Foreign exchange rate sensitivity and stock price: Estimating economic exposure of UK quoted companies in oil and gas sector

Yahaya Mohammed Baba

Department of Accounting and Finance, Mai Idriss Alooma Polytechnic, P.M.B. 1020, Geidam Yobe State Nigeria.

ARTICLE INFO

ABSTRACT

Exchange rate exposure of UK listed oil and gas companies was examined against four major currencies; Australian dollar, Canadian dollar, Euro and US dollar by applying Adler and Dumas (1984) estimation model. The final sample of the study consists of (17) firms. (100%) of the sample firms exhibit significant negative exposure to US dollar indicating a decrease in stock returns of these firms, all the companies' exhibit significant positive exposure to Australian dollar, 88% of the sample firms exhibits significant positive exposure to Canadian dollar. Major findings from the study reveals that oil and gas sector in UK is highly vulnerable to exchange rate risk particularly against US, Australian and Canadian dollar.

Introduction

Since the collapsed of Bretton Woods fixed exchange rate regime in the 1970's, numerous empirical research in international finance emerged investigating the sensitivity of firm's value to exchange rate fluctuation, however the search for statistically significant and economically meaningful exposure estimate in most previous works was unsuccessful, Pritamani *et al.* (2004). This indicates that previous empirical studies on foreign exchange exposure mostly failed to detect a significant link between exchange rate movements and changes in the value of a firm. But economic theory and conventional wisdom assumes that frequent changes in exchange rate affect firm's value; as such it becomes a norm that foreign currency exposure should have an effect on shareholders wealth because depreciation in domestic currency against foreign currency adds value to companies engaged in export activities and reduces the values of companies engaged in import activities, while appreciation in domestic currency add values to importers and reduces the values of the exporters.

Bartram (2004, 2008), Cherry and Raymond (2002), Shin and Seonen (1999) and Crabb (2002) further disclosed that future cash flows and profitability of companies with overseas activity such as import and export are more vulnerable to foreign exchange risk exposure, but Bradley and Moles (2001), Parsley and Popper (2006) and Bartram *et al.* (2010) added that profitability of companies with pure domestic activities are also affected by exchange rate exposure through oversea competitors. Activities of companies with pure domestic operations may be affected by exchange rate changes if the price of their input and output resources are influenced by currency fluctuation Adler and Dumas (1984). Therefore Butler (2011) described foreign exchange exposure as the sensitivity of firm's value due to fluctuation in one or more foreign currency value fluctuations in exchange rate which can be estimated by the slope coefficient in a regression of stock returns on changes in the spot exchange rate. $r_t^d = \alpha^d + \beta^f(s_t^{d/f}) + \varepsilon^d$.

Under floating exchange rate regime three types of exposures are identified: translation, transaction and economic exposure. Translation or Accounting exposure refers to impact of changes in currency values on a firm's consolidated financial statements translation or accounting exposure is measure by three different methods, the current, temporal and current rate method. Transaction exposure to currency is defined as the changes in the value of monetary (contractual) cash flows due to unexpected changes in exchange rate. But economic exposure is the sensitivity of firm's non-contractual cash flows to exchange rate movement, which is measure by the slope coefficient in a regression of stock returns on changes in the spot exchange rate. This particular study intend to investigate the sensitivity of stock price of UK quoted companies in oil and gas sector to fluctuation of Pound sterling (£) against four major different currencies; US dollar (U$), Euro (€), Australian dollar (A$) and Canadian dollar (C$) from January 2007 to December 2010 using daily data.

In a nutshell this research intends to provide answer to following research questions;

- To find out whether the sample companies exhibits statistically significant exposure to exchange rate changes or not.

- To find out the foreign currency (US Dollar, Euro, Australian Dollar and Canadian Dollar) which the sample companies are mostly exposed to.

- Finally to find out whether companies' size influence firms exposure to exchange rate movement.

Literature Review

Existing literature on foreign exchange risk exposure is stuffed with studies concerning the exposure of firms and countries to frequent changes in the exchange rates of domestic currencies in relation to the currencies of trading partner countries, while economic theory and conventional wisdom assumes that fluctuation in exchange rate affect firm's value. In view of that Aysun and Guldi (2011) apply four different estimation models (Linear, Non-linear, Partially parametric and

Non-parametric) to estimate exchange rate exposure for a sample of three hundred and sixty seven (367) firms drawn from US, Brazil, Chile, Mexico, Korea and Turkey from 1995-2006. Using daily stock returns and exchange rate data on home currency against selected foreign currencies (US Dollar, Euro, Japanese Yen, and UK Pound sterling), Aysun and Guldi (2011) find out that majority of the sample companies in all the selected countries exhibits significant exposure to exchange rates changes across all the models.

In a related development Makar and Huffman (2008) investigates the sensitivity of stock price for a sample of forty four (44) multinationals in UK to fluctuation of pound sterling against US dollar, Australian dollar, Euro, Canadian dollar and Swiss franc from 1999-2002. The findings from the study reveals that majority of UK firms exhibit significant exposure to exchange rates changes, however contrary to some previous studies on companies in UK which revealed that UK firms are mostly exposed to Euro (€), the findings from the worked of Makar and Huffman (2008) find out that majority of firms in UK are mostly exposed to US dollar (US$) with a negative coefficients, meaning that UK companies losses economic value when pound sterling appreciates against US dollar. Furthermore the study find out that firm's size and firm activity (export or import) influences the size and magnitude of the exposure. Nguyen *et al.* (2007) used monthly data from 1990-2001 to examines the impact of introduction of Euro currency on exchange rate exposure of companies in France against fluctuation in applicable trade weighted exchange rate index in France. The sample includes 99 firms listed on France stocks market while the period of the study is divided into two; before the introduction of Euro (1990-1998) and after the introduction of Euro (1999-2001). Major finding from the study reveals that 32% of the sample firms exhibit significant exchange rate exposure before the introduction of Euro of which 84% recorded negative exposure, the number of firms with significant exchange rate exposure after the introduction of Euro reduces to 11% of which 60% recorded negative exposure. The study reveals that France companies are more exposed to exchange rate risk before the introduction of Euro currency. Nguyen *et al.* (2007) re-estimate the exposure of these companies to fluctuation against Pound sterling and US dollar, and find out that 22.34% and (46.81%) of the firms are exposed to British Pound sterling and (US dollar) respectively before introduction of Euro, the number of firms with significant exposure to British Pound sterling and US dollar dropped to 6.38% and (21.3%) after the introduction of Euro. This indicates that companies in France are more exposed to US dollar than British pound sterling. The study finally documented that the introduction of Euro as single currency minimise the extent of the exposure, but do not eliminates the exposure entirely.

Contrary to the findings of previous studies reported above which demonstrated evidence of statistically significant exchange rate exposure, Bartram and Bodnar (2012) investigates exchange rate exposure of a sample of four thousand four hundred and four (4404) non-financial corporations in thirty seven (37) developed and emerging economies from 1994-2006. Using rolling window over a period of 60 months Bartram and Bodna (2012) find out that only 6.4% and (5.0%) of the entire sample firms exhibit significant exposure to exchange rate changes with positive and (negative) exposure respectively. The further study apply Fama and Macbeth cross-sectional regression analysis on the estimated exchange rates exposure and market beta to determine the unconditional and conditional

effects of stocks return on exchange rate exposure, but no evidence of unconditional relation of stock return effect on exchange exposure rate was found, meaning that potential shareholders and investors cannot make profit simply by acquiring shares in companies with positive or negative exposure. In aggregate evidence of statistically significant exchange rate exposure was discovered in only a small number of companies in the entire sample.

Pritamani *et al.* (2004) reported an insignificant exchange rate exposure on a sample of 186 US import and export companies. Similarly Lou *et al.* (2006) also reported an insignificant exchange rate exposure on a sample of 145 listed companies in New Zealand. Nguyen and Faff (2003), Benson and Faff (2003) reported evidence of insignificant exchange rate exposure on a sample of companies in Australia.

Most previous studies on exchange rate fluctuations measure exposure by regression analysis using stock returns. Adler and Dumas (1984), Makar and Huffman (2008), Lou *et al.* (2006), Priestley and Ødegaard (2007) measure firms' exposure to exchange rate by the slope coefficient in a regression of stock returns on changes in exchange rate Jorion (1990), Nguyen *et al.* (2007), Bartram and Bodna (2012) Martin *et al.* (1999) and Pritamani et al. (2004) measure firm exposure by adding the return of the market to control for market movements.

In summary it can be seen from the above empirical findings that mixed results are reported about the relationship between stock returns and exchange rate fluctuations. Some studies established evidence of significant relationship between stock return and exchange rate, while other investigations reported evidence of insignificant relationship therefore differences in accounting, legal, economic, political and cultural settings from one country to another may contributed to mixed findings being documented on similar issues.

Methodology

In order to measure exchange rate exposure of UK listed oil and gas companies, the research follow Adler and Dumas (1984) model which measure exposure as the slope coefficient from a regression of stock returns on exchange rates.

The model is as follows:

$$R_t^d = \alpha^d + \beta^f(S_t^{d/f}) + \varepsilon^d \qquad \text{...........................} \textbf{(Eq. i)}$$

Where: R_t^d = Equity return in the domestic currency (d) in period (t),

$S_t^{d/f}$ = percentage change in the spot exchange rate during period t.

β^f = is the coefficient that represents the sensitivity of a company's stock return to exchange rate movement. The intercept term α^d is the expected equity return in the domestic currency when $S_t^{d/f} = 0$, finally ε_t^d is the error term.

Since the exposure of the sample firms in this study will be estimated against four different currencies (US dollar, Euro, Australian dollar and Canadian dollar) multiple regression analysis in the following form is apply:

$$R_t^\pounds = \alpha^\pounds + \beta^\$ S_t^{\pounds/US\$} + \beta^\euro S_t^{\pounds/\euro} + \beta^{A\$} S_t^{\pounds/A\$} + \beta^{CD} S_t^{\pounds/C\$} + e_t^\pounds$$
$$\text{............} \textbf{(Eq. ii)}$$

Where the coefficien ts $\beta^{US\$}$, $\beta^\euro$, $\beta^{A\$}$ and $\beta^{C\$}$ in **equation (ii)** stands for sensitivity of stock price to fluctuation of Pound sterling exchange rate against US dollar, Euro, Australian dollar and Canadian dollar. In the model the exchange rate is in direct quotation, therefore if the regression in **Equation (ii)** above yields a slope coefficients of $\beta^{US\$}$, $\beta^\euro$, $\beta^{A\$}$ and $\beta^{C\$} = 0$, then stock price is not sensitive to fluctuation in exchange rate, meaning that changes in the exchange rate have no power to explain changes in domestic equity value. Where the slope

coefficients $\beta^{US\$}$, β^{ϵ}, $\beta^{A\$}$ and $\beta^{C\$}$ is positive, reveals a depreciation in home currency (£), which indicates an increase in the value of the firm, but when the value of $\beta^{US\$}$, β^{ϵ}, $\beta^{A\$}$ and $\beta^{C\$}$ is negative, reveals an appreciation in home currency (£) which corresponds to decrease in the value of the firm.

Finally Exchange rate exposure can be measure as percentage change in domestic currency value of stock return $[\Delta r^d = (r_i^d - r_o^d)]$ resulting from percentage change in the spot exchange rate $\Delta S^{d/f} = (S_i^{d/f} - S_o^{d/f})$. Therefore Exposure = $[\Delta r^d / \Delta S^{d/f}]$.

Choice of Exchange Rates

In international finance literature there is no specific rule that mandates the choice or application of a particular exchange rate index in estimating the exposure of firms to exchange rate risk, as such past and present studies on exchange rate exposure used different exchange rates index ranging from trade weighted exchange rate to bilateral exchange rates, Aysun and Guldi (2011). This study apply specific currency spot exchange rate of Pound sterling against US dollar, Euro, Australian dollar and Canadian dollar respectively. The use of this exchange rate (specific currency exchange rate) is in consistent with previous worked of Makar and Huffman (2008), Rees and Unni (2005) and Parsley and Popper (2006).

Data Description

The model in Equation (ii) will be estimated using daily observations of stock returns and exchange rate from January 2007 to December 2011. Data for this research are secondary data (stock price and exchange rates), data for stock prices were obtained from Morningstar company intelligence and yahoo finance, while data on exchange rate variables for all the currencies were obtained from The Bank of England

Sample Description

The companies examined the study are firms in oil and gas sector listed on London stock exchange (Main Market) as well as those listed on Alternative investment market (AIM). The initial sample consists of thirty (30) companies obtained from the Main Market and AIM; however the sample was restricted to companies with complete data from January 2007 to December 2011. Therefore due to incomplete data in some companies, the final sample consists of seventeen (17) firms of which thirteen (13) are from main market and four (4) from alternative investment market (AIM).

Analysis and Interpretation of Results

The findings of the study are outline in table(s) (i) and (ii) below.

Table (i) above outline the summary of descriptive statistics for key variables of the sample companies included in the study. The maximum value, minimum value, the mean and the standard deviation for annual turnover, number employees, number of shares and board size as at 2011 for the companies are categorically stated. For example the minimum number of employee(s) in all the companies is 1, while the maximum value is 90,000; the mean and standard deviation are 11,418.9412 and 28453.31697 respectively. Furthermore the smallest board size in the sample is 5; while the largest board size is 16, the mean for board is 9.8824 while the standard deviation is 3.17967. With regard to revenue or annual turnover the minimum and maximum values are £0 (M) and £181073(M) respectively, the mean and standard deviation are £11344.13(M) and £43801.505 (M) respectively.

The results shown in Table (ii) above is the outcome of regression analysis based on equation (ii) above on firms' Exposure to multiple exchange rates; Pond Sterling to US Dollar, Pound Sterling to Euro, Pound Sterling to Australian Dollar and Pound Sterling to Canadian Dollar. Out of seventeen companies included in this study all of them representing (100%) exhibit significant exposures to US dollar exchange rate fluctuation. But in the case of Euro (€) only three firms representing 18% of the sample companies exhibit significant exchange rate exposure. With regards to Australian dollar all the companies' exhibit significant exchange rate exposure to Australian dollar just like the US dollar, finally fifteen companies representing 88% of the sample firms exhibits significant exposure to Canadian dollar. It should be noted that all the firms that exhibits significant exposure to US dollar are also exposed to Australian dollar. Furthermore all the companies with significant exposure to US dollar ($) experienced negative exposure coefficient, meaning that an appreciation in home country currency pound sterling (£), corresponds to decrease in stock returns of these firms, meaning that the firms are adversely affected as a result of negative exposure to US dollar. In the case of Australian dollar and Canadian dollar the firms experienced significant positive exposure coefficients, indicating depreciation in home country currency pound sterling (£), which indicates an increase in the value of the firm stock returns. This indicates that firms with international transactions in Australian dollar and Canadian dollar benefitted. Finally only two out of seventeen firm's exhibit significant exchange rate exposure to Euro, meaning that stock price is not sensitive to fluctuation in **Pound/Euro** exchange rate in most of the firms.

Conclusions

The study examined exchange rate exposure of selected companies in oil and gas sector listed on London Stock Exchange from January 2007 to December 2010. The findings of the study reveal that, all the currencies of international transaction with the exception of Euro are sources of foreign exchange risk companies in oil and gas sector listed on London stock exchange. US and Australian dollar followed by Canadian dollar turned out to be the major source of foreign exchange risk to companies in UK oil and gas sector. All the companies had significant negative exposure to US dollar reveals a fall or decrease in stock returns of these firms, meaning that the firms are adversely affected as a result of appreciation in home country currency (pound sterling (£)) against US dollar. Companies with exposure to Australian and Canadian dollar on the other hand experienced higher stock returns as result of home country currency (pound sterling (£)), depreciation against the Australian and Canadian dollar. Therefore it will be of more benefit for UK oil and gas companies to denominate their foreign deals with Australian and Canadian dollar.

Major findings from the study reveals that oil and gas sector in UK is highly vulnerable to exchange rate risk particularly against US, Australian and Canadian dollar. This also reveals that the used of financial derivatives if any such as forwards, futures, options and swaps does nothing or little in mitigating the exposure. Finally to answer the research questions outline above, it can be seen that with the exception of Euro, most of the sample companies exhibits significant exchange rate exposure against US and Australian dollar followed by Canadian dollar, while firms' size doesn't influence firms exposure to exchange rate movement.

References

- Adler, M. and Dumas, B. (1984) Exposure to Currency Risk: Definition and Measurement. *Journal of Financial Management* **13**(2) pp. 41-50.

Table (i). Summary of Descriptive Statistics

	Number of Firms	Minimum	Maximum	Mean	Std. Deviation
Annual Turnover (£m)	17	0	181073	11344.13	43801.505
Number Of Employees	17	1	90,000	11418.9412	28453.31697
Number Of Shares (m)	17	73.03	25696.00	3466.2218	7287.18579
Board Size	17	5	16	9.8824	3.17967

Table (ii). Regression Coefficients

Firm	α	$\beta^{US\$}$	$\beta^{€}$	$\beta^{A\$}$	$\beta^{C\$}$
Afren	.018 (.872)	-2.227 (.000)**	.243 (.275)	1.202 (.000)**	.935 (.000)**
BG	.097 (.145)	-1.669 (.000)**	.031 (.818)**	.930 (.000)**	.757 (.000)**
BP	-.007 (.905)	-1.176 (.000)**	.019 (.873)	.750 (.000)**	.823 (.000)**
Bowleven	-.191 (.156)	-1.583 (.000)**	-.368 (.176)	.729 (.015)**	.991 (.000)**
Borders & South	.086 (.516)	-1.657 (.000)**	-.004 (.988)	.693 (.019)**	1.155 (.000)**
Cairn Energy	.040 (.691)	-1.740 (.000)**	-.050 (.807)	1.023 (.000)**	.833 (.000)**
Faroe oil	-.046 (.668)	-.739 (.000)**	.080 (.710)	1.330 (.000)**	-.018 (.928)
Fortune oil	.054 (.692)	-.701 (.002)*	-.155 (.572)	1.428 (.000)**	.472 (.063)*
Gulf Sands	.096 (.338)	-1.546 (.000)**	-.224 (.271)	.964 (.000)**	.930 (.000)**
Hardy oil	-.024 (.762)	-1.408 (.000)**	.059 (.711)	1.044 (.000)**	.543 (.000)**
JKX oil	.040 (.712)	-1.528 (.000)**	.162 (.459)	.859 (.000)**	.816 (.000)**
Melrose oil	.049 (.671)	-.558 (.004)**	-.150 (.520)	.646 (.012)*	.200 (.352)
Premier oil	.003 (.969)	-1.528 (.000)**	.433 (.014)*	.582 (.003)**	.715 (.000)**
RDS	-.004 (.966)	-1.091 (.000)**	-.064 (.706)	.534 (.004)**	1.056 (.000)**
Salamander	-.042 (.699)	-1.912 (.000)**	-.461 (.034)*	1.275 (.000)**	.568 (.005)**
Soco int'l	-.046 (.614)	-1.219 (.000)**	-.072 (.698)	.707 (.001)**	.428 (.012)*
Tullow oil	.127 (.120)	-1.791 (.000)**	.119 (.469)	1.163 (.000)**	.832 (.000)**

Numbers in (Parentheses) signify the significance of the relationship, while * and ** refers to significance at 0.05 and 0.01 level of significance.

-Aysun, U. and Guldi, M. (2011) Exchange rate exposure: A nonparametric approach. *Emerging Markets Review* **12**(2011) pp. 321–337.

- Bartram, S.M. (2004) Linear and nonlinear foreign exchange rate exposures of German nonfinancial corporations. *Journal of International Money and Finance*, **23**(4) pp. 673-699.

- Bartram, S.M. (2008) What lies beneath: Foreign exchange rate exposure, hedging and cash flows. *Journal of Banking and Finance* **32**(8) pp. 1508-1521.

- Bartram, S.M., and Bodnar, G.M. (2012) Crossing the lines: The conditional relation between exchange rate exposure and stock returns in emerging and developed markets. *Journal of International Money and Finance* **31**(2012) pp. 766–792.

- Benson, K.L. and Faff, R.W. (2003) Exchange rate sensitivity of Australian international equity funds. *Global Finance Journal* **14**(2003) pp. 95–120.

- Bradley, K. and Moles, P. (2001) "The effects of exchange rate movements on non-financial UK firms. *International Business Review* **10**(1) pp. 51-69.

- Butler, K.C. (2008) *Multinational finance* 4th ed. Chichester: John Wiley and Sons Limited.

- Crabb, P.R. (2002) Multinational corporations and hedging exchange rate exposure. *International Review of Economics and Finance* **11**(2002) pp. 299–314.

- Jorion, P. (1990) The Exchange-Rate Exposure of U.S. Multinationals. *The Journal of Business* **63**(3) pp. 331-345.

- Luo, R.H., Visaltanachoti, N. and Kesayan, P. (2006) Analysis of Foreign Currency Exposure of the New Zealand Stock Market. *Investment Management and Financial Innovations* **3**(1).

- Makar, S.D., and Huffman, S.P. (2008) UK Multinationals' Effective Use of Financial Currency-Hedge Techniques: Estimating and Explaining Foreign Exchange Exposure Using Bilateral Exchange Rates. *Journal of International Financial Management and Accounting* **19**(3) 2008.

- Nguyen, H. and Faff, R. (2003) Can the use of foreign currency derivatives explain variations in foreign exchange exposure? Evidence from Australian companies. *Journal of Multinational Financial Management* **13**(2003) pp. 193-215.

- Nguyen, H., Faff, R., and Marshall, A. (2007) Exchange rate exposure, foreign currency derivatives and the introduction of

the Euro: French evidence. *International Review of Economics and Finance* **16**(2007) pp. 563–577.

- Parsley, D.C. and Popper, H.A. (2006) Exchange rate pegs and foreign exchange exposure in East and South East Asia. *Journal of International Money and Finance* **25**(2006) pp. 992-1009.

- Priestley, R. and Ødegaard, B.A. (2007) Linear and nonlinear exchange rate exposure. *Journal of International Money and Finance* **26**(2007) pp. 1016-1037.

- Pritamani, M.D., Shome D.K. and Singal, V. (2004) Foreign exchange exposure of exporting and importing firms. *Journal of Banking and Finance* **28**(2004) pp. 1697–1710.

- Rees, W. and Unni, S. (2005) Exchange rate exposure among European firms: evidence from France, Germany and the UK. *Accounting and Finance* **45**(2005) pp. 479–497.

- Shin, H. and Seonen, L. (1999) Exposure to currency risk by US multinational corporations. *Journal of Multinational Financial Management* **9**(2) pp. 195-207.