THE ESTIMATION OF THE INFLUENCE OF THE ECONOMY ON THE CAPITAL MARKET IN POLAND DURING 2000-2006

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Received 9 November 2007, Accepted 20 December 2007

Abstract

The relation between the economy and the capital market is very interesting as far as analysis related to the capital market is concerned. The key statement is that the changes in the country economy have influence on the capital market. The aim of this article is to investigate if there are any essential connections between the values characterizing the capital market and the economy condition in Poland. Such values were taken into consideration as stock indices (*WIG20*, *WIG*), the rate of exchange, the level of unemployment, inflation, the *GDP*, Poland's economic growth. The analyses were made for some indices on the Warsaw Stock Exchange (*WIG*, *WIG20*) and for some economic variables (e.g. the level of unemployment, inflation, the *GDP*, the economic growth and other). Analyses were made for the data in the period of 2000-2006. Some statistical parameters were used to find statistical regularity for some indexes on the Warsaw Stock Exchange and for some economic variables observed in Poland. The authors analysed the relation between selected variables, too. *Excel 2003 for Windows* and *Statistica 6.1 PL* were used for all the calculations. The significant element of the fundamental analysis is the confirmation of a statistic regularity concerning the relation between the economy and the capital market. Stock analysis in the scope of fundamental analysis should be also made by the use of macroeconomic variables. It will considerably increase the safety of investment and also its profitability.

Keywords: capital market, fundamental analysis, national economy.

JEL classification: C10.

Introduction

The capital market, just as the remaining elements of any economic system, does not exist in a vacuum – it operates in certain environment. The environment can be classified according to various criteria, e.g. it can be divided into areas of conditions of the following character:

- economic,
- legal/political,
- socio-cultural,
- personnel-related,
- organizational/technical.

The capital market along with the job, goods and services, enterprise, capital goods and land markets creates an economic space in which there is an exchange of matter, energy and information. The capital market is directly connected with market economy whose functioning without that market is not possible. The mutual permeation of economic, legal/political, socio-cultural, personnel-related, and organizational/technical areas in a stabilized economy is a fact. The subjects of consideration in this article are the relations of economy with the capital market and an effort to answer the question whether in conditions of the Polish economy one can observe any statistical regularity in this field. Verification has been done of the hypothesis claiming that in Poland one can observe statistically important relations between the country's economy and the capital market.

Empirical research

The study of the influence of macroeconomic variables characteristic of the Polish economy on the capital market started with the specification of factors characterizing the economy and the capital market in Poland.

The study was carried out on the basis of quarterly data in the years of 2000-2006. It was a period characterized by a relatively high economic growth. The choice of quarterly data was determined by the character of the variables studied and by the method of their collection. The capital market in the studied period was characterized by four variables:

- $WIG - Y_t$,

- $WIG20 - Y_2$,
- rate of return for $WIG - Y_3$,
- rate of return for $WIG20 - Y_4$.

The phenomena and processes characterizing the country's economy were examined in a comprehensive way, taking into account measures covering the most important macroeconomic elements of the economy. In the study, proportional measures were used, which guarantees comparability in time as well as in space.

In the first phase of the research, a discussion on potential variables characterizing the economy was carried out. In the second phase, due to a high correlation existing between variables describing the economy and in order to eliminate variables, first correlation analysis and then taxonomic methods (the concentration analysis and the factor analysis) were used. As a result of the applied procedures, the following variables were qualified for further research¹:

- unemployment rate [%] X_1 ,
- gross domestic product [%] X_2 ,
- inflation rate I (with reference to the analogical quarter of the previous year) [%] X_3 ,
- money supply M1 [mill. PLN] X_4^2 ,
- money supply M2 [mill. PLN] X_5^3 ,
- bill rediscount [%] X_6 ,
- credit on securities [%] X_7 ,
- PLN demand deposits min [%] X_8 ,
- PLN demand deposits max [%] X_9 ,
- PLN 12-month deposits min [%] X_{10} ,
- PLN 12-month deposits max [%] X_{11} ,
- 100 USD exchange rate [PLN] X_{12} ,
- 100 EUR exchange rate [PLN] X_{13} ,
- average gross monthly salary [PLN] X_{14} ,
- foreign trade turnover export [mill. PLN] X_{15} ,
- foreign trade turnover import [mill. PLN] X_{16} ,
- foreign trade turnover balance [mill. PLN] X_{17} .

For this selected group of variables Pearson's linear correlation coefficients were determined (Table 1). In Table 1 statistically important correlation coefficients are presented in bold type. As one can see from the data presented in Table 1, for many of the chosen macroeconomic variables there is a crucial correlation with stock market indices describing the capital market. On the basis of the analysis of the correlation coefficients, variables for further study were chosen from the groups of variables describing the same areas:

- from variables X_4, X_5 variable X_4 – money supply M1,
- from variables X_6, X_7 variable X_7 – credit on securities,
- from variables X_8, X_9, X_{10}, X_{11} variable X_{11} – PLN 12-month deposits max,
- from variables X_{15}, X_{16}, X_{17} variable X_{15} and X_{16} – export and import.

In Figures 1-21 the shaping of all the variables under study is presented. The result of analysis of Figures 1-21 shows that in the studied period 2000-2006 there were clearly visible positive trends in the Polish economy, which is supported by practically all the analyzed variables. In the next phase of the study for the variables characterizing the capital market and selected macroeconomic variables chosen on the basis of analysis of correlation coefficients (see Table 1) linear models of regression were constructed. They were constructed for every capital market variable with all the chosen macroeconomic variables and with those which were in the models with all the variables statistically important. The estimate results together with basic parameters of the model stochastic structure and the Student's t-test are presented in Table 2.

The successive lines of Table 2 show the values of structural parameters calculated using the classical method of the smallest squares and the corresponding values of Student's t statistics. The last two columns are the values of a multiple correlation coefficient (R^2) and a model medium error (S_u). Models 1 and 2 were estimated for the *WIG* index (Y_1), 3 and 4 for the *WIG20* index (Y_2), 5 and 6 for the quarterly rate of return of the *WIG* index (Y_3), 7 and 8 for the quarterly rate of return of the *WIG20* index (Y_4).

Figures 22-28 present theoretical values of variables explained in particular models. Following the data in Table 2 and Figures 22-28, we can observe a strong dependency between stock indices and the country's economy (models 1-4). In years 2000-2006 the situation on the Warsaw Stock Exchange was a derivative of the situation in the Polish economy. High level of matching in models 1-4 (Figures 22-24) confirms this hypothesis univocally. In case of the rates of return of the *WIG* and *WIG20* the situation is much worse (models 5-8). The

level of matching is much lower for stock indices. The analytical and prognostic value of these models is very low.

Conclusions

On the basis of simple correlational analysis and regression between variables characterizing the capital market and economy of Poland in the years of 2000-2006, it is possible to say that there are essential statistical relations between the capital market and the national economy. The situation on the Warsaw Stock Exchange in the studied period was a derivative of the economic situation.

Taking into account the relatively short period of time – it was a result of the short history of the Polish capital market – and various properties of the macroeconomic variables and capital market, preliminary analyses allow for optimism. Thus, the continuation of this type of studies in the future is justified. The development of the capital market, which is a fact, and the stabilization of the economy are connected with a socio-economic situation. This is supported by increasingly stronger ties between the variables describing these areas. The knowledge of these relations may be a substantial indication in investment processes on the capital market. The quality of the estimated models justifies their use in the process of analysis and diagnosis, as well prognosis.

Table 1

Pearson's linear correlation coefficients between capital market variables and macroeconomic variables describing the economy

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	Y1	Y2	Y3	Y4
X1	1.00																				
X2	-0.06	1.00																			
X3	-0.61	-0.06	1.00																		
X4	0.25	0.62	-0.65	1.00																	
X5	0.18	0.46	-0.63	0.96	1.00																
X6	-0.63	-0.41	0.88	-0.85	-0.75	1.00															
X7	-0.64	-0.41	0.88	-0.85	-0.75	0.99	1.00														
X8	-0.72	-0.26	0.89	-0.76	-0.70	0.96	0.96	1.00													
X9	-0.73	-0.25	0.89	-0.76	-0.68	0.97	0.97	0.99	1.00												
X10	-0.49	-0.34	0.76	-0.72	-0.71	0.82	0.83	0.87	0.83	1.00											
X11	-0.68	-0.36	0.89	-0.81	-0.70	0.99	0.99	0.97	0.98	0.79	1.00										
X12	-0.28	-0.46	0.54	-0.91	-0.91	0.75	0.75	0.69	0.67	0.65	0.70	1.00									
X13	0.46	0.54	-0.23	0.21	-0.01	-0.44	-0.46	-0.42	-0.42	-0.34	-0.46	-0.02	1.00								
X14	0.31	0.39	-0.62	0.85	0.87	-0.73	-0.73	-0.71	-0.71	-0.68	-0.70	-0.82	0.11	1.00

Fig. 1. The unemployment rate [%]

Source: own study based on *CSO* data (*CSO* – Central Statistical Office).

Fig. 2. Gross Domestic Product

Source: own study based on *CSO* data.

Fig. 3. Rate of inflation [%]

Source: own study based on *CSO* data.

Fig. 4. Money supply M1

Source: own study based on CSO data.

Fig. 5. Money supply M2

Source: own study based on CSO data.

Fig. 6. Bill rediscount

Source: own study based on CSO data.

Fig. 7. Credit on securities

Source: own study based on CSO data.

Fig. 8. PLN demand deposits min

Source: own study based on CSO data.

Fig. 9. PLN demand deposits max

Source: own study based on CSO data.

Fig. 10. PLN 12-month deposits min

Source: own study based on CSO data.

Fig. 11. PLN 12-month deposits max

Source: own study based on CSO data.

Fig. 12. USD rate of exchange

Source: own study based on CSO data.

Fig. 13. EURO rate of exchange

Source: own study based on CSO data.

Fig. 14. Average monthly salary

Source: own study based on CSO data.

Fig. 15. Foreign trade turnover export

Source: own study based on CSO data.

Fig. 16. Foreign trade turnover import

Source: own study based on CSO data.

Fig. 17. Foreign trade turnover balance

Source: own study based on CSO data.

Fig. 18. WIG index

Source: own study based on WSE data.

Fig. 19. *WIG20* index

Source: own study based on WSE data.

Fig. 20. Rate of return for *WIG*

Source: own calculations.

Fig. 21. Rate of return for *WIG20*

Source: own calculations.

Fig. 22. Theoretical and real values of *WIG* – model 1

Source: own calculations.

Fig. 23. Theoretical and real values of *WIG* – model 2

Source: own calculations.

Fig. 23. Theoretical and real values of *WIG20* – model 3

Source: own calculations.

Fig. 24. Theoretical and real values of *WIG20* – model 4

Source: own calculations.

Fig. 25. Theoretical and real values of rate of return for *WIG* – model 5

Source: own calculations.

Fig. 26. Theoretical and real values of rate of return for *WIG* – model 6

Source: own calculations.

Fig. 27. Theoretical and real values of rate of return for *WIG20* – model 7
Source: own calculations.

Fig. 28. Theoretical and real values of rate of return for *WIG20* – model 8
Source: own calculations.

Notes

¹ Data from the Central Statistical Office.

² Money supply M1 comprises: – currency in circulation (excluding bank cash desks); – overnight deposits (together with investment accounts in bank stockbroker agencies) of private persons, economic agents of the non-financial sector and non-banking financial institutions in PLN and foreign currency as well as demand deposits.

³ Money supply M2 comprises: – currency in circulation (excluding bank cash desks); – liabilities in PLN against private persons and economic agents; this includes: overnight PLN deposits, fixed-term and frozen PLN deposits and the PLN part of the category: savings bonds, certificates of deposit (non-marketable), loans received from trusts and non-financial funds, credit and loans received from non-banking financial institutions, liabilities from the sale of securities with repurchase agreement; – foreign currency liabilities against private persons and economic; this includes: overnight foreign currency deposits, fixed-term and frozen foreign currency deposits and the foreign currency part of the category: savings bonds, certificates of deposit (non-marketable), loans received from trusts and non-financial funds, credit and loans received from non-banking financial institutions, liabilities from the sale of securities with repurchase agreement.