Firms' Exchange Rate Exposure and Hedging: The Case of Romania

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Abstract
This paper analyzes exchange rate exposures of 142,626 small, medium and large Romanian firms based on cash flows for the period 2004 – 2013 using panel data regression. The exchange rate exposure in terms of transaction risk, translation risk and economic risk is also discussed. Domestic currency invoicing allows for internationally active firms to reduce their exchange rate exposure. However, the Romanian leu is not preferred as a settlement currency by business partners and thus, the Romanian firms are often significantly exposed to exchange rate fluctuations. Currency invoicing strategies and hedging with exchange rate derivatives allow for significant reduction of transaction and translation risk and their optimal use is discussed in the paper. The results indicate that the exposure estimates are economically meaningful, despite the fact that individual time-series results are noisy and many exposures are not statistically significant. Management techniques for exchange rate exposure are complemented with an analysis of their actual use.

Keywords: exchange rate exposure, cash flow, exchange rates, panel regression
JEL codes: G32, F31, C33

1. Introduction

Currency fluctuations are one of the key sources of risk in multinational operations. Several studies suggest that all firms, regardless if they export or not, should be subject to foreign exchange exposure due to their cash flows being directly or indirectly affected by exchange rate movements (Shapiro, 1975; Marston, 2001). The exchange rate volatility affects firms' direct foreign exchange exposure which arises when firms own foreign assets and liabilities and also their expected future foreign currency cash flows.

Some studies show that exchange rate volatility increases the cost of hedging (Arteta, 2005), which may result in less hedging activity and thus higher foreign exchange exposure. On the other hand, many empirical studies show that foreign exchange fluctuations have little or no impact on stock returns (Jorion, 1990; Bartov and Bodnar, 1994). While the theory suggests that firm value is sensitive to exchange rate movements, empirical support provides mixed results and focuses mainly on stock prices analysis due to unavailability of frequent cash flow data. Therefore, there exists only sparse evidence regarding the effect of exchange rate risk on corporate cash flows. The exchange rate exposure itself can be interpreted as the sensitivity of a firm's market value to a change in exchange rate. It is generally held view that exchange rate fluctuations are an important factor causing macroeconomic uncertainty and thus it probably has a significant impact on firm value, regardless of whether the firm operates in domestic market or is engaged in international activities (Shapiro, 1975).

Exchange rate movements affect corporate expected cash flows, and hence stock returns, by causing changes in the domestic currency denominated revenues and the terms of competition for firms operating in international market. Although there are financial instruments which can prevent the changes in cash flows resulting from the currency changes, smaller firms usually have limited resources to hedge. It implies that the firm's value is rather sensitive to exchange rate uncertainty (Bodnar and Marston, 2002). Some firms are also able to reduce the risk by using lagging, leading or netting strategies. However, these strategies are feasible between multinational companies with subsidiaries in foreign countries. Other strategy is currency matching, which involves pairing suitably a multinational firm's foreign currency inflows and outflows with respect to amount and timing and invoicing in

domestic currency. This strategy reduces transaction risk primarily related to exports and imports. When exports are invoiced in domestic currency, the exchange rate risk is transferred to the importer. The Romanian leu is however not preferred as a settlement currency, since the vast of exports flow to euro area countries and settlement is conducted in euro. One of the benefits of a single currency zone is that foreign exchange risk is eliminated for the trade and investment amongst the countries that form monetary union which significantly reduces the uncertainty of firms. Romania is bound to a commitment of adopting euro as a single currency. As of April 2015, the Romanian government concluded it was on track to attain its target for euro adoption in 2019, both in regards of ensuring full compliance with all nominal convergence criteria and in regards of ensuring a prior satisfying degree of real convergence. Monetary policy authorities consider managed-floating exchange rate regime as the most appropriate nowadays and also highlight its function as a strong shield against crises.

The objective of this paper is to document the extent of economic exchange rate exposure in a sample of small, medium and large Romanian firms in the period 2004 – 2013. The contribution of the paper lies in four areas: (I) estimating cash flow exposures offers a new perspective and provides new evidence on the foreign exchange rate exposure of firms. (II) Although some papers concern exchange rate exposure in emerging markets, there is a lack of literature concerning Eastern European countries. (III) Due to cash flow data unavailability, studies of foreign exchange rate exposures generally use stock returns to proxy for changes in cash flows. (IV) The dataset used to analyze the cash flows exposure comprises more than 142,000 firms.

The remainder of the paper is organized as follows. The literature related to exchange rate volatility and its influence on firm value is covered Section 2. Section 3 provides information about data set and section 4 describes methodology used to estimate cash flow exposures. The exposure estimation results and the robustness of these results are discussed in the Section 5. The paper is concluded by a summary of results in Section 6.

2. Literature Review

Before reviewing the relevant literature, we need to clarify the categories of exchange rate risk. In the literature, we can find the three basic types of exposure: transaction, translation and operating (Shapiro, 2013). The transaction exposure represents the exchange rate risk when converting foreign cash flows. As exchange rates change, so does the value of their associated foreign currency cash flows, leading to currency gains and losses. This type of exposure also occurs when the firm is involved in a foreign currency contract but the goods have not yet been delivered and thus the receivables have not yet been settled. Transaction exposure arises out of the various types of transactions with a foreign currency settlement. Among many of them, we may suggest borrowing and lending in foreign currencies, lease payments, forward contracts. Additionally, firms with foreign operations also face translation exposure (also known as accounting exposure) when these are consolidated and converted into the company's domestic currency (appearing in the financial statements). Operating exposure arises because currency fluctuations can alter a company's future revenues and costs, thus operating cash flows. The difference from the transaction exposure lies in the timeline. The transaction exposure arises later on and only if the company is involved in foreign currency denominated sales or purchases. Economic exposure is based on the extent to which the value of the firm measured as present value of its expected cash flows changes when exchange rates change. Economic exposure therefore represents any impact of exchange rate fluctuations on a firm's future cash flows. Economic exposure can be separated into two components – transaction exposure and operating exposure (Shapiro, 2013).

Most of the studies regarding exchange rate exposure follow the approach by Adler and Dumas (1984) who define the extent of exchange rate exposure as the elasticity between changes in firm value and exchange rate. The exposure coefficient is obtained by running a linear regression of stock returns on an exchange rate change, whilst some researchers add macroeconomic control variables, such as the returns of a market index. The empirical evidence concerning exchange rate exposure provides mixed results. While some studies have found strong evidence of exposure (Allayanis and Ofek, 2001), other empirical studies present rather weak relationship between firms' stock prices and exchange rate volatility (Dominguez and Tesar, 2006; Griffin and Stulz, 2001; Bartram and Bodnar, 2012). However, some studies show that the effect of exchange rate uncertainty on the firm value depends on variety of firm characteristics, including percentage of foreign sales (Jorion, 1990), firm size (Dukas et al., 1996)

or industry concentration (Bartram and Karolyi, 2006). Starks and Wei (2006) have found that the magnitude of exchange rate exposure is related to proxies for probabilities of financial distress, growth opportunities and product uniqueness. The mixed results are justified by using different methodology in the papers and also different proxy for foreign exchange rate movements. Some papers use a single currency exchange rate, whereas others have employed weight indices of exchange rates (Bartov and Bodnar, 1994; Jorion, 1990).

The majority of studies on the impact of exchange rates on firm performance assess the exposure of non-financial firms, typically by regressing exchange rate changes on contemporaneous stock returns in the presence of control variables. The seminal work on exchange rate exposure is by Adler and Dumas (1984) who have presented a single factor model to estimate foreign exchange rate exposure by estimating the elasticity of firm stock returns to exchange rate changes. According to them, the market value of a firm is constructed as the present value of future cash flows, thus the exposure can be obtained using market data which simplifies the estimation. They argue that insignificant exposure can be explained by well managed foreign exchange risks. Jorion (1990) added a variable for market movements to the model and analyzed foreign exchange rate exposure of 287 U.S. multinationals over the period from 1971 to 1987. Using OLS method and monthly basis data, he finds out that only 5.2% of companies are significantly exposed at the 5% level. Choi and Prasad (1995) in the latter paper use similar two-factor model, but they orthogonalized the exchange rates to the market factor and found out that 14.9% (61 out of 409) of the individual firms in U.S. are significantly exposed at the 10% level. Chung and Zhou (2012) used two-factor and multi-factor nonparametric models and found out that in recent years, large number of U.S. firms has been significantly affected by exchange rate fluctuations. Muller and Verschoor (2006) analyse the exposure of 817 European multinational firms using OLS to estimate two-factor model by Jorion (1990), with euro's bilateral exchange rate with alternatively the US dollar, UK pound and Japanese yen as explaining variables. They used the OLS method to estimate two-factor model or the GARCH (1.1) method in case when residuals of a particular regression exhibit time-varying heteroskedasticity. Their results suggest that about 13% of the multinational firms experienced significant exposure effects to the Japanese yen, 14% to the US dollar and 22% to the UK pound.

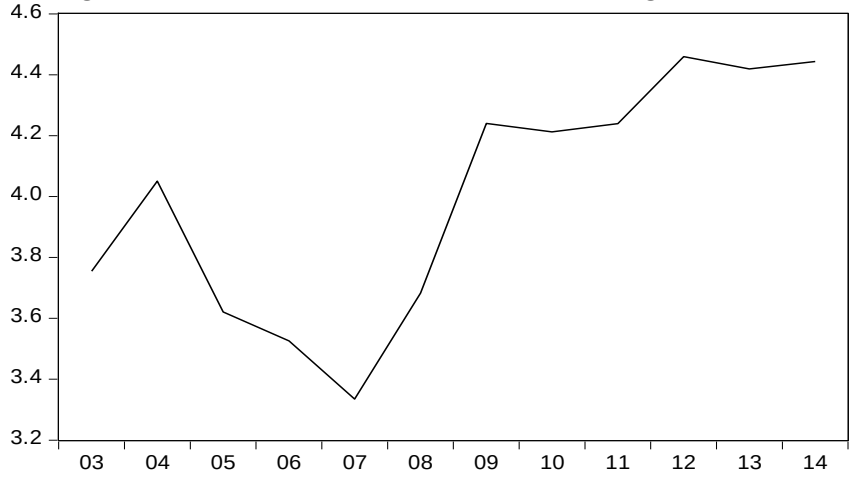
Empirical studies regarding emerging countries have usually shown a significant exposure of firms. Kiymaz (2003) analyzed the exposure of Turkish firms traded in Istanbul Stock Exchange over the period 1991 – 1998 using monthly orthogonalised market return and a foreign exchange basket of US dollar and ECU. The results show that 61% of firms were highly exposed to exchange rate risk, especially those operating in textile, machinery, chemical and financial industries. The study that focused on emerging markets by Bartram and Bodnar (2012) analyzed exposure of non-financial firms in 37 countries around the world; however, the countries of Central and Eastern Europe were not included. Their results suggest that 30 – 40% of firms in open and emerging market countries are significantly exposed. Chue and Cook (2008) estimated the exchange rate exposure in 15 emerging economies, excluding transition economies from their analysis. They find that depreciations had a negative impact on emerging market stock returns during 1999–2002; however, this impact significantly faded during 2002–2006.

Regarding the cash flow exposures, the evidence is limited and usually conducted on a basis of case studies of individual firms. Bartram (2007) analyzed exchange rate exposure of VEBA nonfinancial multinational company based on internal cash flow data. They have found that the residual net exposure is economically and statistically small, even if the operating cash flows of the firm are significantly exposed to exchange rate risk, proving the hedging activities are important key factors of the exposure reduction. According to Froot et al. (1993), higher cash flow volatility due to exchange rate risk may lead to reductions in firm value if firms face constraints on their internal financing and, as a consequence, incur either higher costs of raising external funds or opportunity costs of forgone profitable investment projects. The cash flow regressions take more of a corporate point of view where the exposure is important information for risk management in a company. The exposures of cash flows and stock prices are related via the present value. The stock prices are measure of corporate performance as the present value of cash flows; however, the stock markets in Romania are rather less liquid compared to some emerging and developed countries, thus the cash flow exposure estimation is essential for the exchange rate exposure analysis.

3. Data

For the exchange rate proxy the nominal exchange rate of Romanian leu vis-á-vis euro was used. The exchange rate is on yearly basis from 2003 – 2014. The following Figure 1 shows development of the Romanian leu in direct quotation from 2003 – 2014. The currency reform was made in 2005 and involved extracting 4 zeros out of the "old" currency abbreviated as ROL. The abbreviation of the "new" leu is now RON. Regarding the monetary policy, the National Bank of Romania practices a managed floating. The leu was strengthening from 2004 until 2007. At the end of 2006 the capital account was liberalized which resulted in excessive capital inflows and therefore, RON appreciated. The Figure 1 shows significant appreciation in 2007 and depreciation in 2008. In 2007, the accession to the European Union has brought an increasing trust of foreign investors. In 2008, the reasons for the Romanian leu's fragility could be accounted to country's worsening macroeconomic imbalances (poor functionality of the mix of fiscal-monetary policy and currency speculations). Moreover, the financial crisis has affected Romanian leu (and to higher extent also Hungarian forint) much more than other Central European currencies. After 2009 agreement on international financial aid the market pressures weakened and leu has stabilized. In the 2012 leu depreciated due to domestic political issues. Nowadays leu appreciates, however the banking sector is exposed to loans denominated in foreign currencies which account for approximately one third of total loans and therefore significant depreciation could lead to possible problems and also to negative assessment from European Central Bank regarding the currency stability.

Figure 1: Romanian Leu to Euro Nominal Exchange Rate



Source: European Central Bank

The Romanian firms' data was obtained from Bureau Van Dijk's Amadeus Database. The data comprises of large, medium and small firms operating in industries divided by NACE Rev. 2 - Statistical Classification of Economic Activities in the European Community, Rev. 2 (2008):

- Agriculture, forestry and fishing
- Mining and quarrying
- Manufacturing, Electricity, gas, steam and air conditioning supply
- Water supply; sewerage, waste management and remediation activities
- Construction
- Wholesale and retail trade; repair of motor vehicles and motorcycles
- Transportation and storage
- Accommodation and food service activities
- Information and communication
- Financial and insurance activities
- Real estate activities
- Professional, scientific and technical activities
- Administrative and support service activities

- Public administration and defense; compulsory social security
- Education
- Human health and social work activities
- Arts, entertainment and recreation
- Other service activities
- Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use

The data comprises 142,626 companies, of which there are 4,698 large, 30,781 medium and 107,156 small companies.

The size classes are defined following Amadeus database. If the company satisfies at least one of the following criteria, it is classified as medium sized company: operating revenue equals to at least 1 million euro, total assets equal to at least 2 million euro, number of employees equal to at least 10. If the criteria are in all cases smaller, the firm is classified as small. The company is classified as large when it meets at least one of the criteria: operating revenue equals to at least 10 million euro, total assets equal to at least 20 million euro, number of employees equal to at least 100.

4. Methodology

To examine the importance of exchange rate exposure for stock returns, the sensitivity of each group of firm's cash flows to the change of exchange rate is estimated. According to the seminal paper by Adler and Dumas (1984), the exposure elasticity can be obtained as the change in the market value of the firm resulting from a unit change in the exchange rate. As an alternative to the traditional approach using stock returns, firm's cash flows measures as a firm performance are used. The availability of internal cash flow data during the period 2004 – 2013 allows conducting an exposure analysis using the following regression as suggested in Bartram (2007). A company faces exchange risk to the extent that variations in the euro value of the unit's cash flows are correlated with variations in the nominal exchange rate (Shapiro, 2013).This correlation can be established by a regression analysis. A simple way is therefore to regress the changes in actual cash flows from past periods, converted into their euro values, on changes in the average exchange rate during the corresponding period. The following regression can be written as:

$$RCF_{i,t} = \alpha_i + \delta_i R_{S,t} + \varepsilon_{i,t}, \quad (1)$$

where *RCF* denotes percentage changes in corporate cash flows of a company group *i* in period *t*, $R_{S,t}$ denotes the percentage change of the leu to euro exchange rate during period *t*, ε represents a random error term with mean 0 in period *t* for a group of firms *i*.

The output from equation (1) includes three key parameters: First, the foreign exchange coefficient delta δ, which captures the sensitivity of the euro cash flows to exchange rate changes and, thus, represents a measure of foreign exchange rate exposure of *i*-th firm. Second, the *t*-statistic or *p*-value, which measures the statistical significance of the δ coefficient. Third, the R^2, which measures the fraction of cash flow variability explained by variation in the exchange rate.

Firms with higher and significant coefficient delta δ will indicate larger exposures. Conversely, the lower the delta coefficient, the less exposed the firm is to exchange rate changes. What matters in this regression analysis is the value of R^2, showing the percentage of total corporate cash flows variability that is affected by the currency fluctuations. If exchange rate changes explain only 1% of total cash flow variability, the firm should not devote much in the way of resources to foreign exchange risk management, even if the delta coefficient is large and statistically significant.

With regard to firm size, larger firms might be more exposed due to the possibility of operating on global international markets, but they also might have more resources to hedge against the exchange rate risk. Some papers showed that large firms are less likely to be affected by foreign exchange exposure than small firms (Dominguez and Tesar, 2006; Hutson and Stevenson, 2010), because it is assumed that large firms are more likely to be internationally diversified and thus 'naturally' hedged. The advantage

of cash flow OLS regression consists of the fact that the estimated effects of the exchange rate risk on corporate cash flows are independent of the perception of market participants (Bartram, 2007).

If exposures of firms differ depending on their operations, then categorizing firms according to various attributes could potentially lead to more powerful and interesting results. Therefore, we estimate exchange rate exposure of large, medium-sized and small firms separately, also categorized by the operating industry because the exposure varies across industries. It is assumed that more exporting industry will be also more exposed to foreign currency volatility. While firms in services will act more on domestic market, transportation firms, manufacturers and wholesale and retail firms are more likely to operate worldwide.

5. Estimation and Results

Table 1: Estimation Results for Large Companies

	Intercept	*t*-stat	Exposure Coefficient delta δ	*t*-stat	R^2	No. of firms
Agriculture, forestry and fishing	37.846	-0.218	-188.357	-1.984	0.146	162
Mining and quarrying	356.757	1.556	9.555	0.235	0.250	47
Manufacturing	51.311	0.814	-4.199	-0.495	0.200	1,630
Electricity, gas, steam and air conditioning supply	4535.345	2.050	-744.795*	-2.486	0.131	99
Water supply; sewerage, waste management and remediation activities	51.593	3.361	-1.891	-0.899	0.159	124
Construction	112.869	0.939	-19.748	-1.110	0.139	453
Wholesale and retail trade; repair of motor vehicles and motorcycles	186.741	2.672	-15.889**	-1.674	0.129	969
Transportation and Storage	82.231	1.895	-9.251	-1.353	0.488	273
Accommodation and Food service activities	-83.598	-0.235	-74.357	-1.552	0.118	96
Information and communication	-54.211	-0.425	6.476	0.326	0.470	136
Financial and Insurance activities	223.603	3.190	-14.058	-1.146	0.756	15
Real estate activities	-2728.02	-1.541	445.672**	1.817	0.113	188
Professional, scientific and technical activities	37.112	0.691	6.145	0.475	0.173	154
Administrative and support service activities	518.088	2.204	-23.529	0.474	0.168	264
Human health and social work activities	361.168	0.866	-95.717**	-1.660	0.139	26
Agriculture, forestry and fishing	37.846	-0.218	-188.357	-1.984	0.146	162
Mining and quarrying	356.757	1.556	9.555	0.235	0.250	47
Manufacturing	51.311	0.814	-4.199	-0.495	0.200	1,630

Notes: *denotes 5% significance, ** denotes 10% significance

Source: author's calculations

For the estimation, panel data ordinary least square regression analysis with fixed effects was used. The data were stacked in panels according to the size of a firm and the industry the firm operates in. Results are presented in Tables 1 – 3. The results find that the response of cash flows to exchange

rate fluctuations is mostly negative. Most of the companies show negative exposure coefficient, therefore depreciation of domestic currency corresponds with a decrease of firm's cash flow.

Regarding the large firms, as shown in Table 1, the significant cash flow exposure is present in a group of firms operating in electricity, gas, steam and air conditioning supply industry and accounts for approximately 13% of all the companies. The coefficient of exposure in this case is negative and significant at 5% significance level. Thus the depreciation of Romanian leu is connected with a decrease in company's cash flows. Very similar case is present in case of wholesale and retail trade industry where almost 13% of 969 companies are significantly exposed. Surprising results are present in case of firms operating in real estate activities and also human health and social work activities. Human health and social work activities are connected with service providing thus it was not expected to be affected by the exchange rate changes. The exposure coefficient is however significant only at 10% significance. Real estate activities industry has a positive exposure coefficient unlike the other significant deltas. Appreciation of Romanian leu is in this case connected with increase in firms' cash flows, and therefore also with the higher firm value.

Table 2: Estimation Results for Medium Companies

	Intercept	*t*-stat	Exposure Coefficient delta δ	*t*-stat	R^2	No. of firms
Agriculture, forestry and fishing	165.809	3.627	0.189	0.030	0.162	1,617
Mining and quarrying	163.703	2.976	-5.944	-0.719	0.313	176
Manufacturing	45.928	3.730	-3.475**	-1.935	0.137	7,074
Electricity, gas, steam and air conditioning supply	110.207	1.425	-7.538	-0.524	0.773	131
Water supply; sewerage, waste management and remediation activities	472.520	2.205	-39.773	-1.333	0.193	354
Construction	1038.382	2.685	-76.622	-1.437	0.232	3,761
Wholesale and retail trade; repair of motor vehicles and motorcycles	210.690	3.359	-14.813**	-1.913	0.153	8,619
Transportation and storage	237.946	3.877	3.370	0.399	0.122	2,031
Accommodation and Food service activities	-171.798	-1.695	7.851	0.485	0.143	1,441
Information and communication	479.932	2.014	-7.666	-0.198	0.205	936
Financial and insurance activities	-80944.75	-1.501	13948.720	1.847	0.125	917
Professional, scientific and technical activities	533.129	3.556	-62.797*	-3.005	0.125	1,355
Administrative and support service activities	-511.965	0.401	68.714	0.683	0.127	1,244
Education	35.986	0.707	-15.645	-1.026	0.358	107
Human health and social work activities	144.663	1.375	-34.819*	-2.372	0.193	442
Arts, entertainment and recreation	137.443	1.668	-14.922	-1.275	0.181	299
Other service activities	6.576	0.199	10.624	0.043	0.174	277

Notes: *denotes 5% significance, ** denotes 10% significance

Source: author's calculations

The Table 2 shows results for medium sized companies. As expected, the manufacturing firms show significant exchange rate exposure. The number of firms in manufacturing industry was high,

accounting for 7,074 firms, thus the results for this sector are robust. The exposure coefficient is negative. As in the large group of firms, also in the medium companies group the industry of wholesale and retail shows significant exchange rate exposure, showing even similar percentage of the exchange rate exposure. In this case, the percentage of the firms affected by exchange rate changes is higher than in case of large firms. It accounts for more than 15% firms of the total amount of 8,619 firms. This can be explained by the lesser possibility to hedge the exchange rate risk for medium sized firms. Also industry of professional, scientific and technical activities and human health and social work activities shows significant exposure. As previous, the exposure coefficient is in both cases negative. Total of 12% of the firms operating in professional, scientific and technical activities and 19% firms operating in human health and social work activities are exposed. Flabbergastingly, as in the group of large firms, the industry of health and social work activities is exposed, accounting for more firms than in case of large firms.

Table 3: Estimation Results for Small Firms

	Intercept	*t*-stat	Exposure Coefficient delta δ	*t*-stat	R^2	No. of firms
Agriculture, forestry and fishing	182.401	4.794	6.148	0.956	0.223	6,826
Mining and quarrying	-48.251	-0.137	-119.010*	-1.983	0.249	372
Manufacturing	107.254	3.956	-10.807*	-2.864	0.132	15,976
Electricity, gas, steam and air conditioning supply	165.344	0.089	-246.997	-0.847	0.180	211
Water supply; sewerage, waste management and remediation activities	387.555	2.534	-5.352	-0.238	0.175	732
Construction	307.073	2.826	-22.607	-1.461	0.187	14,242
Wholesale and retail trade; repair of motor vehicles and motorcycles	168.597	3.407	-16.925	-2.465*	0.167	15,845
Transportation and storage	138.712	3.468	-8.326	-1.451	0.146	13,249
Accommodation and Food service activities	-8.082	-0.078	-10.007	-0.679	0.154	7,608
Information and communication	229.175	4.163	-15.005	0.056	0.149	6,718
Financial and insurance activities	143.095	2.347	2.343	0.272	0.219	1,158
Real estate activities	-134.351	-1.223	18.256	1.188	0.138	5,752
Professional, scientific and technical activities	-364.694	-0.786	82.541	1.258	0.143	3,005
Administrative and support service activities	161.622	3.886	-12.663*	-2.099	0.148	5,200
Education	11.036	0.196	-7.378	-0.894	0.186	1,144
Human health and social work activities	162.120	4.615	-8.678**	-1.752	0.188	4,533
Arts, entertainment and recreation	75.856	0.630	-10.834	-0.616	0.155	1,443
Other service activities	48.704	0.431	-11.304	-0.697	0.123	3,142

Notes: *denotes 5% significance, ** denotes 10% significance

Source: author's calculations

The results for small companies are presented in Table 3. As expected, the smaller firms show significant exposure in more cases. Exposure is significant in mining and quarrying, manufacturing, wholesale and retail trade, administrative and support service activities, human health and social work

activities industry. For the mining and quarrying industry, the percentage of significantly exposed firms is quite high, almost 25% out of 372 firms. The coefficient is negative, thus the depreciation of Romanian leu is connected with decrease in firms' cash flows. Also the exposure coefficient itself is one of the highest. Manufacturing industry shows similar results as in the case of medium sized companies. Approximately 13% of manufacturing firms are significantly exposed which is high regarding to the sample size of almost 16,000 manufacturing firms. Also in the group of small firms, the wholesale and retail trade is exposed. Almost 17% of the 15,845 firms operating in the wholesale and retail trade industry are exposed, which is significantly higher amount than in case of the firms in large and medium sized groups. Human health and social work activities industries are exposed as shown in large and medium sized groups. Similar to the wholesale and retail trade industry, the percentage of significantly exposed firms is higher than in the two previous groups, accounting for almost 19% out of 4,533 firms.

The results are in constraint with other studies regarding emerging markets (i.e. Kiymaz, 2003; Bartram and Bodnar, 2012; Chue and Cook, 2008) which usually find higher percentage of the significantly exposed firms. The studies however used stock prices data with higher frequency. Regarding the lack of existing empirical evidence on Eastern European countries the empirical results are more difficult to compare.

The exchange rate risk management involves determining which foreign-currency-denominated assets and liabilities are exposed. Although the small firms have harder access to the financial derivatives in terms of finance, knowledge and also human resources, it is possible to suggest a few undemanding activities. The owners or managers should develop a long term strategy and also develop marketing and production initiatives that help ensure profitability. The key issue must be addressed when developing a pricing strategy. Firms have three methods for hedging. Either adjusting fund flows, entering into forward contracts or exposure netting. Funds adjustment comprises altering the amounts of the planned cash flows to reduce the firms' local currency exposure. Forward contracts can reduce the uncertainty by creating an offsetting asset or liability in the foreign currency. Exposure netting involves offsetting exposures in one currency with exposures in the same currency so that gains and losses will offset each other. The basic hedging techniques are selling (depreciation) or buying (appreciation) local currency forward, reducing or increasing the amount of the local currency cash, delay or speed u collection of hard or soft currency receivables, borrow locally in case of depreciation or reduce local borrowings in case of appreciation. If possible, the company can also use the currency risk sharing strategy, comprising the price adjustment clause. This hedging activity allows adjust prices so they reflect certain exchange rate changes.

6. Conclusion

Contrasting to the literature that typically uses stock returns as a measure of firm performance to assess the effect of foreign exchange rate risk on firms; an alternative approach is taken in this paper by estimating the foreign exchange rate exposure of a large sample of Romanian firms on the basis of corporate cash flows.

The results document that corporate cash flows in case of some industries are affected by foreign exchange rate risk in case of small, medium sized and even large firms. The results are consistent with cash flow variability being a concern of companies when considering foreign exchange exposure, especially in industries which are more likely to operate worldwide.

The industries significantly affected by the changes in exchange rate are wholesale and retail trade activities, human health and social work activities. Overall, the small firms are affected more than the large firms which can be a result of more difficult access to financial derivatives and hedging activities. In most cases, the depreciation of the currency was connected with cash flows decrease. This means that the hedging activities would be profitable for vast majority of the firms.

If hedging at the firm level increases value, firms with operations that are significantly exposed will engage in risk management activities to an extent that the residual exposure is small. However, most studies concerning emerging markets have found higher percentage of significantly exposed firms. This can be caused by lower frequency data on corporate cash flows.

The results have implications for corporate finance and exchange rate risk management. Although the financial derivatives markets are not that easily accessible by medium sized and small firms, by the

time of euro adoption, the hedging against exchange rate risk would result in more effective protection of the firm value especially in case of small firms groups. The firms should thus use especially natural hedging activities. The exposure coefficients are positive and negative within the industries, implying heterogeneity across firms' exposure. Theoretically, the number of statistically significant exposure coefficients is limited implying that either firms are successful in hedging activities or do not participate extensively in international trade and thus do not have significant exposure. The results are also limited by the cash flow data frequency.

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