

# A Firm-Specific Analysis of Taiwan Foreign Exchange Rate Exposure: A Panel Data Approach

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**Abstract:** *This study investigates the determinants of Taiwanese foreign exchange exposure, using firm-specific operational and financial variables from 1990 to 2010. After testing six hypotheses on the relationship between variables and level of exposure, we find 7 statistically significant determinants which is a quite large number, compared to the relevant literature. Foreign operations, size, liquidity, profitability and hedging have all an impact on exposure. The ratio export to sales, total assets, the ratio current assets to total assets and option hedging increase the level of exposure, while net sales, net income and forward hedging decrease it. This research provides a better understanding of Taiwanese exposure. If a variable increases the level of exposure, it means that it is related to a benefit from an appreciation of the domestic currency.*

**Keywords:** *Exchange rate exposure, Exposure Determinants, Panel analysis, Taiwan*

**JEL classification:** *C23, F31, G12, G15, G31*

## 1. Introduction

One of the key issues in international finance is the foreign exchange exposure and its impact on firm value. Currencies movements affect the cash flow of a firm's operation and are also an important source of uncertainty for companies. If

financial theory strongly supports that the value of the firm is sensitive to exchange rates changes, most empirical studies fail to find a strong link between stock returns and exchange rate movements.

Nevertheless, Varga (2013) finds that sampling and methodologies may explain the poor empirical evidences. He selects a sample of 107 Taiwanese non-financial firms from 1990 to 2010 (daily data), arguing that a small open economy is a better laboratory to study exposure. He also focuses his model on different kind of asymmetries and volatilities. His results show that about 90% of the sample is exposed. As far as we know, it is the highest level of exposure ever documented. But more interesting, all the concerned firms are negatively exposed, meaning that Taiwanese companies benefit from an appreciation of the domestic currency (TWD). If Varga (2013) describes the exposures and the impacts from asymmetries and volatilities, his goal is not to explain why Taiwanese firms are exposed.

The purpose of this research is, using a panel data approach, to identify the determinants of the Taiwanese exposure: which firm-specific financial variables may explain the level of the Taiwanese currency exposure. Our starting point is the foreign exchange exposure coefficients obtained by Varga (2013). The identification of the determinants will be based on hypotheses we plan to test.

The reminder of this paper is organized as follows. The next section presents a literature review relating to the determinants of exposure and our hypotheses to be tested. Data and methodology are described in section 3. Section 4 reports the main empirical findings and section 5 concludes the paper.

## 2. Related Papers on Determinants

This paper is not about foreign exchange exposure, but about why Taiwanese companies are exposed. For a more complete review of the related literature on foreign exchange exposure, see for example Bartram, Brown and Minton (2010) or Varga (2013).

## 2.1. Determinants of Foreign Exchange Exposure

Literature has proposed a number of operational and financial determinants of foreign exchange exposure. For example, an export-oriented firm may benefit from a depreciation of the local currency while a company that relies on imported intermediate goods may suffer from a depreciation of the local currency: its costs of production increase which leads to a reduction of the profits and the value of the firm. Exchange rates affect also the value of the company if it has financial assets and liabilities denominated in foreign currency. Besides, knowing that even firms not engaged in international transactions are also impacted by exchange rates variations (through the competitive structure of their respective industry) and hedging operations tend to reduce the foreign exchange exposure, the effects of currencies shocks on firm value could be very complex to measure.

Thus, there may be little hope for structural models that incorporate all potential explanatory variables for exposure because the results of many empirical studies are not consistent with each other. In view to define a guide line to evaluate Taiwanese firm-specific determinants, we may categorize potential variables into three sub-categories: foreign operations, firm size and hedging incentives. The hypotheses to be tested are based on those sub-categories.

### 2.1.1. Foreign Operations and Exposure

Theoretical literature such as Marston (2001) identifies the degree of foreign operations of a company as one of the major factors, thus proxies as foreign sales have been widely used for empirical studies in this field. Most results found a positive relationship between the degree of foreign activities and the magnitude of exposure. Jorion (1990) shows that the level of foreign sales is the main determinant of exposure for large US multinational firms. Choi and Prasad (1995) report that exchange risk sensitivity is a function of foreign operating profits, sales and assets supporting too a positive relationship with exposure, for US firms. He and Ng (1998) find a strong relationship between foreign sales and exposure for Japanese multinational companies, relationship confirmed too by Chow and Chen (1998), Gao (2000), Williamson (2001) and Allayannis and Ofek

(2001). Doidge et al. (2002) using a sample from eighteen countries find a significant relationship between international sales, foreign income, foreign assets and exposure. Their results support the economic theory that exporters are supposed to benefit (be hurt) from currency depreciations (appreciations). They also show that the strong relationship between foreign sales and firm value is concentrated in large firms.

Conversely, a few exceptions are reported. Chow et al. (1997) find that cross-sectional differences in the level of exposure of individual firms is not related to the percentage of foreign sales to total sales for US firms. Dominguez and Tsar (2001a) using a sample from height non-US countries including Japan, also find no link between foreign sales or international assets and exposure. Dominguez and Tsar (2001b) fail to document evidence of systematic relationship between the size of trade and exposure. They argue that being engaged in heavy trade, firms are the most aware of currency risk and thus are the most likely to hedge their exposure.

### 2.1.2. Firm Size and Exposure

Many studies investigated the effects of firm's foreign activities as well as the firm size, knowing that size effect is related not only to foreign operations but also to hedging incentives of a firm.

Concerning foreign transaction and firm size, Bodnar and Wong (2000) consider that large companies are often multinationals or large exporters and thus are supposed to be more exposed to currency risk, while small firms are less likely to be exposed, being generally non-trade goods manufacturers and potentially net importers.

But Dominguez and Tsar (2001b) argue that large firms involved in international trade are the most aware of the exchange rate risk and the most engaged in hedging. Therefore, they are less likely to be exposed.

With regard to firm size and hedging incentives, hedging theory suggests two possible explanations which jointly determine the relationship between these two variables: economies of scale in hedging activities and financial distress costs. Warner (1977) observes that the direct cost of financial distress is less than proportional to firm size and thus,

concludes that small firms have more incentive to hedge those costs. In terms of economies of scales, large companies have easier access to risk management expertise and therefore are supposed to be less exposed. This view is also supported by Nance et al. (1993). Information and transaction costs of hedging are higher for small firms which explain why they have a lower economic incentive to hedge. Nevertheless, empirical studies on the relationship between size and hedging conflict with each other.

Bodnar and Wong (2000) and He and Ng (1998) show that large firms have more exposure than small firms, respectively in USA and Japan even after taking into account the level of foreign sales. This is consistent with the assumption that larger firms have a lower financial distress cost compared to small firms reducing thus their incentives to hedge currencies risks.

But Chow et al. (1997) find that the level of economic exposure is larger for smaller firms, which is consistent to the hypothesis that hedging operations exhibit economies of scale. Dominguez and Tsar (2001a) find that the link between exposure and firm size is very weak when studying a sample of eight non-USA countries.

### **2.1.3. Hedging Incentives and Exposure**

The fact that companies may use currencies derivative tools to hedge the exchange rate risk could be one of the potential explanations for why most of the empirical studies found low level or even no significant levels of foreign exchange exposure. Allayannis and Ofek (2001) demonstrate it and also show that the level of hedging depends solely from the exposure to currencies moves through international trade, rather than variables associated with optimal hedging theories, such as firm size or leverage. Similarly, for Allayannis and Weston (2001) using Tobin's Q as a proxy for the market value of a firm, there is a significant and positive relationship between firm value and the use of derivatives, for companies that have foreign sales and thus are more likely to be exposed to currencies risk.

But other evidence suggests that the impact of derivatives on exposure may be very small. Bodnar et al. (1998) show that less than half of payables and receivables are hedged and most of them are short-term. Brown (2001) finds that

companies hedge for speculative reasons that are not linked to our subject of studies.

So the relationship between hedging activities and exposure is obviously complex. One other way to investigate it is to use variables that are proxies for a firm's hedging incentives. Several empirical studies employ some proxy variables (for hedging incentives) that appear linked to the costs of financial distress. Smith and Stulz (1985) for example, state that hedging can reduce the probability of bankruptcy and thus the costs of financial distress.

He and Ng (1998) following this same approach, test if hedging incentives can be a significant explanation of exposure for multinational Japanese firms. They find that firms with weak liquidity position or with higher financial leverage are more likely to hedge and hence less exposed to currency risk because they face larger expected financial distress risk. But they do not provide enough evidence that (as optimal hedging theory states) growth opportunities have a significant impact on exposure. Geczy et al. (1997) for example, find that exposure becomes smaller when lower growth opportunities cause an increase of hedging incentives in view to reduce the underinvestment's costs.

## **3. Sample and Methodology**

### **3.1.1. Sample**

The following table provides the sample list with firms and industries codes, used by Varga (2013).

All industries are almost equally represented. For more details about the sampling, see Varga (2013).

Industry Code	Firm Code	Industry Code	Firm Code	Industry Code	Firm Code	Industry Code	Firm Code
1	1101	4	1418	7	1713	14	2540
1	1102	4	1419	7	1718	15	2601
1	1103	4	1423	8	1802	15	2603
1	1104	4	1434	9	1903	15	2605
1	1108	4	1435	9	1904	16	2701
2	1201	4	1441	9	1905	16	2702
2	1210	4	1436	9	1907	16	2704
2	1213	4	1437	9	1909	16	2705
2	1215	4	1439	10	2002	17	2915
2	1216	4	1440	10	2006	17	2913
2	1217	4	1443	10	2007	17	2901
2	1218	5	1503	10	2008	17	2903
2	1229	5	1504	10	2009	17	2904
3	1301	5	1506	10	2010	17	2905
3	1303	5	1507	11	2102	17	2906
3	1304	6	1605	11	2103	19	9904
3	1305	6	1608	11	2104	19	9902
3	1307	6	1609	11	2105		
3	1308	6	1611	12	2201		
3	1309	6	1603	13	2303		
3	1310	6	1604	13	2371		
3	1312	7	1701	13	2302		
3	1313	7	1702	13	2305		
3	1326	7	1704	13	2308		
4	1402	7	1707	13	2311		
4	1409	7	1708	13	2312		
4	1410	7	1709	14	2501		
4	1413	7	1710	14	2504		
4	1416	7	1711	14	2509		
4	1417	7	1712	14	2506		

**Table 1 – Sample List**

*From Varga (2013)*

**3.1.2. Methodology**

The foreign exchange exposure coefficients used in our panel data approach are obtained from Varga (2013). For reference only, here is his main model:

$$R_{i,t} = \beta_{0,i}^* + \beta_{1,i} \delta_{m,t} + (\beta_{2,i}^* + \beta_{3,i} D_{sign,t} + \beta_{4,i} D_{amp,t}) s_t + \beta_{5,i} h_{s,i,t} + \varepsilon_{i,t} \quad (1)$$

Where:

$s_t$  = the unexpected change in the exchange rate

$D_{sign,t}$  = 1 if  $s_t < 0$  and 0 otherwise (sign asymmetry)

$D_{amp,t}$  = 1 if  $|s_t| > x$  and 0 otherwise;  $x = 0.5\%$  (threshold firms are supposed to react to – magnitude asymmetry)

$h_{s,i,t}$  = the time-varying exchange rate volatility

$\varepsilon_{i,t}$  = error term which follows a GJR GARCH (1,1) process as:

$$\varepsilon_{i,t} = \mu_{i,t} \sqrt{h_{\varepsilon,i,t}}, \text{ and } h_{\varepsilon,i,t} = \omega_{\varepsilon} + \alpha_{\varepsilon,i} \varepsilon_{i,t-1}^2 + \gamma_i D_{t-1} \varepsilon_{i,t-1}^2 + \beta_{\varepsilon,i} h_{\varepsilon,i,t-1}$$

(conditional variance of  $\varepsilon_{i,t}$ )

where  $D_{t-1}$  is equal to 1 if  $\varepsilon_{i,t}$  is negative and 0 otherwise.

The unexpected change in the exchange rate is obtained from a martingale of the form:

$$FX_t = \theta + FX_{t-1} + s_t \quad (2)$$

For more details about the model, see Varga (2013).

### 3.1.2.1. Potential Determinants: Hypotheses

$\beta_{2,i}^*$  in the equation (1) represents the foreign exchange rate exposure we will use in our determinants model.

Following the literature and the three related sub-categories both described in our previous section, we identify several operational and financial variables as potential determinants of the Taiwanese exposure. In view to analyze the relationship between firm-specific variables and exposure, we will test the following 6 hypotheses and their related financial variables:

#### H-1 Firms engaged in foreign operations are more exposed

Traditionally, export ratio to total sales is used to measure the level of foreign operations of the firm.

#### H-2 Larger firms are more likely to be exposed than smaller firms

We will use as the firm size, the logarithm of net sales and total assets of each firm.

#### H-3 Financial leverage reduces exposure

In view to measure the financial leverage, we will use the following ratios: total liabilities / total equity and current liabilities / total liabilities

#### H-4 A large liquidity position increase exposure

We use for that purpose, the ratios: current assets / current liabilities and current assets / total assets

#### H-5 High profitability increase exposure

The following financial variables will be used: Net Income / Equities, Cash Flow/Net Sales and EBIT (earnings before interest and tax)

#### H-6 Hedging decreases exposure

We use hedging dummies for Forward, Future, Option and Swap (=1 if firm uses it, 0 otherwise).

### 3.1.2.2. Exposure's Determinants: Model Specifications

$$\beta_{2,i} = \alpha_0 + \alpha_1 FS_{i,t} + \alpha_2 NS_{i,t} + \alpha_3 TA_{i,t} + \alpha_4 TL_{i,t} + \alpha_5 CL_{i,t} + \alpha_6 CAL_{i,t} + \alpha_7 CA_{i,t} + \alpha_8 NI_{i,t} + \alpha_9 CF_{i,t} + \alpha_{10} EBIT_{i,t} + \alpha_{11} Dfo_{i,t} + \alpha_{12} Dfu_{i,t} + \alpha_{13} Do_{i,t} + \alpha_{14} Ds_{i,t} + e_{i,t}$$

for the firm  $i$  at the time  $t$ .

Where:

- FS: Exports/Net Sales
- NS: LN(Net Sales)
- TA: LN(Total Assets)
- TL: Total Liabilities/Equity
- CL: Current Liabilities/Total Liabilities
- CAL: Current Assets/Current Liabilities
- CA : Current Assets/Total Assets
- NI: Net Income/Equities
- CF: Cash Flow/Net Sales
- EBIT: Earnings before interest and taxes
- Hedging Dummies:
- Dfo: Forward (=1 if firm uses it, 0 otherwise)
- Dfu: Futures (=1 if firm uses it, 0 otherwise)
- Do: Options (=1 if firm uses it, 0 otherwise)
- Ds: Swap (=1 if firm uses it, 0 otherwise)

As for the data used by Varga (2013), our financial variables are obtained from TEJ, a database maintained in Taiwan and we also use the same period of time: from 1990 to 2010.

## 4. Empirical Results

Among the 14 variables included in our model, 7 are statistically significant which is a higher quantity compared to most of the related publications. Moreover, they are highly significant (less than 1%) except one. Out of our 6 hypotheses, only 1 could not be confirmed (confirmed or rejected).

The next table provides a summary.

**Table 2 – Results**

Variable	Definition	Hypothesis	Sign	p-Value
FS	Foreign Sales	H1	<0	*
NS	Net Sales	H2	>0	*
TA	Total Assets	H2	<0	*
CA	Current Assets/Total Assets	H4	<0	*
NI	Net Income/Equities	H5	>0	*
DFO	Forward Hedging	H6	>0	***
DO	Option Hedging	H6	<0	*

\* and \*\*\* represent significance at 1% and 10%, respectively

As described in our introduction, all exposure coefficients obtained by Varga (2013) and used in our determinants model are negative, meaning that Taiwanese companies benefit from an appreciation of the domestic currency (TWD). So the level of exposure increases (decreases) if the sign of the coefficient is negative (positive).

The first hypothesis is confirmed: the foreign sales ratio is positively related to the Taiwanese exposure. This is largely supported by the literature, see for example De Jong et al. (2002), Bartram (2004)<sup>2</sup> even if many researchers found opposite result as Solakoglu (2005) or even no relationship at all with the level of exposure, see for example Li et al. (2011).

But the second hypothesis considering the size of the firm provides mixed results.

Net Sales are negatively related to the exposure rejecting thus the hypothesis. Similar result is found for example by Solakoglu (2005), Aggarwal and Harper (2010) or Li et al. (2011). It may mean that Net Sales is not relevant enough in our case, to describe the size of Taiwanese firms or large Net Sales are more subject to hedging, reducing thus the exposure level.

But Total Assets are positively correlated to exposure confirming thus the hypothesis, result

<sup>2</sup> See also papers related to all our hypothesis, in section 2

supported for example by De Jong et al. (2002) or Muller and Verschoor (2006).

Our fourth hypothesis is confirmed: a large liquidity position increases the exposure. This result is conformed to Bodnard et al. (1998) who show that just a small part of the receivable is hedged, which is certainly the case for the Taiwanese firms.

Moreover, liquidities are part of the assets of the company so the result is coherent with the one obtained with the variable Total Assets (see hypothesis 2).

Maybe, it means that large liquidity reduces the probability of bankruptcy and so the cost of financial distress, providing thus fewer incentives to hedge.

Nevertheless, many authors find opposite relationship as for example Muller and Verschoor (2006) or Li et al. (2011).

The fifth hypothesis is rejected: for Taiwanese firms, high profitability does not increase the exposure level. Knowing that all exposure coefficients are negative, companies with a high level of profit seems to not benefit from an appreciation of the domestic currency (TWD).

The sixth hypothesis as for the second one, provides mixed results. If a firm is engaging in hedging activities, it makes sense that the level of exposure is decreasing. But as mentioned in our section 2, the relationship between hedging activities and exposure is complex. Two tools are significant in our model: Forward and Option hedging.

As expected, the use of Forwards reduces the level of Taiwanese exposure. In section 2, we show that the results of many empirical studies

are not consistent with each other, and our own results show inconsistencies too.

If Forward hedging is negatively related to exposure, Option hedging increases the level of Taiwanese exposure. If the former case is conformed to the conventional wisdom, the latter case could surprise.

One explanation may come from the fact that options allow firms to make asymmetric gains. The company is protected from adverse changes but may profit from beneficial fluctuations. See Andren (2001) for more details.

Varga (2013) shows that 14% of his sample exhibit a sign asymmetry and almost all the signs are negative, increasing thus the exposure level. This result is supported by Koutmos and Martin (2003) who associate negative sign asymmetry and negative exposure to asymmetric hedging.

Firms with a high level of financial leverage are usually considered to be at risk of bankruptcy especially when facing adverse environment. Those companies are thus more likely to engage in hedging activities and hence less exposed to exchange rate risk. Nevertheless, at least for Taiwanese firms, financial leverage has no effect on their exposure level, so hypothesis 3 cannot be considered; the variables used to test this hypothesis are not statistically significant.

## 5. Concluding Remarks

The purpose of this research is to measure the determinants of Taiwanese currency exposure. Adopting a panel data approach, we use the exposure coefficients obtained by Varga (2013) and firm-specific financial variables we downloaded from TEJ, a database maintained in Taiwan. If statistically significant, not only those financial variables will be determinants of the currency exposure but their sign will indicate their impact on exposure level, knowing that all exposure coefficients are negative: Taiwanese firms benefit from an appreciation of their domestic currency (TWD).

If Agyei-Ampomah et al. (2013) find very little or no relationship between firm-specific factors and currency exposure, financial literature supports the existence of exposure's determinants. Among 14 financial variables used to test our 6 hypotheses about the level of exposure, 7 are statistically significant:

- Foreign Sales (foreign operation effect)

- Net Sales (size effect)
- Total Assets (size effect)
- Current Assets/Total Assets (liquidity effect)
- Net Income/Equities (profitability effect)
- Forward Hedging (hedging effect)
- Option Hedging (hedging effect)

As expected, the foreign sales ratio is positively related to Taiwanese exposure, its sign being negative. It means that higher is the ratio, higher is the benefit for Taiwanese firms from an appreciation of the domestic currency (TWD).

The size effect hypothesis verifies if a larger firm will have a higher exposure than a smaller one. For that purpose, we use 2 variables: Net Sales and Total Assets. The former one is negatively related to exposure: either this variable is not relevant for Taiwanese firms to measure the size or large Net Sales are more subject to hedging, reducing thus the exposure level. As for the latter, Total Assets have a positive relation with the exposure level.

The Total Assets result is coherent with the liquidity effect: a large liquidity level increase exposure (its coefficient is negative). It makes sense since liquidity is part of the total assets of the firm and a large level of liquidity provides benefits when the domestic currency appreciates. Moreover, large liquidity reduces the probability of bankruptcy and so the cost of financial distress, providing thus fewer incentives to hedge.

A high profitability does not increase the Taiwanese exposure, meaning that concerned Taiwanese firms do not benefit from an appreciation of the domestic currency.

If forward hedging reduces the level of exposure, which is conformed to the conventional wisdom, we found an opposite result for option hedging. We attribute this to the fact that options hedging allow firms to make asymmetric gains and so create an asymmetric exposure (sign exposure). Almost all the sign exposure coefficients calculated by Varga (2013) are negative so it makes sense that options hedging increase the exposure level.

One of our hypotheses concerns the financial leverage which should reduce the exposure. Effectively a firm with a high financial leverage is considered to be at risk especially if it is facing

an adverse environment and that should be an incentive to hedge to reduce the exposure. Unfortunately, the financial variables used to test this hypothesis are not statistically significant, at least in the Taiwanese case. It is not totally surprising knowing that Taiwanese firms do not have a high level of debt.

To summarize, the ratio export to sales, total assets, the ratio current assets to total assets and option hedging increase the level of exposure, while net sales, net income and forward hedging decrease it.

This research provides a better understanding of Taiwanese exposure. If a variable increases the level of exposure, it means that it is related to a benefit from an appreciation of the domestic currency, its sign being negative as well as the sign of all exposure coefficients.

The sample used by Varga (2013) includes all industries. Nevertheless, Electronic sector represents about 70% of the Taiwan stock market capitalization. Our future study should concentrate on this sector, to verify if we may obtain different results concerning linear and non-linear exposures and their determinants.

## Reference

1. AGGARWAL, R., HARPER, J., T., 2010, foreign Exchange Exposure of “Domestic” Corporations, *Journal of International Money and Finance*, Vol. 29, 1619-1636
2. AGYEY-AMPOMAH, S., MAZOUZ, K., and YIN, S., 2013, The foreign exchange exposure of UK non-financial firms: A comparison of market-based methodologies, *International Review of Financial Analysis*, Vol. 29, Pages 251–260
3. ALLAYANNIS, G., and OFEK, E., 2001, Exchange Rate Exposure, Hedging and the Use of Foreign Currency Derivatives, *Journal of International Money and Finance*, Vol. 20, 273-296
4. ALLAYANNIS, G., and WESTON, J., 2001, The Use of Foreign Currency Derivatives and Firm Market Value, *Review of Financial Studies*, Vol. 14, 243-276
5. ANDREN, N., 2001, Is macroeconomic exposure asymmetric?, *Department of Business Administration, Lund University*, Working Paper
6. BARTRAM, S. M., 2004, Linear and Nonlinear foreign Exchange Rate exposure of German Non Financial Corporation, *Journal of International Money and Finance*, vol. 23, 673-699
7. BARTRAM, S.M., BROWN, G.W., and MINTON B.A., 2010, Resolving the exposure puzzle: The many facets of exchange rate exposure, *Journal of Financial Economics*, Vol. 95, 148-173.
8. BODNAR, G. M. and WONG, M. H. F., 2000, Estimating Exchange Rate Exposures: Some “Weighty” Issues, *NBER Working Paper Series*, Working Paper No. 7497
9. BODNAR, G. M., HAYT, G., and MARSTON, R., 1998, Wharton Survey of Financial Risk Management by US Non-Financial Firms, *Financial Management*, Vol. 27, 70-91
10. BROWN, G.W., 2001, Managing Foreign Exchange Risk with Derivatives, *Journal of Financial Economics*, Vol. 60, 401-448.
11. CHOI, J. and PRASAD, A. M., 1995, Exchange Rate Sensitivity and its Determinants: A Firm and Industry Analysis of U.S. Multinationals, *Financial Management*, Vol. 24, No. 3, 77-88
12. CHOW, E., and CHEN, H., 1998, The Determinants of Foreign Exchange Rate Exposure: Evidence from Japanese Firms, *Pacific-Basin Finance Journal*, 153-174
13. CHOW, E., LEE W., and SOLT, M., 1997, The Economic Exposure of US Multinational Firms, *The Journal of Financial Research*, 191-210
14. De JONG, A., LIGTERINK, J., MACRAE, V., 2002, A Firm-Specific Analysis of the Exchange rate Exposure of Dutch Firms, *ERIM Report Series Research in Management*, ERS-2002-109-F&A
15. DOIDGE, C., GRIFFIN, J., and WILLIAMSON, R., 2002, Does Exchange Rate Exposure Matter?, Working Paper, Ohio State University
16. DOMINGUEZ, K., and TESAR, L., 2001a, A Re-Examination of Exchange Rate Exposure, *American Economic Review Papers and Proceedings*, 396-399
17. DOMINGUEZ, K., and TESAR, L., 2001b, Trade and Exposure, *American Economic Review Papers and Proceedings*, 367-370
18. GAO, T., 2000, Exchange Rate Movements and the Profitability of US Multinationals, *Journal of International Money and Finance*, 117-134
19. GECKZY, C., MINTON, B., and SCHRAND, C., 1997, Why Firms Use Currency Derivatives, *Journal of Finance*, 1323-1354
20. HE, J. and NG, L. K., 1998, the Foreign Exchange Exposure of Japanese Multinational Corporations, *Journal of Finance*, Vol. 53, Issue 2, 733-753.
21. JORION, P., 1990, The Exchange-Rate Exposure of U.S. Multinationals, *Journal of Business*, Vol. 63, No. 3, 331-345
22. KOUTMOS G. and MARTIN A.D., 2003, Asymmetric Exchange Rate Exposure: Theory and Evidence, *Journal of International Money and Finance*, Vol. 22, 365-383



23. LI, J-F., LIN, Y-B., HONG, C-Y., 2011, The Impact of Unexpected Changes in Exchange Rate on Firms' Value: Evidence from a Small Open Economy, *African Journal of Business Management*, Vol. 5(7), 2786-2793
24. MARSTON, R., 2001, The Effects of Industry Structure on Economic Exposure, *Journal of International Money and Finance*, Vol. 20, 149-164
25. MULLER, A., VERSCHOOR, W., F., C., 2006, European foreign Exchange Risk Exposure, *European Financial Management*, Vol. 12, 195-220
26. NANCE, D., SMITH Jr., C., and SMITHSON, C., 1993, On the Determinants of Corporate Hedging, *Journal of Finance*, Vol. 48, 391-405
27. SMITH, C., and STULZ, R., 1985, The Determinants of Firms' Hedging Policies, *Journal of Financial and Quantitative Analysis*, 391-405
28. SOLAKOGLU, M., N., 2005, Exchange Rate Exposure and Firm-specific Factors: Evidence from Turkey, *Journal of Economic and Social Research*, Vol. 7(2), 35-46
29. VARGA, R., F., 2013, Exchange Rate Exposure: Do Asymmetries and Volatilities Matter? Evidence from the Taiwan Stock Market, *International Business Research*, Vol. 6, No. 7, 120-130
30. WARNER, J., 1977, Bankruptcy Costs: Some Evidence, *Journal of Finance*, 337-348
31. WILLIAMSON, R., 2001, Exchange Rate Exposure and Competition: Evidence from the Automotive Industry, *Journal of financial Economics*, Vol. 59, 441-475