2. A review of literature on exchange-rate exposure

Several studies tried to examine the exposure of multinational firms to fluctuations in the exchange rate. The definition of exposure, based on Adler and Dumas (1984), is the sensitivity or relation of the change in value of an asset or liability to a fluctuation in the exchange rate. Then, Jorion (1990) investigated the exposure of a sample of 287 U.S. multinational to foreign currency risk. According to his empirical results, he only can find weak evidence of such a relation existing. Furthermore, in this study, it hypothesized that the degree of involvement in foreign operations may be a determinant of exposure for multinational firms. Jorion showed that the foreign sales ratio, which represented the degree of involvement in foreign operations, is a significant determinant of exchange-rate exposure. Amihud (1994) finds no significant exchange-rate exposure for a sample of 32 large U.S. exporters from 1979 to 1988.These studies mentioned above use basic regression to examine whether the sample firms are contemporaneously exposed to exchange-rate fluctuations but they ignore lagged effects.

Bartov and Bondar (1994) explained why previous studies failed to identify the significant correlation of U.S. firms between stock returns and exchange-rate fluctuations with two potential drawbacks. The first potential drawback is in their sample selection procedure. To solve this potential problem, they select firms that are likely to have similar correlations between stock returns and exchange-rate fluctuations. The second one is the existence of mispricing .This mispricing may cause from systematic error when investors estimate the correlation between stock returns and exchange-rate fluctuations. It means stock price adjustments arising from exchange-rate fluctuations take time; therefore, they take lagged fluctuations in exchange rate into account and view lagged exchange-rate fluctuations as another important variable via regression analysis. In contrast to previous studies, they found there is no significant correlation between the same time period stock returns and exchange-rate fluctuation, but there is significant correlation between stock returns and one period lagged fluctuation in exchange-rate.

In recent studies, Chamberlain, Howe, and Popper (1997) examined the exchange-rate exposure of U.S. and Japanese firms in the banking industry via basic regression ignoring lagged effects of exchange-rate fluctuations. They found there is significant correlation between stock returns and exchange-rate fluctuations in U.S. firms but only little correlation in Japanese firms. Furthermore, they next examine the sensitivity of U.S. firms through cross-sectional analysis. The cross-sectional findings show that, among firms with exchange-rate exposure, those with off-balance sheet activities in foreign operations and foreign currency transactions exhibit less exchange-rate exposure. This conclusion is consistent with the use of foreign exchange contracts for the purpose of hedging.

Another study, He and Ng (1998) estimated the exposure to exchange-rate fluctuations of 171 Japanese multinational firms via regression including the lagged effects of exchange-rate fluctuations and found significant exposure for about 25% of those firms, i.e. a much higher percentage than Jorion's results from U.S. firms. They also look at the determinants of exchange-rate exposure and the impact of hedging. From their empirical examinations, they found estimated exposure is positively related to the ratio of foreign sale/total sales and negatively correlated with the use of currency derivatives for hedging.

One would expect firms in a more open economy to be more sensitive to movements in exchange rates. All the studies discussed above focused on the big and developed economy, such as U.S. and Japan. Nydahl (1999) first of all studied firms in a small open economy. He investigated the relation between stock returns and exchange-rate fluctuations of Swedish firms via regression with lagged term. About 26% firms in the sample have significant exposure to exchange-rate fluctuations, which is with higher percentage than earlier results for U.S. firms. Meanwhile, he also found the level of foreign sale/total sales significantly increases exposure and the level that firms engage in hedging activities decreases exposure.

Williamson (2001) tried to examine exchange-rate exposure and incorporate the effect of intra-industry competition in automotive industry of United States and Japan. According to his empirical evidence, there is significant exposure to the exchange-rate shock, which is consistent with theoretical predication. Besides, he found it exists time-variation in exchange-rate exposure and this kind of change is consistent with changes in the competitive environment within the industry.

As to the studies which selected Taiwanese firms to investigate exchange-rate exposure, Chiao and Hung (2000) considered the effects of the timing of three liberalization events through which the government in Taiwan performed policies to open its exchange and stock markets. They did not have enough evidence to reject that most exporting firms in Taiwan are individually exposed to exchange-rate fluctuations in all sub-periods. Besides, the determinants of possibly time-varying exchange-rate exposure of exporting firms are exports-to sales ratio, firm size, and the timing of the three liberalization events.

Later, Xie (2002) selected the Taiwan electronic firms to examine whether these firms are exposed to exchange-rate fluctuations. About 15.9% and 9.6% of sample firms are contemporaneously and with a lag respectively exposed to exchange-rate fluctuations. Meanwhile, she also found the determinants such as the quick ratio, the long-term debt ratio, institutional investment ratio, and firm size are with significant influence on exchange-rate exposure. However, the sign of firm size is not consistent with the hypothesis. It shows that the larger the firm size is, the higher the exchange-rate exposure is.

To summarize, all the studies mentioned above investigated the existence of exchange-rate exposure by regression. Generally, they view the return on the market index as an important explained variable, which stands for the economic situation. One may question the potential correlation between the return on the market index and exchange-rate fluctuations may cause general regression with difficulties to explain the results. As a result, the empirical evidence that the exchange rate affects a firm’s value is still weak. Considering the high degree of foreign involvement of many firms today, the lack of empirical evidence is ambiguous. It indicates the need for more research.

In this study, we will modify the possible drawback of traditional analysis and try to study firms in a small open economy-Taiwan. Traditional wisdom suggests that firms in a more open economy to be more sensitive to fluctuations in the exchange-rate. Therefore, we will try to examine whether the electronic firms, which are the main exporting firms in Taiwan and with high degree of involvement in foreign operations, tends to exposed to exchange-rate fluctuations via nonlinear model. Meanwhile, we also form a cross-sectional analysis and relate the estimated exchange-rate exposure to some characteristics of firms.