

# A Comparative Analysis in the Field of the Economic Exposure to Currency Risk

Belascu Lucian

"Lucian Blaga" University of Sibiu, Faculty of Economic Sciences

[lucian.belascu@ulbsibiu.ro](mailto:lucian.belascu@ulbsibiu.ro)

## Abstract

*Currency fluctuations became a daily habit of nowadays financial markets and their impact can be felt in all companies, from the mere domestic ones to the transnational corporations with intricate businesses around the world. Our paper investigates the economic exposure to currency risk for a number of 20 companies from Romania and Croatia, between 2006 and 2011, on a short-term and long-term perspective. The results picture a different image regarding these companies' exposure either to the Euro and the US dollar. We find that Romanian companies are more exposed to unexpected changes in the value of their national currency against both the Euro and the US dollar compared to Croatian companies, with the exposure more pregnant over the long-term. This may be explained by the exchange rate regime applicable to both currencies: a managed floating for the Romanian currency and a more controlled rate for the Croatian currency.*

**Key words:** Currency risk, economic exposure, currency fluctuations

**J.E.L. Classification:** F00, G15, FG17

## 1. Introduction

The exchange rate exposure measures the sensitivity of stock returns to exchange rate changes and it is an essential issue in international financial management, because unexpected exchange rate changes may affect the company's pricing decisions, future cash flows and valuation. All companies involved in international transactions are subject to transaction risk arising from payables and receivables in foreign currencies. Moreover, multinational firms will end up with translation risks from having assets and liabilities denominated in foreign currencies. Economic exposure includes two types of effects, namely the transaction and the translation one, but they also incorporate the competitive situation of the firm.

The economic or operating exposure might have a significant impact on the competitiveness of a company, by affecting both its cash flows and market value. This type of exposure is not as easily quantifiable compared to transaction or translation exposure, but its impact is perhaps at times more important. There are a number of factors which determines the economic exposure such as the market structure and the company's ability to mitigate the exposure. Concerning the market structure the company must analyse both its input and output markets. A company is subject to operating exposure if the cost of the raw materials, labour or other inputs is sensitive to the changes in the exchange rate. This is also valid in the case of the sensitivity of the selling prices. Therefore, as long as any type of future cash flow is sensitive to the changes in the exchange rates the company has operational exposure. The way of managing this exposure is to stabilize the cash flows on the long term, therefore to develop long-term strategies involving the trading partners, the location of production facilities, the markets in which to sell and many others. The most common ways the companies try to mitigate the exposure is by locating their production facilities in countries with low costs, by adopting a flexible sourcing policy both from the point of view of capital and labour, by market diversification and product differentiation. Nonetheless most companies, when making the above-mentioned operational decisions, take into account other factors and tend to ignore the exchange rate exposure. The most cautious companies which fail to

do so chose to mitigate the exposure through financial hedging. One of the most appealing method used by the companies to mitigate this exposure is thus by using derivatives such are currency forward and option contracts. One important aspect related to this method is that it uses merely an approximation of the exposure and it represents a hedge against the nominal changes only, not considering the real ones which are the ones which affect the operations of the company.

The literature in the field developed since the beginning of the 90s, initially focusing on developed markets (the most prominent studies on the developed markets belong to Jorion (1990), Roll (1992), or Chow et al. (1997)), and afterwards exploring the specificities of emerging markets as well (see the studies of Kyimaz (2003), Dong et al. (2005), Murinde (2004) or Aggarwal et al. (2011)). In Romania, previous studies on currency exposure belong to Horobet and Lupu (2005 and 2006), Horobet and Ilie (2007) and Horobet and Dumitrescu (2008). We provide in the next paragraphs an overview of the most important results revealed by these and other empirical studies on currency exposure.

The area of research relevant on the implications of foreign exchange risk for the domestic stock markets has reached to results that are interesting, but contradicting most of the times. There are researchers that advocate that the exposure of stocks' prices and returns to foreign exchange rates volatility is limited and statistically insignificant, whereas others claim that a large part of the variability of local stocks can be attributed to fluctuations in the foreign exchange rate. The overwhelming majority of these studies address the US market, either by exploring the impact of exchange rate fluctuations on the "stand alone" equity, or by considering the impact from the point of view of a portfolio of securities.

Jorion (1990) is one of the first authors to advance the subject of exposure of US multinational companies to currency risk. He examines the exchange rate exposure for a 17 years period, namely between 1971 and 1987 and concludes that share prices of these companies are not systematically influenced by changes in nominal exchange rates. He finds that a relationship between the stocks' prices and foreign exchange rates exists only when the company is involved in international business. Although such an exposure exists, the author underlines that the risk appears to be diversifiable and there is no need for hedging. On the other hand, Roll (1992) finds evidence that a part of the stocks' volatility is affected by foreign currency risk. The author provides three reasons for which market indices are volatile: (1) a poor diversified portfolio; (2) the pattern of industries in the index; (3) foreign exchange risk. The last two factors cumulated count for around half of the total index volatility, whereas the exchange rate risk alone is responsible for 23% in most of the countries. Therefore, according to this author there is an inverse relationship between stocks' returns and changes in the value of the national currency. Chow et al. (1997) examine the exposure of both stocks and bonds to foreign exchange rates fluctuations in the US market. The authors underline the fact that all assets are subject to currency risk exposure and that previous empirical studies proving otherwise were not correct. They observe the fact that returns on bonds market are affected by foreign exchange rate changes both in the short and in the long run, whereas stocks are exposed only to long run changes. Another worthwhile aspect is brought forward by Priestley and Ødegaard (2003) which advocate that there is an asymmetry concerning the exchange rate exposures of industry stock returns in depreciations relative to appreciations regimes. They underline the fact that in appreciating regimes the exposure of stocks' prices to exchange rate movements is not as significant as in depreciating regimes. They analyse a sample of 30 industries and conclude that over half of them have a significant exchange rate exposure, mainly those which are engaged in extensive international trade. An additional conclusion is that the magnitude of the exchange rate fluctuation affects directly the company's exposure, namely the higher the exchange rate change, the higher the level of correlation between it and the changes in stocks returns. Koutmos and Martin (2003) investigate the exchange rate exposure of US stocks by analysing the daily returns for a 7 year period (1992-1998). They promote the idea that exposures are asymmetrical and lagged. Moreover, they underline that fact that exposures are industry specific, as financial services industry is significantly more exposed to exchange rate fluctuations, either contemporary or lagged, as compared to other industries.

Moving beyond the US market, Glaum et al. (2000) investigate the exposure of German companies to changes in the nominal exchange rate of the German mark against the dollar, by analysing the period between 1974 and 1997. Although the authors find the exposure as being

significant, they mention that their result is not stable over time. They point out to different factors which affect the degree of exchange rate exposure, such as the level of foreign direct investment, the level of international trade, the structure of firms' foreign currency denominated assets or liabilities or the hedging activities. Dutch companies have been researched by De Jong et al. (2002), which investigated 117 companies over a 5-year period, between 1994 and 1998. They find more significant exposures in phases of the Dutch guilder depreciation against other currencies. They reach the conclusion that all non-financial companies which are exposed to exchange rate fluctuations benefit from the depreciation of the local currency. They also underline that some of the most important factors influencing the exposure the companies are the size of the company and the weight of the exports in its total revenues. On the Japanese market, Doukas et al. (2003) examine the connection between the returns of 1,079 companies' shares and the exchange rate fluctuations. The study is of significant importance considering the unexpected changes in the Japanese yen exchange rates between 1975 and 1995. The authors advocate that there are significant exposures to exchange rate changes. The degree of exposure is higher in the case of multinational and exporting companies; therefore an important factor is the degree of international involvement of the firm. Also the authors find other influencing factors, which negatively affect the exposure, namely the size and financial leverage of the company. Outside the US market, studies on exposure to currency risk referred to the Turkish market, emerging Asian countries, and Central and Eastern European markets. Kiyamaz (2003) investigates the way in which the volatility of foreign exchange rates affects the stock market in an inflationary Turkish environment. His research is made on 103 companies traded on the Istanbul Stock Exchange between 1991 and 1998 and it shows that these stocks are very sensitive to foreign exchange risks. Moreover, the degree of exposure is in concordance with the level of international involvement of the company and with the industry in which it activates. On the emerging Asian market, Dong et al. (2005) studied six countries over a 15 year period, between 1989 and 2003. The result is that there is no co-integration between the exchange rates and stock prices. Nonetheless, they observed bi-directional causality in Korea, Malaysia, Indonesia and Thailand. For one of the observed countries (Thailand), the stock prices presented significantly negative relation with the changes in the foreign exchange rates. One of the most recent studies is made on the Chinese market by Aggarwal et al. (2011). The authors analysed the foreign exchange exposure of Chinese companies, after China abandoned in July 2005 the policy of fixing the Yuan against the US dollar. Their results underline that the appreciation of the Yuan did not hurt the local companies' competitiveness; moreover they have caused higher returns for the Chinese companies. An interesting aspect brought forward is that the companies are less exposed to the variation of the Yuan against the Euro, US Dollar, Yen or Hong Kong dollar as compared to the ASEAN currency index.

Another study of interest is that of Murinde and Poshakwale (2004), which investigate the Hungarian, Polish and Czech stock markets. The aim of the paper was that of analysing the European emerging markets before and after they entered the Euro-zone. Their results point out that as the markets became more integrated within the EU, the causality became much easier to detect. The authors underline that while the results are mixed for the three countries before the Euro adoption, afterwards for all three countries the exchange rates exposure is significant. On the Romanian market, Horobet and Lupu (2005) analyse the relationship between stocks' returns and exchange rates for the period January 2000 – October 2005. They conclude that there is a weak relationship between the two variables, attributable to low involvement of Romanian business in international aspects or to very effective hedging strategies. The same authors expand their research in 2006 in order to include 10 Central and Eastern European countries, namely Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovenia, Slovakia and Romania. They reach the same conclusion as in the Romanian case, that there is a weak exposure of the companies to the exchange rate changes, either contemporaneous or lagged (Horobet and Lupu, 2006). Horobet and Ilie (2007) investigate the link between exchange rate changes and stock market performance using co-integration and Granger causality tests on the stock prices and exchange rates, between 1999 and 2007. The authors advocate that there is a long-term equilibrium relationship between performance of the stock prices and the exchange rates. They underline the lagged exposure, namely that the information is transmitted with a one-month lag. Later on, Horobet and Dumitrescu (2008) extend this research to four Central and Eastern European

countries, namely Czech Republic, Hungary, Poland and Romania and they find two types of exposure: contemporaneous and lagged. Concerning the contemporaneous exposure, it is relatively small, whereas the lagged one is more statistically significant for three to four months.

In what follows we investigate the exposure of 20 companies from Romania and Croatia to changes in the nominal exchange rate of the domestic currencies to the Euro and the US dollar, over the short and the long-term. Section 2 provides details on data and research methodology, Section 3 outlines the main results, and Section 4 concludes.

## 2. Data and research methodology

We study the exchange rate exposure of 20 companies from Romania and Croatia for a six year period starting in January 2006 and ending in December 2011. We investigate both the short-term exposure, by using daily prices and returns, and long-term exposure, by employing monthly prices and returns.

Concerning the stock prices two types of data have been used in the analysis. First, we have used the stock prices of some of the most important companies in each country. From the listed companies we have excluded the ones involved in the rendering of services in order to see the exchange rate exposure for the manufacturing industry. Second, we have used the MSCI country indices for Large and Medium Companies. For the first set, the data refers to the closing prices of 10 Romanian stocks and 10 Croatian stocks for the period January 1, 2006 - December 31, 2011. The Romanian stocks are listed on the Bucharest Stock exchange and the Croatian ones on the Zagreb Stock Exchange. All prices were denominated in local currencies, i.e. the Romanian Leu (RON) and the Croatian Kuna (HRK). Since we have considered only the working days in the six year frame, therefore we have obtained sets of 1,529 observations for Romania and 1,496 observations for Croatia. Due to the fact that level of transactions in both stock markets is not as high as in the developed countries, there were days in which some of the securities were not traded. Consequently, for those cases we have used an average closing price based on the previous and following days. Therefore, the returns for those days are proportionally cumulated following the accrued interest principle.

The selected Romanian and Croatian companies are all from the oil and gas, raw materials and manufacturing sector. Concerning the exchange rates, we have used the daily nominal exchange rates published by the countries' central banks for the same period. We have used the exchange rate of the domestic currencies against the Euro and US Dollar, quoted on a direct basis.

For all sets of data we have computed and worked with logarithmic returns. In order to identify the relevance and magnitude of corporate exposures to changes in the exchange rates we have used OLS linear regressions. The analysis has been concluded both on a short term basis using the daily returns and on a long term one using the monthly figures. We have used two regressions, so that the influence of the two exchange rates between the local currencies and the Euro, respectively the US dollar, is addressed separately. The regressions have the following form:  $y_t = \alpha + \beta x_t + \varepsilon_t$ , where  $y_t$  is the dependent variable, namely the daily logarithmic return of the stocks, respectively the monthly returns,  $x_t$  is the independent variable, namely the daily change of the exchange rate, respectively the monthly one,  $\alpha$  and  $\beta$  are the regression coefficients, namely the intercept and the coefficient of the independent variable coefficient, and  $\varepsilon_t$  is the regression residual.

## 3. Results

We present the results by dividing them in four main parts: in the first two parts we show and discuss the results for the short-term exposure, and in the last two parts we present the results for the long-term exposure, both for Romanian and Croatian stocks. In the end we compare the two types of exposures in an attempt to find similarities and differences.

### **Short-term exchange rate exposure of Romanian stocks**

Concerning the analysis of the Romanian stocks changes against the daily changes in the RON/EUR exchange rate, it appears all analysed stocks all of them present an exposure to the exchange rate. Moreover, there is a statistically significant negative relation between the changes in

the stock returns and the changes in the RON/EUR exchange rate. As expected, both the correlation and the Determination coefficients are not significant, as there are other more important factors affecting the prices than the exchange rate. The stocks which present a higher exposure are Dafora SA, OMV Petrom SA and Vrancart SA, for which the daily changes in the RON/EUR exchange rate are responsible for between 2% and 3 % of the changes in the stock prices, as measured by the coefficient of determination. Consequently the correlation coefficient is above 15%. Therefore, according to the analysed data the Romanian stocks seem to be exposed to the changes in the RON/EUR exchange rate on a short term. To be more specific, it appears that as the RON appreciates, or the nominal exchange rate decreases, the prices of the stocks will decrease.

Concerning the analysis of the Romanian stocks changes against the daily changes in the RON/USD exchange rate, it appears that also out of the 10 analysed stocks all of them present an exposure to the exchange rate. Moreover we find the same statistically significant negative relation between the changes in the stock prices and the changes in the RON/USD exchange rate as in the case of the EUR exposure. Similarly, both the correlation and the determination coefficients are not significant, as there are other more important factors affecting the prices than the exchange rate. The stocks which present a higher exposure are Alro SA, Dafora SA and OMV Petrom SA, with a correlation coefficient of over 20%. Additionally, for Amonil SA, Rompetrol Well Services and Vrancart SA the coefficient of correlation is above 15%.

Therefore, according to the analysed data the Romanian stocks seem to be exposed both to the changes in the RON/EUR and RON/USD exchange rates on a short-term basis. To be more specific, it appears that as the RON appreciates in terms of either currency, namely as the nominal exchange rates decrease, the prices of the stocks are expected to decrease.

#### **Short-term exchange rate exposure of Croatian stocks**

In the case of Croatian stocks, it appears that none of the 10 analysed stocks presents a statistically significant exposure to the HRK/EUR exchange rate. Moreover, for all the analysed relations between the daily changes in the exchange rate and the daily returns of the stocks the p-values are rather high, suggesting that there is no significant relation between the two variables.

While Romanian stocks are more exposed to the daily changes in the exchanges rates, Croatian stocks do not appear to be statistically exposed to the changes in the EUR, most likely due to the fact that the HRK exchange rate is closely monitored by the authorities and the fluctuations are kept under tight control. Also, for the analysed period only two of the 10 stocks present an exposure to the changes in the HRK/USD exchange rate. The direction of the short term exposure is the same as in the case of the Romanian stocks, namely as the domestic currency appreciates the prices of the stocks decreases.

#### **Long-term exchange rate exposure of Romanian stocks**

The long term exposure has been addressed from the point of view of the relation between the monthly changes in the exchange rates and the stocks' monthly returns. For Romanian stocks, the results show that only four stocks are exposed to the changes in the RON/EUR exchange rate. Moreover, there is a statistically significant negative relation between the changes in the stock prices and the changes in the RON/EUR exchange rate. As expected, both the correlation and the determination coefficients are not significant, as there are other more important factors affecting the prices than the exchange rate. The stocks which present an exposure are the ones issued by Alro SA, Amonil SA, Oltchim SA and Vrancart SA: for these stocks the monthly changes in the RON/EUR exchange rate are responsible for between 8% and 22 % of the changes in the stock prices, as measured by the coefficient of determination; consequently the correlation coefficients are above 28%. Concerning the analysis of the Romanian stocks changes against the monthly changes in the RON/USD exchange rate, it appears eight out of the ten stocks present a significant exposure. There is a statistically significant negative relation between the changes in the stock prices and the changes in the RON/USD exchange rate. As expected, both the correlation and the determination coefficients are not significant, as there are other more important factors affecting the prices than the exchange rate.

#### 4. Conclusions

Currency fluctuations became a daily habit of nowadays financial markets and their impact can be felt in all companies, from the mere domestic ones to the transnational corporations with intricate businesses around the world. Emerging markets are also prone to potential losses in the value of their assets and cash flows as result of unexpected exchange rate movements.

Our paper investigated the economic exposure to currency risk for a number of 20 companies from Romania and Croatia, between 2006 and 2011, on a short-term and long-term perspective, using daily and monthly observations on stocks prices and returns. The results we obtained picture a different image regarding these companies' exposure either to the Euro and the US dollar, the two major international reserve and trading currencies. We find that Romanian companies are more exposed to unexpected changes in the value of their national currency against both the Euro and the US dollar compared to Croatian companies, with the exposure more pregnant over the long-term. This may be explained by the exchange rate regime applicable to both currencies: a managed floating for the Romanian currency and a more controlled rate for the Croatian currency.

At the same time, the direction of both short-term and long-term exposures is the same for Romanian and Croatian companies: as the domestic currency appreciates the prices of the stocks decrease, which suggests that companies in our study have an exporter profile.

#### 5. References

- Aggarwal, R., Chen, X., Yur-Austin, J., 2011. Currency Risk Exposure of Chinese Corporations. *Research in International Business and Finance*, 25 (3), pp. 266-276
- Chow, E., Lee, W., Solt, M., 1997. The Exchange-Rate Risk Exposure of Asset Returns. *The Journal of Business*, 7(1), pp. 105-123
- De Jong, A., Ligterink, J., Macrae, V., 2002. A Firm-Specific Analysis of Exchange-Rate Exposure of Dutch Firms. Working Paper, *Erasmus Research Institute of Management*, [online]. Available at: <<http://econpapers.repec.org/paper/dgreureri/2002271.htm>> [Accessed 12April 2017]
- Doukas, J.A., Hall, P.H., Lang, L.H.P. (2001). Exchange Rate Exposure at the Firm and Industry Level. Working Paper, [online]. Available at: < <http://ssrn.com/abstract=291684> > [Accessed 25April 2017]
- Glaum, M., Brunner, M., Himmel, H., 2000. The DAX and the Dollar: The Economic Exchange Rate Exposure of German Corporations. *Journal of International Business Studies*, 31(4), pp. 715-724
- Horobet, A., Ilie, L. (2007). Real exchange rates and stock prices: insights into the competitiveness of Romanian economy. *Studies in Business and Economics*, 2(2), pp. 30-40
- Horobet, A. Lupu, R. (2005). Expunerea la riscul valutar a firmelor românești: o analiză sectorială. *Oeconomica*, , 4 (XIV), pp. 107-136
- Horobet, A., Lupu, R., 2006. Real exchange rates and corporate performance: a comparative analysis for CEE countries. In *Proceedings of the 2006 International Conference on Commerce*. Bucharest: Academy of Economic Studies Bucharest pp. 272-281
- Horobet, Al., Dumitrescu, S., 2008. Insights into Central and Eastern European Countries Competitiveness: On the Exposure of Capital Markets to Exchange Rate Risk. *Review of Economic and Business Studies*, I (2), pp.107-126
- Jorion, P., 1990. The Exchange-Rate Exposure of U.S: Multinationals. *The Journal of Business* 63(3), pp. 331-345
- Koutmos, G., Martin, A., 2003. First- and Second-Moment Exchange Rate Exposure: Evidence from U.S. Stock Returns. *The Financial Review*, 38(3), pp. 455-471
- Kyimaz, H. (2003). Estimation of foreign exchange exposure: an emerging market application. *Journal of Multinational Financial Management*, 13(1), pp. 71-84
- Murinde, V., Poshakwale, S., 2004. Exchange Rate and Stock Price Interactions. In *European Emerging Financial Markets Before and After the Euro*, EFMA 2004 Basel Meetings Paper, [online]. Available at: < <http://ssrn.com/abstract=493543>> [Accessed 15April 2017]
- Priestley, R., Ødegaard, B.A., 2003. Long Swings in the Dollar and the Exchange Rate Exposure of Stock Returns. Working paper, Norwegian School of Management, [online]. Available at: < <http://ssrn.com/abstract=493543>> [Accessed 16 April 2017]