CHAPTER 2

REVIEW OF RELATED LITERATURE

There were concerns among economists (Branson, 1972; Magee, 1973) during the 1970s that external imbalances of major trading countries, particularly that of the United States, did not respond to exchange rate movement as expected. The issue was related to the effects of exchange rate changes on price adjustment process. Researchers were active in studying the relationship between exchange rates and prices and this has led to the study of two related topics; i.e. the exchange rate pass-through (ERPT) relationship and pricing-to-market (PTM) behavior. ERPT refers to the degree to which exchange rate changes are reflected in the importer's currency prices. ERPT is said to be "complete" if import prices one-for-one respond to exchange rate changes, while it is said to be "incomplete" or "partial" if import prices *do not* one-for-one respond to exchange rate changes. Incomplete pass-through occur, for instance when firms in the exporting countries engage in pricing-to-market (PTM), which effectively implies that firms with market power in a segmented market are able to sell identical product at different prices in different markets (Dornbusch, 1987 and Krugman, 1987; Goldberg and Knetter, 1997). Incomplete pass-through was found a common phenomenon among industrial countries. Kreinin (1977) estimated to degree of ERPT to import price to be 50 percent for the USA, 60% for Germany, 70% for Japan and 90% for Belgium.

Subsequent studies have investigated the reasons of incomplete pass-through in the long-run. Theoretical models, mostly based on imperfectly competitive market structures, have evolved to explain that incomplete pass-through can occur through adjustments of profit margins as exporters price strategically to gain advantage (Dornbusch, 1987 and Krugman, 1987 and Klemperer, 1989).

The study of the effect of exchange rates on price at the very early stage mostly concentrated on theories. Later, the validity of these theories has been tested by empirical works. Most of the original ERPT and PTM literature was done to explain the huge US-Japan deficit in the 1980s, so naturally most of early studies

examined US and Japanese data (Ohno, 1989; Feenstra, 1989; Hooper and Mann, 1989 and Marston, 1990, for example). ERPT has been studied from both import and export sides as well as in both aggregate level and disaggregated level. For literatures on the ERPT and PTM concerning export prices, the degree of ERPT or PTM can be derived from a firm's profit maximization problem. Knetter (1989) is a pioneering work examining price discrimination in destination markets by exporters. To find the relationship between exchange rates and export prices, Knetter used a fixed-effects regression model which is given by:

$$\ln p_{it} = \theta_t + \lambda_i + \beta_i \ln s_{it} + u_{it}, \qquad (2.1)$$

where p_{it} is export price in exporter's currency, θ_t is a time effect, λ_i is a country effect, s_{it} is the bilateral exchange rate between the exporting country's currency and the destination's currency i,, and u_{it} is the error term. The time effect measures marginal cost which is assumed to be identical across export destinations but vary over time. The country effect measures the markups that vary across export destinations. From equation (2.1), exporters can price discriminate between destination markets by varying their markups specific to each destination. The distinguished feature of this model is that marginal cost, which is in fact unobservable, can be incorporated in export pricing equation. The above equation is tested for some export products from the USA and Germany. It is found that U.S. export prices are rather insensitive to exchange rate fluctuations, while German export prices appear to be much more sensitive to exchange rate fluctuations. German exporters tend to stabilize their local currency price in the destination market, especially the U.S. market.

Price discrimination is also examine in Ohno (1989) which indicates that Japanese firms price discriminate between domestic and export markets, especially following exchange rate changes. On the contrary, American exporters do not tend to price discriminate between domestic and overseas markets, with their pricing decision based on domestic cost factors. The estimated average pass-through coefficient for the USA is 0.95, while Japan has a pass-through coefficient of 0.78. The Japanese PTM behavior is also confirmed in another notable work (Marston, 1990) which studies disaggregated data covering 17 3 and 4 digit SITC products in the transport

equipment and electrical machinery industries for Japanese multilateral exports and domestic sales. It is found that PTM behavior is widely practiced in all but two industries.

For small economies, most of empirical studies regarding the relationship between exchange rates and export prices are in ERPT area, rather than in PTM. The markup model is widely used to estimate the degree of ERPT.

Athukorala (1991) studies the pass-through relationship between exchange rate and prices of manufactured exports of Korea. The first differenced model is utilized and is estimated by OLS. The results suggest that, on average, Korean exporters absorb 72 percent of a given exchange rate change in their margin on export sales within 4 to 5 quarters, and the major part of this adjustment occur within 2 quarters. Alternatively stated, the average pass-through coefficient for Korean manufactured exports examined in this study is 28 percent. In addition, the hypothesis of asymmetry in the export price response to currency depreciation and appreciation is tested by separating into two sub-periods: depreciation and appreciation. The Chow's parameter stability test does not support the hypothesis that there has been a structural break in the observed relationship. The regression results provide ample support to Tobin's (1989) conjecture that Newly Industrializing Countries (NICs) like Korea have very little control over prices at which they sell and therefore exchange rate changes may be of little relevance in determining their relative prices in international markets.

By similar method and model, Menon (1992) examines the relationship between the Australian manufactured export prices and exchange rates. The results from this study suggest that it is not exactly true to assume that exchange rate movements will not have any effect on the terms of trade simply because of the "size" of the Australian economy compared with its major trading partners. It is found that the effects of exchange rate changes on export prices varied across industries, in terms of both magnitude and timing. The extent of foreign ownership and control in total exports appeared to be positively related to the degree of exchange rate pass-through across industries.

For cross-country studies, Hung, Kim and Ohno (1993) applies cointegration and error correction analysis to estimate the long-run steady state and short-run

dynamic relationships between the exchange rate and export prices in industrial and newly industrializing economies. The major difference from past studies in the area is that the endogeneity of the determinants of export prices is explicitly allowed. The analysis shows that the exchange rate has smaller effects on the export price than previous studies would indicate. It contradicts some widely-accepted relationships – e.g. smaller, more open countries have greater coefficients of pass-through. The results also exhibit important differences among the USA, Japan, and Germany in their export pricing behavior.

The endogeneity of export prices determinants is also taken into account in Athukorala and Menon (1994) and Ohno (1989) which modeled a separate cost function when estimating pass-through for Japanese exports. This is because exchange rate changes can affect both exporting firms' profit adjustments to offset change in exchange rates as well as firm's cost of imported input. Thus, variations in export price can take place through either changes in markup or changes in cost of production. The results from both studies indicate that when allowing cost to be endogenously determined by the exchange rates, the degree of pass-through is lowered. This implies that the studies which allow cost to be exogeneous may over-emphasize the degree of pass-through to the extent that cost of production is sensitive to exchange rate changes.

While several pass-through and PTM studies assume implicitly that the degree of pass-through and PTM during depreciations and appreciations of exporter's currency are equal. Alternatively speaking, the degree of pass-through or PTM is symmetric between appreciations and depreciations. However, a number of studies point out the different responses of export prices during these different directions of exchange rate changes. Knetter (1994) proposed two hypothesis regarding the asymmetry in PTM, that is, market share hypothesis and marketing bottlenecks hypothesis. When exporting firms encounter capacity constraints such as marketing bottlenecks, then PTM may be greater during depreciations of the exporter's currency. But when exporting firms aim to increase or preserve market share in the destination markets, then PTM may be greater during appreciations of the exporter's currency (see Knetter, 1994 for more details). Asymmetry in PTM is tested for European countries in Gil-Pareja (2000). Results indicate that the degree and direction of

asymmetry vary across industries and countries. Within an industry, there are also differences in the direction of the asymmetry across countries. No clear-cut direction of the asymmetry is found. However, for the case of U.S. export industries, Mahdavi (2002) found evidence of an asymmetric resonse in 7 of the 12 industries but with no clear direction in the asymmetry.

Parsons and Sato (2005) provided a new insight into an estimation of ERPT, which has an implication for the monetary integration in East Asian countries. The prices of 34 exports to major 13 markets disaggregated at HS 6-digit level of four Southeast Asian countries, Indonesia, Malaysia, Philippines and Thailand are examined. Panel fixed effects model is utilized to estimate the pass-through coefficients. ERPT is estimated from ASEAN's export prices. Also, it is estimated from import prices of the destination markets. Through this method of dual equation estimation we can infer whether or not: 1) bilateral exchange rate movements actually pass through to the destination markets; and 2) whether this lack of pass-through (as it turns out in most cases) is due to adjustment at the exporter's end possibly due to PTM behavior, or whether is may be something else. Contrasting results are obtained from dual equation estimation, i.e. both *complete* and *zero* ERPT are found in the same goods exported to the same destinations. This creates a conflict in an interpretation under the imperfect competition model. However, these results support the "small country in integrated world market" model (perfect competition model) and reflect the fact that export prices are often set or invoiced in a major international currency (typically the US dollar). As long as the US dollar is the dominant invoice currency and/or East Asian exporters are price-takers in a world market, destination-specific PTM is unlikely to occur in East Asian exports. Importers both within and outside of East Asia in turn will bear the risk of exchange rate changes between US dollar and their own currency.

The issue of invoicing currency is taken into account in an estimation of pass-through coefficient at the product level in Bowe and Saltvedt (2004). Firm level data are utilized to examine the relationship between exchange rates and export prices invoiced in different currencies of Norwegian fishing industry. ERPT coefficients vary from 0.07 to 0.98 across products. Moreover, for a given product, ERPT coefficients vary significantly both across and within destination markets, depending

upon the invoicing currency chosen. The findings also suggest that the choice of invoicing currency may be an important strategic variable facilitating discriminatory pricing by exporting firms.

Athukorala and Menon (1994) realize the importance of invoicing currency in estimation of pass-through coefficients. Instead of using the trade weighted NEER as exchange rate variable as in other studies (Menon, 1992, for example), they use contract-currency weighted exchange rate index.

For Thailand, Wiseschindawat (1998) studies the effect of changes in exchange rate expressed in units of Baht per unit of U.S. dollar on prices of one-digit SITC exports plus some major export commodities, e.g. rice (SITC 042) as well as other determinants of export prices by regression using OLS method. The period of study covers 1991Q4 – 1998Q2. The estimated coefficients are around 70 percent, indicating that 1 percent depreciation of Thai Baht raises export price in terms of Thai Baht by 0.7 percent or lowers export price in terms of U.S. dollar by 0.3 percent.

Sakunbongkot (2001) investigates the bilateral pass-through coefficients of Thailand's three major industrial exports, motor car, motor vehicle, parts & accessories; automatic data processing machines & parts and electronic integrated circuits exported to top five destination markets of each industry. The period of study covers 1996:M1-2000:M12. Cointegration technique as well as Granger Causality Test is used to find the long-run equilibrium relationship and Granger causality between export prices in terms of Thai Baht and bilateral exchange rates. The results show that the effect of exchange rate changes varies across industries and export markets. This study concludes that exchange rate changes may not improve the degree of price competitiveness in the export markets. In other words, exchange rate depreciation may not improve the trade balance via decreased export prices.

Pricing-to-market and pass-through literature on the export side are used to explain the international transmission of exchange rate changes from export prices denominated in exporter's currency to export prices denominated in importer's currency (import prices). This is based on an implicit assumption that exports are invoiced in the exporter's currency or, to a lesser extent, in importer's currency. While this may be true for many industrialized countries, this may not be the case of Thailand's exports. With over 80 percent of exports invoiced in U.S. dollar, it can be

said that Thailand relies heavily on the U.S. dollar. In exporter's point of view, the U.S. dollar should be the most important currency influencing their export pricing decision. On the other hand, other bilateral exchange rates should play a minor role (Parsons and Sato, 2005).

This study extends past empirical works in that more export industries are examined and take into account the predominant role of the U.S. dollar as an invoicing currency of Thailand's exports. Furthermore, this study examines possible asymmetry in industry-level export price adjustment during currency appreciation and depreciation which has not been examined in previous studies.