


CORPORATE FINANCE UNDER THE MIXTURE BETWEEN MICROECONOMIC AND MACROECONOMIC DETERMINATION. ANALYTICAL APPROACH ON CEE CORPORATIONS

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ABSTRACT

This paper explores the link between idiosyncratic and fundamental dimensions of the corporate finance within CEE countries. We elaborate a Vector Error Correction Model integrating both idiosyncratic and macro related indicators. We expect idiosyncratic variables to be closely related to the macro-fundamentals and we anticipate the sign of the relation. Conclusions regarding the long term relationship between these variables differ by country from the perspective of the way macro related variables enter the co-integration equations. The impact is different according to the peculiarities of the macroeconomic architecture.

 *idiosyncratic, fundamentals, CEE countries, macroeconomic*

INTRODUCTION

Globalization triggered a higher corporate exposure to macroeconomic environment. Therefore corporate risk measurement and management system has become more granular, integrating not only the idiosyncratic dimension, but also the fundamental one, deriving from the macro-environment. A thorough financial analysis is bi-dimensionally approached, incorporating information both on the

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micro-level- reflected by the firm related variables- as well as on the macro-level. Gradually, the analytical approach becomes a mixture between two perspectives, with a high degree of complexity.

This paper explores the link between idiosyncratic and fundamental dimensions of the corporate finance within CEE countries. We elaborate a Vector Error Correction Model integrating both idiosyncratic and macro related indicators. We expect idiosyncratic variables to be closely related to the macro fundamentals and we anticipate the sign of the relation. In our research, fundamentals are embedded into GDP, one year treasury bills interest rate, current account deficit and consumption price index. GDP is a key element of the macro fundamentals. Economic growth impacts positively corporate environment, creating a favorable context to employment, innovation, research and development, whereas recession brings corporate failure.

Literature agreed on the fact that relation between GDP and corporate sector is a bilateral one. It is not only the GDP which exerts an impact on corporate segment, but also corporations that influence GDP at the aggregate level.

One year treasury bills interest rate impacts corporations from the perspective of the finance mechanisms. A low interest rate facilitates corporate access to financing, ensuring a good level of liquidity as well as growth perspectives whereas a high interest rate prevents companies from financing the operational and investing activity (Lindé, 2002). Recession implies inflation and consequently interest rate increase, which affects the capacity of the company to resort to external financing and to sustain growth.

Current account deficit is closely related to demand. A high current account deficit impacts positively economic growth by consumption. The rationale for including this variable into the series of fundamentals consists of a peculiarity of the emerging countries, especially from the perspective of the production structures performance. Since these countries go through a catching up process, internal deficient production capacities can not sustain growing consumption which is satisfied mainly by imports. This overlapping phenomenon of the imports reporting to exports triggers a high current account deficit.

Therefore, current account deficit is positively correlated with corporate profitability within emerging countries, but this phenomenon is revealed on short term. A persistent current account deficit has a negative impact on the macroeconomic environment on long term, bringing out the spectrum of the trade imbalance. Idiosyncratic variables include asset management, liquidity, profitability and solvency ratios.

We expect idiosyncratic variables to be closely related to the macro fundamentals and we anticipate the sign of the relation. We expect asset management,

profitability and liquidity ratios to be positively correlated with GDP and current account deficit and negatively with one year treasury bills interest rate and consumption price index. Economic growth supported by a relaxed monetary policy creates incentive to sale increase and to tough inventory and accounts receivable management whereas recession and monetary tightening determine sale decrease and inventory turnover slowdown.

A high current account deficit usually accompanied by a low CPI creates incentive to an inflated demand which accelerates current assets turnover. Having as reference chain transmission mechanism, we consider asset management ratios as key determinants of liquidity and profitability. Since company manages to ensure a good level of asset management indicators, this triggers a good liquidity level as well as gain potential.

The conclusions regarding the long term relationship between macro related and firm level indicators differ by country from the perspective of the way the macro related variables enter the co-integration equations. The impact is different according to the peculiarities of the macroeconomic architecture.

1. LITTERATURE REVIEW

Recently there has been developed a consistent literature on the macro determination of the corporate default (see McNeil *et al.*, 2005). Links between micro and macro variables closely related to corporate default have been pointed out. Alves (2005) and Shahnazarian and Asberg-Sommer (2008) found co-integration relationships between the macro and Moody's KMV expected default frequency (EDF) variables. Short term interests, GDP and inflation are closely linked to EDF. They concluded that increased output leads to a lower default frequency whereas rising inflation determines a higher expected default frequency and a lower corporate credit quality. Short-term interest rate appears to have the strongest influence on the corporate credit quality, higher interest rates leading to a higher expected default frequency.

Similar approaches have been developed by Aspachs *et al.* (2006) as well as by Pesaran *et al.* (2006). Aspachs *et al.* (2006) applied a VAR model integrating the EDF characteristic to the banking sector and macroeconomic data on several industrialized countries. They found that banking system default probability and equity impact GDP. Jacobson (2005) elaborated a complex model formed by three blocks. The first one is represented by a VAR model including macro variables as endogenous elements (domestic output, inflation, nominal interest rate, real exchange rate) while foreign macro variables and aggregated default frequency are integrated as exogenous. The second block contains a logit model reflecting the default risk at firm level, with macro variables and idiosyncratic indicators as

regressors. The third block is built up in order to highlight the impact of the macroeconomic variables on firm related indicators.

These perspectives subscribe to an impact derived from the macro environment to the corporate segment while Pesaran *et al.* (2006) revealed that this relationship can be modeled also under the form of an impact deriving from the corporate to the macro side. They found out that corporate default probability as well as equity values impact GDP variables. Castren *et al.* (2007) included domestic output, inflation, nominal interest rate and real exchange rate as endogenous variables into a VAR model while aggregated default frequency and foreign macro variables were incorporated as exogenous variables. They concluded that default frequency and macro indicators have a similar trend.

Drehmann *et al.* (2005) analyze corporate default in UK by the intermediary of a non-linear VAR model which integrates GDP growth, the three-month Treasury bill and inflation rate. Their research underlines that a large increase in interest rates is a key driver of credit risk while large positive shocks to GDP tend to reduce risk significantly.

Pesaran *et al.* (2005) modeled individual firm returns (taken as proxies for changes in asset values) in terms of a number of directly observable contemporaneous risk factors, such as changes in equity indices, interest rates, inflation, real money balances, oil prices and output, both domestic and foreign. In this way differential impacts of macroeconomic factors on the evolution of firm's asset values, and as such their default probabilities are highlighted out.

This research pointed out that macroeconomic factors have to be scaled in terms of impact magnitude. Moreover, there has been underlined a clear shock asymmetry as well as non-proportionality on credit risk. Shocks to real equity prices seem to have the most significant effect on credit risk, followed here by shocks to the oil price.

Symmetric shocks do not determine automatically symmetric changes to the loss distribution. The increase in credit loss from an adverse shock is disproportionately larger than loss mitigation from a positive shock of the same magnitude.

Dees *et al.* (2007) revealed in their paper that financial shocks caused by consistent fluctuations in equity and bond prices are more rapidly transmitted than real shocks (reflected by output dynamic). Moreover, equity and bond markets are more correlated than foreign exchange markets. Castren *et al.* (2008) conceived the link between the global macro-financial factors and corporate default probability under the form of a Global Autoregressive Model. An EDF linking satellite equation is built up, integrating country – or region- specific vector error correction models, which reflect the international linkages across macroeconomic and financial variables. The variables included GDP, real stock market price index, consumer

price index, short-term interest rate, long-term interest rate, oil price, the exchange rate of the currency relative to the US dollar. The study was developed on a sample of 33 different countries in the world.

There has been pointed out that a negative dynamic of the US and euro area real equity price has an impact of 15-34.5% on the various median EDFs. At the global level, EDF varies with GDP shocks, the EUR/USD exchange rate, equity prices and oil prices. European corporations are more sensitive to shocks to global growth in comparison with shocks to euro area growth.

This paper follows up the rationale of Jacobson *et al.* (2005) and of Asberg and Shahnazarian (2008) who conceived macro variables as being deeply related to firm related variables. What it differentiates this approach is precisely the fact that there will be elaborated a Vector Error Correction Model integrating both idiosyncratic and macro related indicators as well as the focus oriented towards to the CEE countries. Until now all the research approaches have concentrated on the developed countries although there has been acknowledged that corporations are more exposed to macro volatility within emerging countries than in the developed ones (Hochrainer, 2006). There have been selected variables closely linked to the macroeconomic volatility – current account deficit, GDP, one year treasury bills interest rate, consumer price index - that have been integrated into a VECM grouping also indicators reflecting the financial soundness of the company.

2. DATA AND METHODOLOGY DESCRIPTION

Valorizing www.corporateinformation.com database as well as CEE Central Banks websites, there have been gathered quarterly financial data on 500 companies located into CEE countries (Romania, Poland, Czech, Slovakia, Hungary), covering the period from January 1997 to December 2008. Financial data included both idiosyncratic (profitability, liquidity, asset management and solvency ratios) and fundamentals (gross domestic product, interest rate on one year treasury bills, current account deficit, consumer price index) related indicators.

Profitability has been quantified by the earnings before interest and taxes margin, liquidity has been reflected by the current ratio whereas asset management and solvency ratios have been highlighted by the total debt reported to earnings before interest and taxes and by the total debt reported to equity, respectively. There have been carried out unit root tests (Dickey Fuller, Phillips Perron) in order to analyze the series stationarity. These tests¹ reveal out that all the variables (both idiosyncratic and fundamentals related indicators) are non-stationary (I(1) variables). Non-stationarity can be interpreted as a CEE countries peculiarity from the perspective of fragility and volatility of their micro and macroeconomic structures which triggers the impossibility of quick shock absorption. Since series proved to be non-stationary, the second step of the research implied the integration of the variables into a Vector Error Correction Model at the level of every country.

The analysis of the Vector Error Correction Model output points out the correlations between idiosyncratic and systemic dimensions exerted at the level of the CEE corporate finance.

3. VEC MODEL ANALYSIS

Time series analysis points out that even if two or more series seem to be non-stationary, a linear combination of them may be stationary. Johansen's methodology points out co-integration of time series including idiosyncratic and macro related indicators². Trace test indicates that we can reject the null hypothesis (i.e. there is no co-integration relationship) both at 1 and 5 per cent significance for most of the variables. Before applying Johansen's methodology, there has been checked up also Granger causality tests in order to highlight potential variable interdependencies and to draw up the assembly of endogenous variables.

Reported statistics highlight different numbers of co-integration vectors at the level of the CEE countries. In the case of Romania and Czech there are 2 co-integration vectors while in the case of Slovakia, Poland and Hungary there is only one co-integration vector. Nevertheless, number of co-integration vectors does not exceed 2 out of the possible 7. The VECM model can be specified at the level of every country as:

$$\Delta X_{it} = \delta_0 + \Gamma_1 \Delta X_{it-1} + \Gamma_2 \Delta X_{it-2} + \Gamma_3 \Delta X_{it-3} + \Gamma_4 \Delta X_{it-4} + \Gamma_5 \Delta X_{it-5} + \Gamma_6 \Delta X_{it-6} + \Gamma_7 \Delta X_{it-7} + \alpha \beta' X_{it-1} + \varepsilon_{it} \quad (1)$$

Where

$$X_t = (\log(EC_GR_t), I_{r,t}, CPI_t, DEF_CR_t, C_L_t, EBIT_mg_t, TD_EQ_t, TD_EBIT_t, F_OP_CL_t, DEBT_EBIT_t),$$

$$\delta_0 = \Gamma_0 - \alpha \beta_0, \quad \varepsilon_t \sim N(0, \Omega) \quad (2)$$

Vector error correction model is concentrated on two key parameters such as α and β .

β' matrix represents the co-integrating vector and incorporates long-term relationships between the endogenous variables.

α matrix reflects the dynamic adjustment of the endogenous variables to deviations from long-run equilibrium depicted by $\beta'x$.

² Statistic output/tests have not been included in the paper, but they are available anytime upon request.

ECM applied at the level of the CEE countries reveals out idiosyncratic indicators as being highly impacted both by internal and macro related environment. At the level of the CEE countries, there can be built up one co-integration equation including a relationship between profitability and a series of idiosyncratic indicators (current liquidity ratio, total debt reported to equity, total debt reported to earnings before interest and taxes) as well as an assembly of macro related indicators (GDP, consumer price index, interest rate corresponding to one year treasury bills and current account deficit weight out of GDP), except for Slovakia where only liquidity is explained by a co-integrated equation. In order to test model s quality, we have checked up the roots of the characteristic polynomial which underline that VECM model is stable.

Table 1. VECM estimates at the level of every country

Poland	$Ebit_mg=0.0452*C_L+0.01164*TD_EQ+0.001226*TD_EBIT+$ $+0.068546*CPI+0.044496*I_R-0.014217*DEF_CR+$ $+0.512*Ec_gr-0.025324$
Czech	$Ebit_mg=0.20308*TD_eq-0.016114*TD_EBIT-0.25532*CPI-0.095081*I_R$ $-0.040542*Def_cr+0.184*Ec_gr+0.69861$
	$C_L=-3.557614*TD_eq+0.31661*TD_EBIT+1.97522*CPI+2.09763*I_r-$ $-0.016873*Def_cr+0.434*Ec_gr-27.58$
Slovakia	$C_L=-28364.98*Ebit_mg-21188.94*TD_Eq-40.10954*Ec_gr-$ $-1241.742*CPI-4823.434*Def_cr-4623.387+0.321*Ec_gr$
Romania	$Ebit_mg=0.20588*TD_Eq+0.03256*C_L-$ $-0.001439*TD_EBIT+0.05132*CPI-0.008979*I_r$ $0.061889*Def_cr+0.01505+0.113*Ec_gr$
	$Debt_ebit=143.073*TD_eq+22.6281*C_L+35.6606*CPI-6.239987*I_r--$ $43.00939*Def_cr+10.4611+0.328*Ec_gr$
Hungary	$Ebit_mg=0.22142*C_L-0.01816*TD_EBIT-$ $-0.919841*TD_EQ+0.05411*Def_cr-0.166986*I_r+1.11734+$ $+0.429*Ec_gr$

where

- Ebit_mg = earnings before interest and taxes margin computed as EBIT/Turnover
- C_L = current liquidity computed as Accounts Receivable/Accounts Payable
- TD_Eq = total debt reported to equity (leverage ratio)
- TD_EBIT = total debt reported to earnings before interest and taxes (solvency ratio)
- CPI = consumer price index
- I_r = interest rater corresponding to one year treasury bills
- Def_cr = current account deficit computed as the weight of the negative current trade balance into GDP
- Ec_gr = Deflated Gross Domestic Product
- I = CEE country

Analysis of the VECM statistic output at the level of every country reveals out profitability as the most frequent idiosyncratic indicator that is highly impacted both by firm and macro related variables which we consider to be a bi-dimensional determination. The only country where profitability does not appear in this position is Slovakia, being replaced by liquidity. Nevertheless, liquidity is the second idiosyncratic variable that closely follows up profitability in terms of bi-dimensional determination. As for Poland, profitability quantified by the earnings before interest and taxes margin depends on a series of firm related indicators (liquidity, leverage and solvency) as well as by macro related indicators (consumer price index, treasury bills interest rate and current account deficit). All the idiosyncratic indicators impact positively profitability. A good liquidity position implies a high gain potential, ensuring financial obligations payment on time.

Nevertheless, there are many studies which point out that a high liquidity position of the company is frequently associated with a high opportunity costs (Chan & Lau, 2006) and with an inactive financial management strategy, leading to the loss of the profit perspective. Depending on the business profile, financial managers have to ensure an appropriate liquidity level within the company, with a deep keen on the investing opportunities. Solvency and leverage indicators impact positively profitability. A good solvency level ensures the financial balance of the company, keeping up the perspective to accumulate profit (Zechner, 2006).

Leverage can be used as a profitability mobile as long as the cost of debt is inferior to the return on equity (Davydenko, 2005). Once the cost of debt is superior to the return on equity, a higher leverage leads to an increasing company risk level.

On the contrary, in the case of Hungary, Romania and Czech, solvency is negatively related to profitability which is in line theories on the pecking order behavior developed within CEE countries corporate segment (Köke & Salem, 2006). Studies on corporate finance within CEE countries revealed that companies are reluctant to indebtedness, concentrating on internal financing which triggers the loss of growth and profitability perspective. This idea is also confirmed by the way leverage joins the co-integration equation in the case of Slovakia and Hungary where as in the case of Czech, Poland and Romania leverage impacts positively profitability.

As for Poland and Czech, this conclusion is validated from the perspective of the capital market development degree. Having as reference the complexity of the financial instruments traded on the capital market as well as the liquidity indicator, Poland has the most high performance capital market within CEE region which implies a higher access of the corporate segment to various financing opportunities and a more receptive attitude to indebtedness. Thus, leverage, as long as it is carefully managed, has a positive impact on profitability.

Regarding the macro related indicators, there are differences at the country level concerning the frequency they are integrated into the VECM. CPI determines profitability in the case of all CEE countries, except for Hungary. Liquidity and solvency ratios are also CPI impacted in the case of Hungary and Czech. What it is really interesting is the sign under which this macro variable integrates into the model.

Excepting two cases, CPI impacts positively the firm-related indicators. Our initial assumption involved the negative impact of the CPI on the firm level variables from the perspective of the macroeconomic disequilibrium determined by excessive inflation.

This is in line with the findings of Asberg and Shahnazarian (2008) who point out that CPI determines positively Expected Default Frequency indicator. Nevertheless, we mentioned a potential positive impact under the hypothesis of an inflated demand specific to the periods characterized by a low interest rate which generates ultimately inflation.

The most frequent situation (positive impact of the CPI on the firm related variables) is specific to the CEE countries where economic growth favorable to corporate segment is consumption oriented, which confirms the assumption of inflation by demand. In most of the cases, interest rate corresponding to one year treasury bills enters negatively the co-integration equations.

A low interest rate is associated with economic growth which implies an easy access of the corporate sector to external financing as well as a high activity turnover and profitability. Similarly to CPI, current account deficit impact on firm related variables can be construed both positively and negatively. The impact is positive in case of Romania, confirming a growing demand determined by the consumption oriented economic growth and by the catching up process supported by a high current account deficit. In the other cases, current account deficit impacts negatively firm related variables, validating mainly the idea that a growing current account deficit determines a macroeconomic des-equilibrium which has a negative influence on firm related indicators.

In line with the findings of Jacobson and Kasper (2005), real GDP has a positive impact on all the firm related indicators, outlining the idea that economic growth creates favorable context to corporate segment. Concentrating on the impact magnitude, in most cases interest rate corresponding to one year treasury bills as well as CPI and current account deficit appear to exert the utmost influence on the profitability. Liquidity is impacted to a high extent by GDP and current account deficit.

Overall, macro fundamentals are deeply correlated with the idiosyncratic indicators, having a strong impact on the profitability and liquidity. Moreover, VECM reflects the long-run relationships between the variables. This finding is

precious from the perspective of the global corporate strategies which have to be built up in a close relationship with macroeconomic environment.

CONCLUSION

ECM applied at the level of the CEE countries reveals out idiosyncratic indicators as being highly impacted both by internal and macro related environment. Analysis of the VECM statistic output at the level of every country reveals out profitability as the most frequent idiosyncratic indicator that is highly impacted both by firm and macro related variables which we consider to be a bi-dimensional determination.

The only country where profitability does not appear in this position is Slovakia, being replaced by liquidity. Nevertheless, liquidity is the second idiosyncratic variable that closely follows up profitability in terms of bi-dimensional determination. As for Poland, profitability quantified by the earnings before interest and taxes margin depends on a series of firm related indicators (liquidity, leverage and solvency) as well as by macro related indicators (consumer price index, treasury bills interest rate and current account deficit).

Studies on corporate finance within CEE countries revealed that companies are reluctant to indebtedness, concentrating on internal financing which triggers the loss of growth and profitability perspective. This idea is also confirmed by the way leverage joins the co-integration equation in the case of Slovakia and Hungary where as in the case of Czech, Poland and Romania leverage impacts positively profitability.

As for Poland and Czech, this conclusion is validated from the perspective of the capital market development degree. Having as reference the complexity of the financial instruments traded on the capital market as well as the liquidity indicator, Poland has the most high performance capital market within CEE region which implies a higher access of the corporate segment to various financing opportunities and a more receptive attitude to indebtedness.

Thus, leverage, as long as it is carefully managed, has a positive impact on profitability. Regarding the macro related indicators, there are differences at the country level concerning the frequency they are integrated into the VECM. CPI determines profitability in the case of all CEE countries, except for Hungary. Overall, macro fundamentals are deeply correlated with the idiosyncratic indicators, having a strong impact on the profitability and liquidity. Moreover, VECM reflects the long-run relationships between the variables. This finding is precious from the perspective of the global corporate strategies which have to be built up in a close relationship with macroeconomic environment, especially in the context of the actual financial crisis, where companies become more and more exposed to country risk and macroeconomic volatility.

The conclusions of this paper must be interpreted in the context of the limitations imposed by the database dimension the research was performed on. Future research will keep on enlarging the methodology. Furthermore, approach will be developed by a comparative analysis at the level of the developed countries.

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