# An International Duopoly Model of Multinational Enterprise and Exchange Rate Pass-Through Strategy: Business Implications and Policy Debates

## Piriya Pholphirul[*]

*This paper provides theoretical justification of Foreign Direct Investment (FDI) effect on the extent of exchange rate pass-through by deriving the standard Cournot fashion of international duopoly. Preliminary results of theoretical framework indicate that FDI will affect on lowering degree of exchange rate pass-through and generates higher degree of Pricing-to-Market behavior. This results are intuitively explained by analyzing the business implications under performance orientation, sourcing and location, distribution systerm, and brand loyalty that determine the multinational's strategic pricing. Finally, this paper generates some policy debates relating to monetary policy, international trade, and competition policy.*

*Field of Research:* Economics, Multinational Enterprise

## 1. Introduction

The relationship between exchange rates and international price-setting is one of the most striking topics of international business studies. Called exchange rate pass-through, it refers to the response of import prices to exchange rates. Another terminology, Pricing-to-Market is referred to price discrimination across export markets induced by the exchange rate volatility. Initially, the model of balance of payments assumed a one-for-one response of import/export prices to exchange rate as "full" or "complete" exchange rate pass-through. However, several studies suggest that exchange rate pass-through is less than complete where the prices of foreign products sold in the domestic market change by a lower percent than do exchange rates.[1] During the end of 1990's to present, exchange rate pass-through has been extended to explain optimal monetary policy with consideration of exchange rate flexibility. Devereux and Engel (2000) explain that, when prices are not very responsive to exchange rates or less degree of exchange rate pass-through, monetary policymakers cannot rely on the exchange rates to provide the necessary adjustment to real shock. As the result, customers in that country do not interpret exchange rates change as relative price changes.[2] Another importance of studying exchange rate pass-through is to explain market competition status of traded goods. The rise of imperfect competition and strategic trade theory led researchers to estimate exchange rate pass-through at the industry level. Incomplete pass-through also explains when markups of price over marginal cost change with exchange rate changes and perform as nonzero markups. Because the nonzero markup is a deviation against the perfect competition condition, incomplete exchange rate pass-through validates the shift toward models of imperfect competition. Therefore, exchange rate

[*]School of Development Economics, National Institute of Development Administration (NIDA) Serithai Road, Klong-Chan, Bangkapi, Bangkok, Thailand, 10240. Email: piriya.p@nida.ac.th

pass-through and Pricing-to-Market behavior always exists when an international firm engages in export/import activities and can control traded good prices in its international market.

However, international trade is not the only one method to capture international markets. Exporting firms can behave another way by investing aboard through the Foreign Direct Investment (FDI). In the modern era, about two-third of total traded volumes is organized within multinational enterprises: parent firms and their affiliates/ subsidiaries. Regarding to the U.S. data from the Bureau of Economic Analysis (BEA) in 1998, 68% of U.S. international trade made within and by the multinational firms and their affiliates, which provides the evidence that foreign direct investment and degree of multinationals should have effect on export firms' pricing strategies. These motivations build up the ideas to extend more on the scope of allowing the physical capital to mobile across countries and how the inflows of foreign direct investment should affect to (higher or lower) the firms' Pricing-to-Market behavior of multinational enterprise and its extent of exchange rate pass-through. In Section II, the derivation of international duopoly model between a foreign multinational corporation and a domestic firm will be presented to show how foreign direct investment flows affect to degree of exchange rate pass-through. Section III intuitively explains the business implications of the results of international duopoly model derived in Section II. Section IV discusses the policy debates related to the results. Section V concludes.

## 2. Model of International Duopoly

Regarding to the Multinational Corporation Model of Wong (1995), begin with considering three types of inputs: *K*, which is capital input in source country that is perfectly inelastic and not a public good in nature. *R* (for R&D), which includes those types of technological advantages and managerial advantages that are not market specific but have public-good nature. Therefore, transfer of *R* from one country does not have any effects to other factor users in another country. *L* is labor employment in source country where labor can move across industries but not across countries. Here, consider an industry of goods produced in two countries. International firm can either produce goods and export to domestic market or go multinational through the foreign direct investment. Denote the amounts of the two advantages initially owned by foreign multinational firm by $\overline{K}$ and $\overline{R}$, respectively, where, in the short run, endowment $\overline{K}$ and $\overline{R}$ are assumed fixed. The production function of the foreign firm or parent firm is given by

$$Q^* = f(K^*, R^*, L^*)$$

Where $Q^*$ is the output of parent firm produced and consumed in the source country and $K^*$, $R^*$, and $L^*$ are, respectively, the input factor of capital, R&D and technology, and labor input to produce $Q^*$. Because of the public-good nature of factor $R$, the multinational firm can use the full amount of the factor even if it is going to a subsidiary in another country. This means that $R^* = \overline{R} = R$. The production function of multinational firm producing in source country is

$$Q^* = R^* f^*(K^*, L^*)$$

Where the partial derivatives with respect to capital ($f_{K^*}^*$) and labor ($f_{L^*}^*$) are positive. The cross-partial derivative with respect to labor and capital ($f_{K^*L^*}^*$) is also positive. All other second derivatives of own factor ($f_{L^*L^*}^*$ and $f_{K^*K^*}^*$) are negative.

Suppose now that parent firm is considering to setting up a new subsidiary in the host country. To invest there, it has to transfer its own advantageous factors $K$ and $R$. As explained previously, the public-good nature of factor $R$ means that the parent firm's use of the factor is not affected by such investment. However, this is not true for factor $K$, which lack this public-good nature. Transfer of capital $K$ from parent country to host country is then considering the degree of foreign direct investment. Given a perfectly inelastic supply of $K$ (at least in the short run) and denoting $K$ is the amount of capital transferred for subsidiary uses in host country. The amount of this factor left for production in source country is $K^* = (\overline{K} - K)$. Substitute $K^*$ and $R$ to the above functions and generate the production function of multinational firm in its source country as follow:

$$Q^* = \overline{R} f^*(\overline{K} - K, L^*) \tag{1}$$

The partial derivative of source country production with respect to transfer amount of $K$, $f_K^*$, are negative and its second derivative, $f_{KK}^*$, is also negative.[3] Wong (1995) also explains the concept of consumer recognition advantage, which happens when consumers have preferences in the firm's favor. A firm that has this advantage can expect high degree of royalty from consumers. In model, assume that foreign firm which initially goes multinational and invests in a new country should face some consumer recognition disadvantage. Because consumers in a market often trust products that have been around for a long time and discriminate against product from other countries, multinational firm that invests in a new country has to compete with local product. Thus, by assume that parent firm should face some market and consumer recognition disadvantages, the production function of multinational firm's subsidiary in the host country is

$$Q = \psi \overline{R} \cdot f(K, L) \tag{2}$$

$\psi$, which is $0 \le \psi \le 1$, represents the extent of parent firm's disadvantages in local market. Lower $\psi$ implies higher extent of difficulty of multinational firm to operate in a host country.[4] $Q$ is the output of subsidiary plant, $K$ is capital input transferred from the parent firm in source country, and $L$ is domestic or local labor employed by subsidiary firm. The public-good nature of $\overline{R}$ allows the subsidiary to use the same amount of this factor without affecting the parent firm's ability. The amount of capital $K$ is what foreign parent firm brings to the host country considered the "degree of foreign direct investment"

There is a domestic firm in host country producing the same product with fixed amount of domestic R&D ($r_d$), domestic capital ($k_d$), and labor employment of local firm ($l_d$). The production function of domestic firm is as follow:

$$q = q(k_d, l_d: r_d)$$

Where the production function is concave, strictly increasing, and twice differentiable in $k_d$ and $l_d$. To focus the analysis on the foreign direct investment to host country, we assume that local firm in host country has no intention to invest or export its production to source country. Thus, the production by domestic firm is only for consumption in local market.

To determine relationship between level of foreign direct investment exchange rate pass-through in this international duopoly model, we have to discuss two actions of multinational firm: to produce goods and export its output to host country or fulfill consumption in host country with output produced by its foreign subsidiaries (foreign direct investment). In analyzing the export-investment decision, most paper share the common assumption that export and foreign investment are two mutually exclusive options.[5]

Consider a simultaneous game in which parent firm locating in source country and local firm locating in host country have to make decisions to take action at the same time in the Cournot fashion framework. Local firm maximize its profit by taking the total production of foreign subsidiary in local market, $Q$, as given as follow:

$$\max_{\{P\}} \quad \Pi = \left[P - MC\right]q(k_d, L : r_d) - FC$$

$$\Pi = \left[P - MC\right]\left[\frac{E}{P} - \psi \overline{R} f(K, L)\right] - FC \tag{3}$$

Where $P$ is the local price of good determined in domestic (host) country currency and $MC$ is constant marginal cost of production in host country. $E$ denotes as total expenditure of good in local market and $FC$ denotes as fixed cost of production. From the profit function of local firm, the first-order condition of this problem is

$$\Pi_P = \frac{MC.E}{P^2} - \psi \overline{R} f(K, L) = 0 \tag{4}$$

Where the subscripts denote partial derivatives, condition above can be differentiated to give

$$\Pi_{PP}\partial P + \Pi_{PK}\partial K = 0 \tag{5}$$

Therefore, the degree of local currency price changes ($\partial P$) over change of direct investment inflows ($\partial K$) is equal to the ratio of second derivatives of profit function $\dfrac{\partial P}{\partial K} = -\dfrac{\Pi_{PK}}{\Pi_{PP}}$ In addition, the second-order derivatives of function $\Pi$ are equal to

$$\Pi_{PP} = -\frac{2E.MC}{P^3} < 0 \tag{6.a}$$

$$\Pi_{PK} = -\psi \overline{R} f_K < 0 \tag{6.b}$$

The sign of these second-order derivatives of price are negative due to the condition of profit maximization. Note that there is a one-to-one correspondence between parent firm investment and its total foreign direct investment $f(K,L)$. This would invert condition to give the reaction function of local firm between price and level capital inflow from the foreign direct investment as $P = \phi(K)$.

The reaction function as given above can be illustrated by schedule $HH$ in Figure 1. Its vertical intercept represents local firm's local price when no investment comes from the parent country. Its slope can be obtained by rearranging condition to give

$$\left.\frac{\partial P}{\partial K}\right|_{HH} = \phi'(K) = -\frac{\Pi_{PK}}{\Pi_{PP}} = -\frac{\psi \overline{R} P^3 \cdot f_K}{2E.MC} < 0 \qquad (7)$$

To explain the slope of local firm *HH* reaction function, which is negative, local firm charges lower price with higher degree of direct investment inflow. Moreover, higher direct investment inflow causes slope of reaction function *HH* flatter due to smaller $f_K$. Simultaneously, foreign multinational firm maximizes its profit by choosing optimal local price setting (*P*) and amount of capital transfer to local production (*K*). The multination firm can simultaneously produce in source country or produce goods in host country through its affiliates. The joint profit function is then equal to

$$\max_{K,P} = \Pi^* = \left\{ \underbrace{\left[\frac{1}{e}(P-t)-MC^*\right] f^*\left(\overline{K}-K,L^*\right)-FC^*}_{profit\ from\ produce\ and\ sell\ in\ source\ country} \right\} + \frac{1}{e}\left\{ \underbrace{\psi \overline{R} f(K,L)[P-MC]-FC}_{profit\ from\ produce\ and\ sell\ in\ host\ country} \right\} \qquad (8)$$

This profit function represents the allocation of capital used by foreign firm whether to produce and sell within country ($K^* = \overline{K}$ -*K*) or to set plant and produce aboard (*K*). *e* denotes nominal exchange rate measuring host country's currency over source country's currency. *t* is trade barrier such as tariff and transportation. The multinational firm chooses to optimize value of *K* and *P*, which regards as the level of foreign direct investment and local currency pricing respectively, to maximize its joint profit. The first-order necessary condition implies that

$$\Pi_K^* = \left[\frac{(P-t)}{e}-MC^*\right]\cdot f_K^* - \left[\frac{\psi \overline{R} f_K (P-MC)}{e}\right] = 0 \qquad (9.a)$$

$$\Pi_P^* = \frac{1}{e}\left[f^*\left(\overline{K}-K,L^*\right)+\psi \overline{R} f(K,L)\right] = 0 \qquad (9.b)$$

Similarly to the local firm, but because multinational firm has international operation, it also considers changes of exchange rate as one of the decision. Totally differentiate its first-order condition given by (9) yield:

$$\Pi_{KK}^* \partial K + \Pi_{KP}^* \partial P + \Pi_{Ke}^* \partial e = 0 \qquad (10)$$

Second derivative equations can yield as follow:

$$\Pi_{KK}^* = \left[\frac{(P-t)}{e}-MC^*\right] f_{KK}^* - \left[\frac{\psi \overline{R}(P-MC)}{e}\right] f_{KK} < 0 \qquad (11.a)$$

$$\Pi_{KP}^* = \frac{f_K^* - \psi \overline{R} f_K}{e} > 0 \qquad (11.b)$$

$$\Pi_{Ke}^* = \frac{\psi \overline{R} f_K (P-MC)-(P-t)f_K^*}{e^2} > 0 \qquad (11.c)$$

We assume that multinational firm produce goods in source country than to produce in host country, so that it allocates less amount of international capital transfer, *K*, than what it has left

in source country for production in source country, $\overline{K} - K$. From this condition, gain from marginal product in producing goods in host country is higher than the loss of marginal product in producing in domestic country ( $\psi \overline{R} f_K > f_K^*$). Assume a positive amount of foreign investment; the foreign firm's first order condition given by (11) can be inverted to give the multinational firm's reaction function $P = \varphi(K, e, t)$. This function is illustrated by schedule *FF* in Figure 1. Because $\Pi_{PK}^* = \Pi_{KP}^*$, the reaction function of a foreign multinational is illustrated by schedule *FF* with slope equals to

$$\left.\frac{\partial P}{\partial K}\right|_{FF} = \varphi'(K:e,t) = -\frac{\Pi_{KK}^*}{\Pi_{KP}^*} = \frac{f_{KK}\left[\psi \overline{R}(P - MC)\right] - f_{KK}^*\left[P - t - e.MC^*\right]}{f_K^* - \psi \overline{R} f_K} > 0 \qquad (12)$$

Regarding to the Figure 1, the intersection of both reaction functions represents the *Nash Equilibrium* of the optimal value of foreign investment and local price setting. Assume that foreign multinational firm has a positive amount of investment in the host country, combine conditions (5) and (10) together to show in this following matrix

$$\begin{bmatrix} \Pi_{KK}^* & \Pi_{KP}^* \\ \Pi_{PK} & \Pi_{PP} \end{bmatrix} \begin{bmatrix} \partial K \\ \partial P \end{bmatrix} = -\begin{bmatrix} \Pi_{Ke}^* \\ 0 \end{bmatrix} \partial e \qquad (13)$$

Define $|D|$ as the determinant of the matrix on the left-hand side of (13) then substitute with the second order derivatives of the firm' profit function. The second-order sufficient condition holds that

$$|D| = \Pi_{KK}^* \Pi_{PP} - \Pi_{KP}^* \Pi_{PK} > 0$$

Using the comparative static to solve condition, the result shows effect of appreciation of foreign currency (source country's currency) or depreciation of local currency (host country's currency), which means increase of $e$, on local-currency price ($P$) and inflow degree of foreign direct investment ($K$)

$$\frac{\partial K}{\partial e} = -\frac{\Pi_{Ke}^* \Pi_{PP}}{|D|} > 0 \qquad (14.a)$$

$$\frac{\partial P}{\partial e} = \frac{\Pi_{PK} \Pi_{Ke}^*}{|D|} < 0 \qquad (14.b)$$

The volatility of exchange rate will stimulate change in direct investment and local pricing. If price ($P$) holding constant, then the effect of increase in exchange rate ($e$) is given by $-\Pi_{Ke}^* \Big/ \Pi_{KK}^* > 0$. Thus, the reaction function *FF* shifts to the right to the new reaction curve is *F'F'*. Local-currency pricing reduces from the depreciation of host country's currency or appreciation of source country's currency. However, the reduction in price is not in a full amount. The Cournot international duopoly model then illustrates incomplete or partial exchange rate pass-through in which price setting in local currency does not change as the full amount of change in exchange rate. Based on Figure 1, new equilibrium point changes from *E* to *E'*. The new equilibrium *E'* shows that appreciation of source country's currency or depreciation of local currency causes reduction of export price in local currency ($P$ decreases) and higher volume of direct investment inflows ($K$ increases).

This result of exchange rate volatility to traded good price ($P$) and degree of direct investment is not surprising and reasonable explain.   Appreciation in the source country's currency or depreciation in the host country currency causes increase in exchange rate parameter $e$, which mean lower imported price in host country's currency. Price will be cheaper for the consumers in host market. $P$ then reduces as shown in the figure.  In addition, increase in exchange rate causes more foreign direct investment ($K$) from home country flowing into the host country. There are a number of literatures explain in this statement.[6] Alternatively, this result could arise if sectors have limited export markets in comparison with their reliance on imported inputs into production.   In this case, depreciation of host market currency would increase the cost of production in those industries.  Anyway, we are considering effect of exchange rate volatility on traded good price ($P$) rather on level of capital investment.

If degree of foreign investment is high ($K$ is high), slope of $HH$ will be flatter, let say $H'H'$, and the new equilibrium from exchange rate volatility move from point $E'$ to point $E''$ as illustrated in Figure 1. It is obvious to see from the equilibrium point that effect of exchange rate volatility (depreciation of host country's currency) lower the degree of pass-through when there is higher degree of direct investment. Therefore, the international duopoly model derived in this Section supports  to the argument that the strategic local-currency pricing, or pricing-to-market, is also depended on higher degree of foreign investment inflows should traded goods is operated under the multinational enterprises.

*Figure 1.* The reaction functions between a domestic firm and a multinational corporation between Level of Investment (*K*) and local currency pricing (*P*)
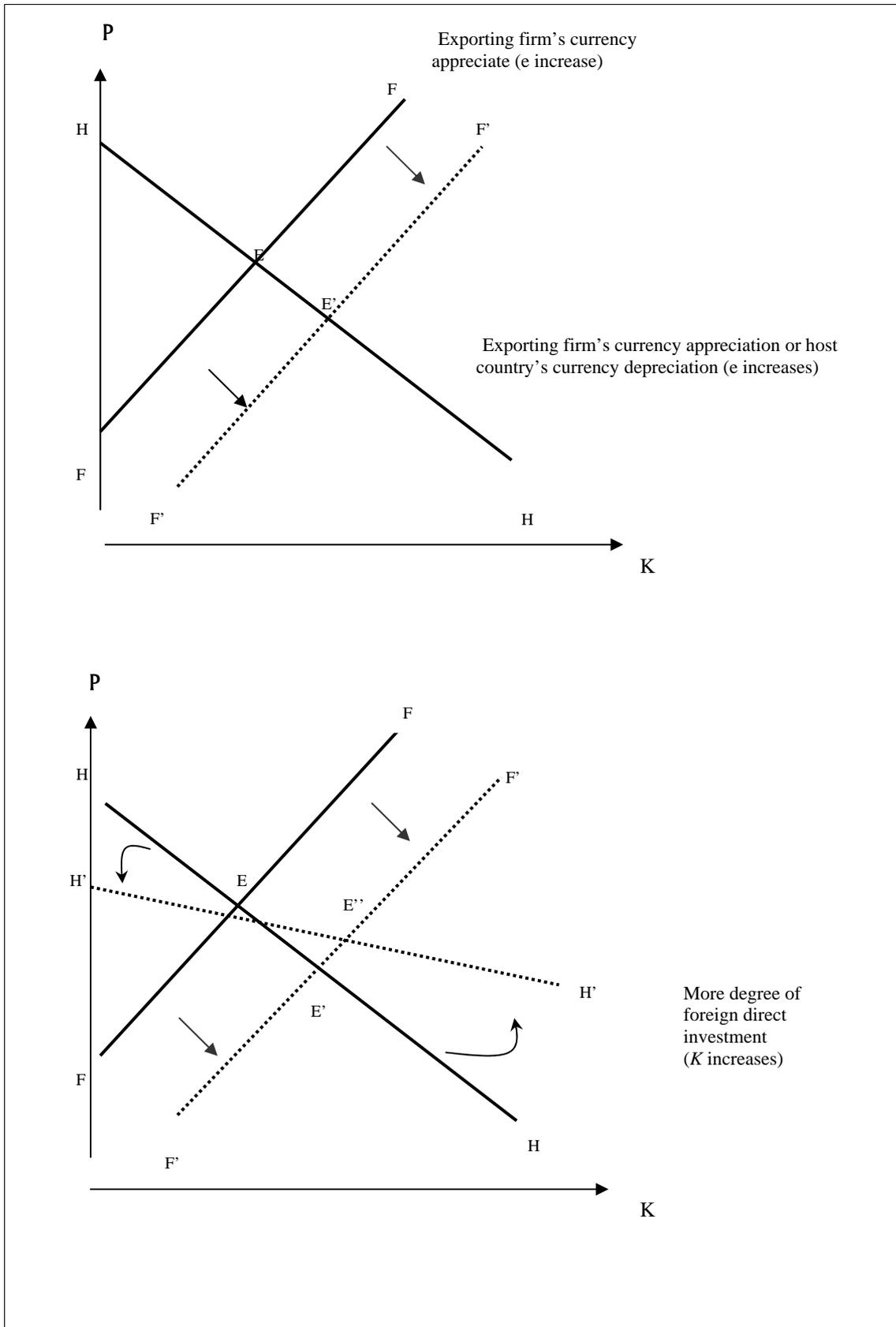
## 1. Business Implications

The intuition of this result can be interpreted to mean that when foreign firms invest more in the domestic country, firms will capture and gain some advantages in the local market and have some market power to markup or maintain their prices over costs. Firstly, the multinational firm is owned privately and directly in its production process and production technique. The most important feature of this technological advantage is that they are like a public good to the firm so that they are easy to transfer among firms and its subsidiaries whether in the domestic or international market. Foreign firms can increase the use of technology without having to pay any additional costs (or not significant if additional costs are required). International firms then earn power to the adjust price they sell in the local market. Secondly, higher foreign direct investment generates a consumer recognition advantage. This firm-specific advantage helps tilt consumers' preference. A firm that has this advantage can expect a certain degree of loyalty from customers. In term of the multinational firm, as a firm goes multinational and invests in a new country, the good will, brand name and consumer loyalty it earns in its own market useful in the host country. For example, McDonald's opens a new restaurant in China. Although the degree of consumer recognition depends on distance and cultural differences between countries, it is still possible that the consumer will already believe in the quality of firm's products.

Moreover, if the multinational corporation is already exporting its products to the host country, it is even easier for a firm to build up consumer recognition. Thus, should the foreign firm earn more recognition and brand loyalty in the local market, the firm earns market power and can maintain or control price within exchange rate volatility. However, it can be argued that a foreign firm's product is often more trusted by the consumers in its home market than by those in the host country. As the result, consumers in host market may trust the products, which have been sold for a long time and discriminate against products from other countries. Thus, this closed substitute product can be a consumer recognition disadvantage, which is measured by $\psi$ in the model. Lastly, the firm gains market and input advantage from investment aboard. Multinational Corporation has knowledge of the specific market it serves such as consumer preference, strategies, and other information based on the volume of foreign investment. The firm gains more market power from obtaining knowledge within a specific market.[7]

Some literatures also indirectly investigate the relationship between multinational corporations and their exchange rate pass-through strategy. For example, Gron and Swenson (1996) explain that the incomplete exchange rate pass-through existing when firms are able to shift their production across countries or alter their location of acquiring input. Multinational firms can acquire input either from host countries or from domestic country, which enhances ability of multinational firms to produce in multiple locations and gives more flexibility to adjust to changes in input price, resulting in a smaller pass-through of exchange rates on prices. This can imply the effect of foreign direct investment for local production on pass-through elasticity. Rangan and Lawrence (1993) use the export price index issued from the Bureau of Labor Statistics (BLS) showing that the real U.S. export prices do not change much if there is high share and high level of intra-firm export between parent companies and their foreign affiliations. Another recent research paper from Yoshida (2001) simply estimate that firms setting their own *distribution agent* affect on reducing pass-through effect of yen on Japanese export prices. The results from these three articles seem to support my future research that outward foreign direct investment and capital outflow likely to decrease the degree of exchange rate pass-through, which increase the degree of markup in local-currency pricing strategies that multinational firms should have.

However, two papers from Desiraju and Shrikhande (1996) and Yoshida (1999) sound contradicting. Desiraju and Shrikhande (1996) study the effects of the international distribution channel (e.g., a dealer, an import jobber, or a retailer) in the foreign market on exchange rate pass-through. The magnitude of the pass-through depends on the present of an incentive problem in the distribution channel. When there is no incentive problem, pass-through is complete; however, when there is an incentive problem, pass-through depends on various characteristics of intermediary and the market setting. Yoshida (1999) extends works of Desiraju and Shrikhande by examining an explicit incorporation of local distributors in an analysis of pricing behavior of exporting firms. He shows that the degree of exchange rate pass-through becomes more complete if there is the vertical integration between parent firm, which is the exporter, and local distributor firm in the local market.

Moreover, because capital markets are usually not perfect, the international firm can invest more by raising capital or accessing raw materials and intermediate products at a lower cost as well as an average cost. To consider cost changes and effects from direct investment inflows, Gron and Swenson (1996) explain that exchange-rate-induced increases in prices of foreign inputs occurs because of the following three reasons: 1) foreign input cost, 2) the firm's ability to substitute between foreign and domestic input, and 3) the firm's ability to substitute between products from plants in different locations. Thus, if multinationals can invest and produce goods in multiple locations, the firm can adjust to change in input prices with little change in cost. This results in a smaller price response and lower pass-through.

When the Multinational Corporation wishes to invest in another country, it tries to bring its ownership advantages with the investment. The Multinational firm not only brings financial capital for investment, but also borrows extensively from the financial markets in the host country. As explained earlier, capital markets are not generally perfect and can be interpreted to have two consequences. First, the opportunity cost of retained earnings of a firm is less than the cost of borrowing from a domestic. Second, for subsidiaries, it may be cheaper to borrow in the host country than in the source country because banks usually trust firms in the local market more than firms in another country (Wong, 1995). Froot and Stein (1991) examine the connection between exchange rates and foreign direct investment that arises when global capital markets are subject to informational imperfections. These imperfections cause external financing to be more expensive than internal financing. This model of an imperfect capital market also determines international capital flows and foreign direct investment.

Another point to consider is the positive relationship between foreign direct investment and market power based on a study by Kindleberger (1969). A multinational corporation is treated as an organization that allocates resources to maximize the profit it receives. The opportunities to invest aboard allow it to allocate resources across countries and increase its profit further. However, a number of theories treat multinationals as not just an organization but also an organism; one that has to feed itself and grow. "In growing [firms] may well go aboard: in going aboard, they grow aboard" (Kindleberger, 1969, page 6). Thus, the firm investing aboard would like to secure their profit and market power, which include its monopoly power of its output side and perhaps monopsony power of its input side.

In sum, the basic intuition of the results found from the international duopoly model and what explained by other literatures might be able to explained why foreign direct investment reduces degree of exchange rate pass-through. These implications are analysed as follow:

### 3.1) Performance Orientation.

Direct investment can enhance firm's market performance. That performance can be increase because of specific knowledge or managerial skills that usually come with direct investment. A performance orientation relates to how the firm defines and measures market success. Firms sometimes aim to different performance goal. In the marketing literature, discussion of

performance orientation usually deals with market based rather than finance-based measures. Such differences in performance orientation will affect the extent of exchange rate pass-through. As direct investment enhance firm's performance and try to earn market share in host market, firms pricing to maximize export market share will seek to lower export market prices and hesitate to raise them, even when exchange rates volatile. Therefore, when exporter's country currency appreciates, market share-oriented multinational corporations tend to pass-through less of the cost increase in the export market. However, firms pricing to maximize a financial performance measure would more likely to focus on expanding margins whenever possible. Then degree of pass-through of financial-targeting firm will be more than that of the market-share targeting firm.

### 3.2) Sourcing and Location Strategy.

Direct investment aboard also reduces cost from sourcing strategy. For example, during the mid-1980s when the U.S. dollar depreciated sharply, U.S. firm would find it increasingly difficult to use foreign supplies because they have to pay higher in U.S. dollar term. However, firm that engage in direct investment or international production usually can switch suppliers from different places. Moreover, many times that multinational firm that invests aboard will sign contract with suppliers on a long-term basis as well as fixed input price. Therefore, costs of production of firm would not be tremendous affected from exchange rates volatility. Firm with global operations can shift supply locations from one country to another to overcome the effects of adverse exchange rate fluctuations. That is, firm can readily relocate their sourcing locations of more favorable currency if number of international supplier location increase. This is then obvious that direct foreign investment by production in different countries reduces degree of exchange rate pass-through. In conclusion, firms using international suppliers on a long-term contract tend to pass-through less of the exchange rate fluctuation than those relying on sport purchases of supplies. Moreover, firms with many alternative sources of supplies tend to pass-through less of the exchange rate fluctuations than those with few such suppliers.

### 3.3) Distribution System.

Multinational enterprises with do foreign direct investment can happen in term of establishing their own distributors rather than hiring local distributors. Three factors to consider roles of distribution system are *Intensity of distribution, Channel length,* and *integration of distribution.* Distribution intensity is important for example; firm is unable to respond to increase demand if firm has low distribution intensity or maybe only single importer/distributor responsible for setting contracts with retailers. This situation called "bottleneck effect". If exchange rate change is temporary, using alternative direct investment to expand distribution will not likely feasible, because of the time limiting. However, for more permanent exchange rate changes, direct investment by foreign corporation to expand distribution intensity may reduce bottleneck effect and price will fall proportionately, leading to increased market share. Therefore, in a currency appreciation of exporting country, the degree of exchange rate pass-through is positive related to the firm's intensity of distribution in the export market. This result is similar to the result from Yoshida (2001).

For the channel length and integration of distribution, the relationship between channel length and exchange rate pass-through also implies the positive relationship in that increase in channel length implies an increase in degree of pass-through. One explanation is, for example, channel distribution is vertical. There are seller and buyer and independent actors will act to optimize their own position. That is, they will pass-through and/or absorb changes as it suits them. However, channel integration can be measured in terms of the degree to which firms own their channel intermediary. Foreign direct investment then obviously increases degree of channel integration. Degree of exchange rate pass-through reduces in high degree of channel integration because firms do not have to optimize their own position. Therefore, the degree of pass-through will be positively related to channels length but negatively related to degree of channel

integration. (Clark, *et al.*, 1999).  Therefore, the effect of direct investment on exchange rate pass-through through the investment on distribution channel is still unclear depending on degree of channel intensity, channel length, and/or channel integration.

### 3.4) Brand Loyalty.

Brand loyalty is a big issue to explain the link between direct investment and degree of pass-through.  Brand loyalty is not only representing the firm's reputation but also reflect customer's memory-based knowledge of the brand.  Direct investment is not the only one source to build up brand equity or brand royalty, but it is also depended on marketing strategies such as advertisements, promotions, or worldwide recognition.  Strong brand royalty implies high customer awareness, and generally assumes strong promotional support.  Therefore, brand loyalty provides benefits on competitive advantage and ability of increase markup of price over production cost.  It also decreases the propensity that consumers will switch brands, and so decreases price elasticity.  Thus, it is clear that brand equity is a significant factor in exchange rate pass-through phenomena. Therefore, foreign direct investment that can enhance its brand loyalty in domestic market will reduce degree of exchange rate pass-through.  Figure 2 illustrates the flowchart of transitional link between direct investment and exchange rate pass-through on strategies that a multinational firm would performs.[8]

*Figure 2.* Transitional framework of foreign direct investment, exchange rate pass-through, and pricing-to-market strategy.

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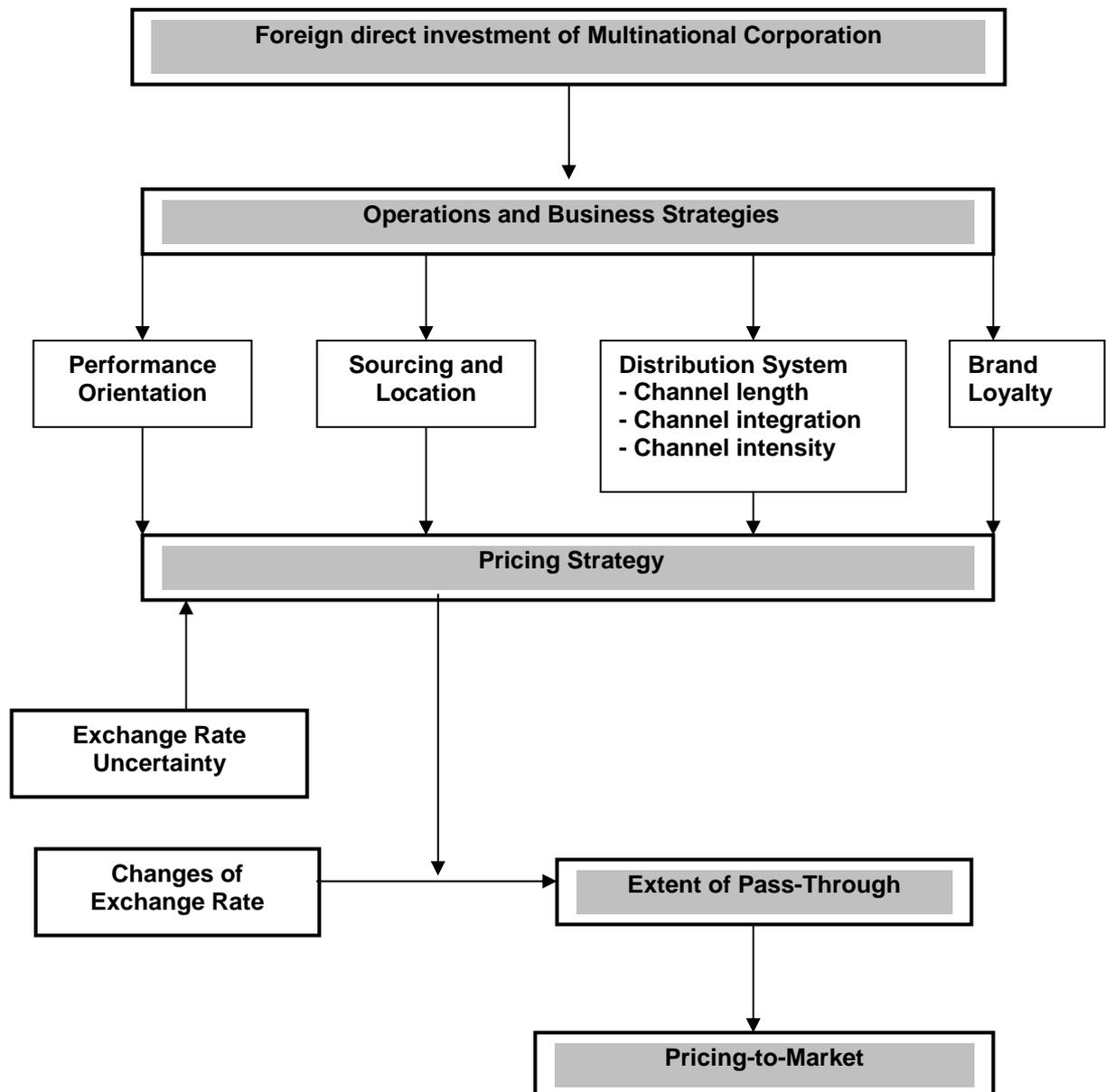
## 2. Policy Debates

Understanding the determinants of foreign direct investment and pricing behavior is an important contribution to the policy debates. The policy liberalization alters many parameters of international location of multinational corporations. The liberalization of direct investment regimes strengthens international production by allowing firms greater freedom in making international location decisions and in choosing mode for serving each market. All enterprises in the market have to raise technical efficiency and be more responsive to market forces to stay in business, not only in tradable activities but also in services and infrastructure. The multinational corporations have to restructure their activities and deploy their assets to compete with local firms. However, the objectives of multinational corporations differ from those of host governments: governments seek to spur national development, while multinational firms seek to enhance their own competitiveness in an international context, increase market share and market power, and maximize their long-run profit. In the other context, rapid innovation and deployment of technology, in line of logistic and market demands, are more important and are a dominant factor to enhance market power over other existing local firms

Moreover, regarding to the results show in the both theoretical and empirical part, foreign direct investment affects by lowering degree of exchange rate pass-through where lower degree of pass-through means increasing market power of the multinational firms. Therefore, the policies debates that government in host countries should be concerned are the debates over "competitiveness". The competitiveness debate has two perspectives, which are strongly interrelated. First, there is concern over the "competitiveness of multinational enterprises" on an international basis and second, there is concern over the "competitiveness of market and location". Competitiveness of multinational enterprises considered whether firms maintain price over changes of other factors such as exchange rate, production cost, shock in market demand, etc. Because the ability that firm can differently charge and maintain higher price over its cost for each country is considered its own market power from Pricing-to-Market ability, competitiveness of location and market is concerned when multinationals gain market power over price once they invest in local market.[9] Market power generates market inefficiency and market distortion in which customers and producers in local market would be suffering. Thus, policymakers in host countries should study more in these possible aspects. Nevertheless, most developing countries still support foreign direct investment inflow by giving particular tax and other fiscal incentives to attract multinational enterprises. More broadly, and perhaps with greater economic implications, attracting foreign capital through low wage and flexible working condition has also become part of many countries' economic policy, and is articulated as a concern over competitiveness explained above.Regarding to the "competitiveness", the effects of direct investment and degree of exchange rate pass-through found in empirical results show that direct foreign investment could either reduce or somewhat amplify degree of exchange rate pass-through. These results can be analyzed that the foreign direct investment may improve market efficiency or distort market efficiency by increasing anti-competitive effects. With higher degree of exchange rate pass-through in the effect of investment inflows, the multinational corporations may improve market and industrial efficiency and resource allocation in their host countries by entering into industries where high entry barriers reduce the degree of domestic competition. The entry of multinational firms into these monopolistic industries in likely to raise the level of competition and force existing local firms to become more efficient. However, foreign entry may causes a fall in the number of firms in the industries if the least efficient local companies are forced out of business. This result can be against our fear that foreign multinational corporations may out compete and generate monopoly power over local firms that are even worse than the existence of domestic oligopolies in host countries. This competitive promotion effect may also be against if there is risk in that those foreign multinational firms with market power may also repatriate profits and avoid taxation through transfer pricing. The generality of competition motivates an examination of study in foreign direct investment and industry structure in host countries. One problem to consider is whether multinational corporation entry explains industry structure or whether industry structure determines if multinational firms will enter or not. Regarding to the studies

of developing countries, most authors have not been able to or have not even tried to determine whether the high degrees of concentration in the industries where foreign affiliates are present have been caused by multinational corporations or whether multinational corporations have just been attracted to these industries by profit earning opportunities (Blomström and Kokko,1996)

Therefore, in this case that foreign direct investment increase market competitiveness, it can be discussed that competition improves market efficiency and welfare, but there are cases where it must not necessarily be that way. First, economies of scale are important determinants of industrial productivity. To consider that foreign entry increases concentration in relatively small national industries, resource allocation and efficiency may well improve from the increase in average firm size. Whether this effect is stronger than that from the reduced competition depends on market characteristics and trade policy. For example, a fall in the number of firms from fifty to forty should not necessarily reduce the competitive environment, but a reduction from three to two producers certainly will. Similarly, increased concentration is likely to have more harmful effects in protected industries or infant industries than the import-competing or export-oriented industries. The government policies on foreign direct investment need to counter two sets of market failures. The first arises from information or coordination failures in the investment process. This failure can lead a country to attract insufficient investment or wrong quality of investment. The second is when private interests of investors diverge from the economic interests of host countries. This causes foreign direct investment to have negative effects on development or may lead to static benefits that are not sustainable over time. This also considers infant industries in which the development of local enterprises can be jeopardized when inward direct investment crowds out those enterprises. The last should be concerned weak bargaining and regulatory capabilities on the part of host country governments, which can result in an unequal distribution of benefits or abuse of market power by multinational firms (Oman, 2000). One of the best policy debates among policymakers in host countries is to promote "linkages" between foreign affiliations of multinational corporations and domestic firms, where the linkages can be classified into *Backward Linkages, Forward Linkages,* and *Horizontal Linkages*.[10]

Extent of exchange rate pass-through is also important for monetary policymakers to launch the monetary policy. It is obvious to say that the optimal monetary policy depends in a fundamental way on the type of price stickiness. Within the partial exchange rate pass-through status where prices are stickier and not responsive to exchange rates, monetary policymakers cannot rely on the exchange rate to provide the necessary adjustment to real shocks. To the extent that consumers do not interpret exchange rate changes as relative price changes in the short run, monetary policy can only achieve an inferior outcome in which it is unable to control the relative demand for domestic and foreign goods. The benefits of floating exchange rates are then diminished in the absence of strong expenditure-switching effects. A number of papers have analyzed monetary policy behavior in the presence of imperfect exchange rate pass-through. For example, Devereux and Engel (2000) examine the implications of local currency pricing in the case optimal monetary policy in response to real shocks is fully consistent with fixed exchange rates.[11] Devereux, et.al. (1999) and Tille (2000) provide the studies to support this monetary policy debates within lower exchange rate pass-through and inward foreign direct investment. If foreign subsidiaries or affiliates' shares are held by domestic firms or local people in higher proportion, those domestic shareholders can buy from foreign producers, which are multinational firms in this case, at prices set in the producer's currencies, and sell to domestic consumers at prices set in consumers' currencies. Therefore, the role of subsidiaries as intermediaries is important to distinguish exchange rate pass-through to import prices from the pass-through to consumer prices. Higher share of domestic control in foreign, which are U.S. in this case, subsidies/affiliates over imports vary among countries and industries of imported goods. For example, based on Tille (2000), analysis of imports by foreign affiliates is that most imports in the U.S. go to U.S. controlled firms instead of affiliates of foreign firms.[12]

In summary, implementing this central role of intermediaries to reduce problem of exchange rate pass-through to monetary policy should be subjected on ownership of domestic firm or local

government in foreign subsidiaries. Those intermediary agents would absorb some of the exchange rate fluctuations in their profit margins, as indicated by the larger degree of exchange rate pass-through to import prices than to consumer prices.

Exchange rate pass-through not only reflects the debates in competition policy and in monetary policy, but also enlightens concerns in international trade policy. One of the main questions to answer is whether devaluation of domestic currency would improve domestic country's balance of trade and its welfare implication. Within the international trade literature, it can be hard to follow the arguments about whether devaluation will improve the trade balance. It is argued that the flows of goods respond only with time lags to changes in the exchange rate. Firstly, the analysis of "J-Curve" is used to describe the movement over time of the trade balance within currency devaluation. It explains that, after the currency devaluation, trade balance may deteriorate at first and improvement may come later. Secondly, to achieve the successful of currency devaluation, the "Marshall-Lerner Condition" must hold.[13] Therefore, the limited degree of exchange rate pass-through in import goods, which means smaller elasticity of demand for domestic imports within exchange rate volatility, may explain why the Marshall-Lerner Condition may not hold in reality. Our result also supports this argument in that foreign direct investment inflows market tend to substitute import demand in domestic market, which cause lower responsiveness of import demand. Lower degree of pass-through from the presence of foreign direct investment is likely to increase the possibility for Marshall-Lerner Condition unable to hold. This condition also explained in Tille (1999, 2000) in that country can benefits from a depreciation of domestic currency, called *Beggar-thy-neighbor,* or is adversely affected, called *Beggar-thyself*, depends on degree of substitutability between goods produced domestically or international. If the cross-country substitutability is high, domestic customers still pay higher price for import within currency devaluation, which causes trade balance unable to improve. Our result causes trade policymakers worry how to implement international trade policy. One of the solutions is to have the intermediaries own by domestic people to let consumer prices independent from imported prices. With this result, degree of cross-country substitutability would decrease and encourage domestic customers to purchase more domestic products and less imported goods.


## 3. Conclusion

Exchange Rate Pass-Through and Pricing-to-Market behavior is an important consideration in International Economics and Industrial Organization Theory. This paper provides both theoretically justification of Foreign Direct Investment (FDI) effect on extent of exchange rate pass-through by deriving the standard Cournot fashion of international duopoly. Preliminary results of theoretical framework indicate that FDI will affect on *lowering* degree of exchange rate pass-through and generates *higher* degree of Pricing-to-Market behavior. We also explain this results by analyzing the business implications under different situations of performance orientation, sourcing and location, distribution systerm, and brand loyalty that determine the multinational's strategic pricing. In addtion, the results found in this study also enlighten three policy debates: international trade policy, monetary policy, and competition policy.

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# Notes:

[1] See Arestis and Milberg (1993), Dornbusch (1987), Mann (1986), and Marston (1990)

[2] Devereux (2001), however, extends his work on choosing different targeting in monetary policy. Policy of strict in inflation targeting is much easier to implement than the policies, which stabilize output.

[3] Using Chain's Rule to prove this condition,

$$f_K^* = \frac{\partial f^*(\overline{K} - K, L^*)}{\partial(\overline{K} - K)} \cdot \frac{\partial(\overline{K} - K)}{\partial K} = -f_{(\overline{K}-K)}^* < 0 \text{ and}$$

$$f_{KK}^* = \frac{\partial f_K^*}{\partial K} = -\frac{\partial f_{(\overline{K}-K)}^*}{\partial(\overline{K} - K)} \cdot \frac{\partial(\overline{K} - K)}{\partial K} = f_{(\overline{K}-K)(\overline{K}-K)}^* < 0$$

[4] In general, $\psi$ can be greater than one, which implies that multinational firms may have some advantages over local firms. For example, multinational firms have superior technology, higher performance of human resource, prior research before market penetration, etc. However, we assume in this case that firms that initially locate in the market should have some advantages in term of consumers' recognition. This should also be able to explain as incumbent firm's strategies discussed in the Industrial Organization Theory.

[5] Therefore, in satisfying a foreign market, a firm either exports or invests. A number of economists, such as Krugman (1983), Smith (1987), and Dei (1990), developed models to test the relationship of export and foreign investment. In general, decisions whether to export or invest aboard generate different amount of cost. Maki and Meredith (1986) measure the cost differentials if firm chooses between export and foreign direct investment. High cost of setting new subsidiary will reduce the probability for firm to invest abroad.

[6] For example, Goldberg (1993) concludes that the 1980s dollar depreciation (appreciation) reduced (stimulated) inward foreign direct investment to the U.S. in manufacturing nondurable sectors. This contraction effect of depreciation on investment observed in the 1980s could arise if the income and wealth effects of exchange rates on investment dominate the demand effect (for traded goods) and the production effect.

[7] Caves (1971) explained that product differentiation is one necessary characteristic of industries in which substantial foreign direct investment occurs. This differentiation can be distinguishable from local firms by minor physical variations such as brand name and advertising. Therefore, from this condition, firms will face downward sloping demand and can earn excess profit from an extra price markup. This excess profit will be at least immune from competitive pressure. The Multinationals usually have stronger financial status, and then they face the natural monopoly in nature so that they can choose strategies of non-competitive pricing to local market

[8] Degree of uncertainty and persistence of exchange rate also determines the outcomes of a firm's pricing-to-market strategy (See Pholphirul, 2002).

[9] Nevertheless, the key point of this study is to conclude the existence of market power by Pricing-to-Market behavior, but it may not qualify in its economic significance. Analysis of prices alone can give only minimal information about market power. A quantitative assessment of market power requires analysis of quantity response as well. The quantity fluctuations can be significant to represent true fluctuation in demand or consumption of the export good in destination markets. Anyhow, price discrimination across countries is still the most prominent to explain markup ability and market power that export firm would have.

[10] The *Backward Linkages* exist when foreign affiliates acquire goods or services from domestic firms and the *Forward Linkages* happen when foreign affiliates sell goods or services to domestic firm. *Horizontal Linkages* involve interactions with domestic firms engaged in competing activities. Linkages can also be defined in term of non-business entities such as universities, training centers, research and technology institutes, or private institutes (UNCTAD, 2001)

[11] Other papers are, for example, Monacelli (1999), Batini, et.al. (2000), Devereux (2001), and Adolfson (2001). Those papers analyze the performance of simple monetary policy rules in the presence of partial exchange rate pass-through.

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[12] However, Mersereau (1992) shows that this situation is different in Canada where foreign controlled-firms accounted for 69% of all imports in 1986.

[13] The analysis of Marshall-Lerner Condition indicates that the devaluation will improve the trade balance and provide a stable foreign exchange market if the elasticity of demand for domestic imports plus the elasticity of demand for domestic export exceeds one. See the proof of Marshall-Lerner Condition and empirical studies from Pholphirul (2004)