welfare of a country is affected by the volume of trade and the level of capital movements. On the effects of a capital inflow on the welfare of a small home country, he also considered the effects of trade restrictions by tariffs and quotas using indirect trade utility function and confirmed the earlier results in these aspects. However he did not take up the case of capital import under VIE by an import subsidy.

Compared with these previous works, this paper introduces a VIE by the use of import subsidy in the analyses of international capital movement and considered how a VIE and direct investment are related in determining the welfare of an importing country.

9. Conclusions

Today, commodity trade in the form of VIE and factor trade in the form of direct investment are proceeding simultaneously. By taking into account of the features of direct investment, we considered the welfare effects of VIE in the presence of direct investment and the welfare effects of direct investment in the presence of VIE. It is shown that a VIE may be voluntary if it is accompanied by a direct investment and that both direct investment and VIE increase the quantity of imports and reduce the price.

It should be noted that our results depend on the model and its assumptions. First, we focused on the effects on the home country and did not consider the impact on the foreign country. This may be justified since we focus on the voluntariness of VIE in an importing country. Second, we assumed that the full repatriation of proceeds is made and that the VIE is enforced by the import subsidy of the home country. The case of partial repatriation and another enforcement mechanism may be introduced. Third, we assumed that the level of welfare of the home country is given as u and did not consider its contents. If an expansion of imports reduces the price of imports, it will benefit

consumers and hurt producers in the import competing sector. Our assumption may be justified for the simplification of the analyses. Fourth, since we analyzed the effects of exogenous direct investment and VIE, in general we introduced two distortions into the model. Thus the welfare effects depend on whether these two policies increase or decrease the level of distortions in the economy.

Despite these limitations, the results of this paper provide a following interesting suggestion: Suppose a country is obliged to accept a VIE, it should also accept an increase of direct investment. Since some developed and/or developing countries are obliged to accept VIE in the presence of direct investment, our analyses provide a justification for the claim that a VIE might be voluntary in such countries.

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Notes

[1] On the analyses of voluntariness of VER, we have, for example, Mai Chao-Cheng and Hong Hwang(1988).

[2] On the analyses of VER with international capital movement, we have already papers such as Dei(1985b) and Neary(1988). Analyses of direct investment in relation to VER started from Bhagwati(1987).

[3] Qiu and Spencer(2001) divided VIE into three types: content VIE, market share VIE, and total value VIE. In the case of automobiles, they are explained as follows: the content VIE requires that autos produced in Japan achieve at least some specified US content per auto. The market share VIE requires Japan to meet a market share target of imported parts and the total value VIE requires that Japan imports a given total value of US parts. On the other hand, developing an oligopolistic model, Ishikawa(1999) focused on the effects of an expansion of the purchase of foreign intermediate goods on output, prices, and profit rather than on welfare. On the types of VIE, he separated VIE into the quantity VIE and market share VIE and showed specifically that the effects are reversed in the two cases. However, the market share VIE is most popular among these.

[4] As in the cases of semi-conductor and autos trade between US and Japan, we assume that the initial small share of imports is due to the higher price of foreign good than that of domestic good. Further it is assumed that an import subsidy is used in order to reduce the price of foreign

good to the level of domestic good. Thus at the initial free trade, we have: $p^d < p = p^*$, where p^d, p, and p^* are the relative price of domestic good, domestic price of foreign good, and foreign price of foreign good. In order to increase the share of imports, assume that an import subsidy is introduced and that the domestic price of foreign good is reduced to the level of domestic good. Thus as a result of a VIE by import subsidy, we have: $p^d = p < p^*$.

[5]   An exception is Krishna et.al.(1998).In the case of 1986 semi-conductor agreement, MITI was responsible for the target. However since it had no explicit policy instruments, it used the moral suasion and administrative guidance with implicit threat of penalties. It enforced an affirmative action policy against the resistance of the Japanese firms. This created much tension between MITI and the Japanese semi-conductor industry.

[6]   Irwin(1994) gives us important lessons on VIE from the US -Japan semiconductor agreement. Specifically he identified that a VIE diminishes competition and that it is arbitrary and discriminatory. We agree with him that it is arbitrary and discriminatory. However we show that it increases competition and reduces the price of imports.

[7]   Grossman and Helpman(1994) developed a new general model to explain the equilibrium structure of trade protection where special interest groups make political contributions in order to influence the government's choice of trade policy. We should note that today the trade policy of a country is affected not only by the pressure of interest groups within a country but also by that of foreign interest groups.

[8]   This type of approach was used in the case of the Japan-US semi-conductor agreement. However there was discord on the interpretation of the agreement between the US and Japan: the USTR interpreted it as a "promise" while MITI considered it as an "expectation". Later MITI officials swore that such an agreement should not be adopted in the future. In this connection, in the economic analyses of the strategic trade policies such as Brander-Spencer(1985), many papers assume models with non-cooperative game. This may be due to the fact that there is little international law and no international mechanism to enforce the contracts. However in reality the cooperative games are more popular in international trade

agreements. It may be said that new protective trade policies such as VER and VIE were devised in order to fill this gap. These result-oriented trade policies have some enforcement mechanisms because they are produced as a result of a cooperative game between the two governments.

[9] It will be shown that $(p^* - p) > 0$. It is clear that if $(p^* - p) \geq 0$, we have $\Delta > 0$.

[10] Θ is also a function of p. However p is determined by m and K, so that Θ is a function of m and K. This aspect is based on the suggestions from Kar-yiu Wong.
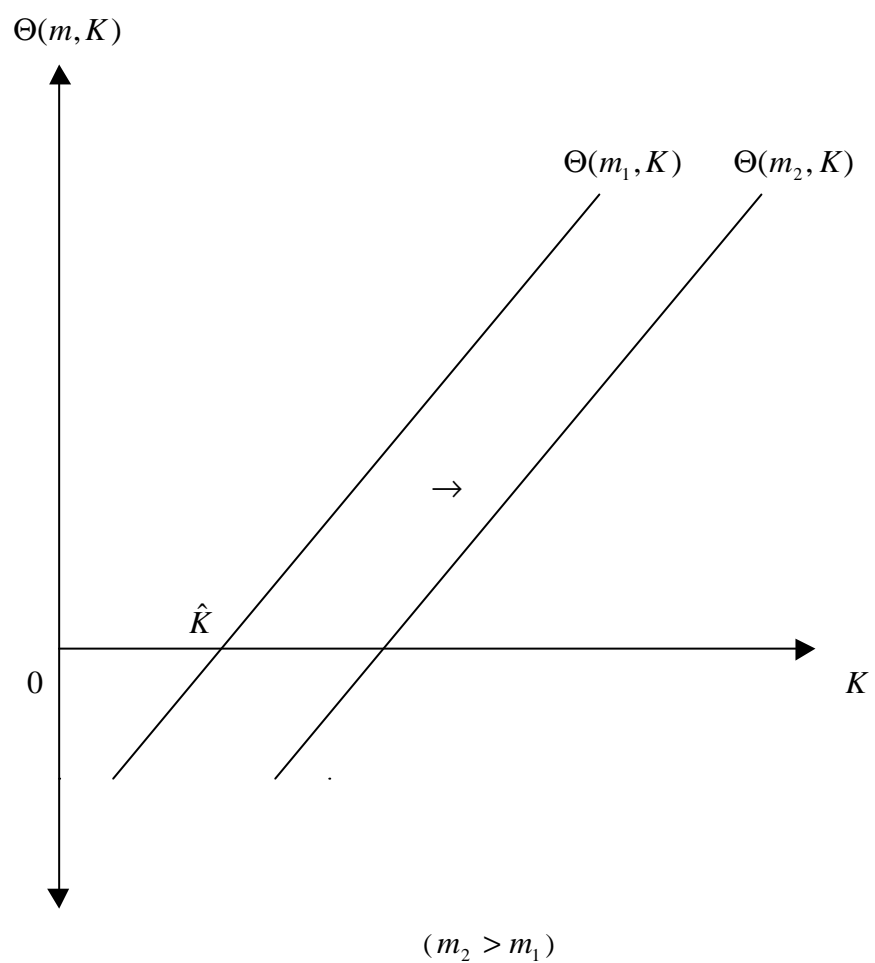
$\Theta(m,K)$

$\Theta(m_1,K)$ $\Theta(m_2,K)$

$\rightarrow$

$\hat{K}$

0

K

$(m_2 > m_1)$

Figure 1