THE IMPACT OF KEY MACROECONOMIC INDICATORS ON STOCK PRICES IN SOUTHERN EUROPE

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Abstract

In this research, we examine the impact of three crucial factors of economic activity on stock market prices: the inflation rate, government bond yields, and industrial production. We analyze a period of more than 20 years (2022-2024), including various economic conditions (the years of the euro's introduction, the 2010 economic crisis, the post-crisis period, the economic shock of the COVID-19 pandemic, and the recent energy crisis). We focus on the stock markets of Southern Europe, as these economies are more vulnerable than those of Central and Northern Europe and their stock markets have exhibited a large volatility during the examined period, strongly influenced by the aforementioned economic events. This study is part of a broader project analyzing the impact of various macroeconomic indicators on stock market performance. The findings will shed light on the influence of these indicators on stock market performance and investor returns. They will also be useful for future research in this specific field, as they cover a long, highly volatile period.

Key words: Stock Prices, Interest Rates, Industrial Production, Inflation, Southern Europe

JEL Code: G10, G12, E31

Introduction

It is widely recognized that financial markets are influenced by various factors, including economic, political, and geostrategic events. The issue of stock market movements becomes more intriguing when analyzing countries with specific geographic, economic, political, and social characteristics. Several factors that significantly affect stock performance are also critical for macroeconomic performance. GDP, sovereign debt, interest rates, investment activity, and inflation are often used to interpret stock market volatility.

In this work, we focus on the impact of some of these factors on stock prices in Southern European countries (Italy, Spain, Portugal, and Greece). The selected factors are inflation, government bond interest rates, and industrial production. The existing literature presents rather contradictory results regarding the short- and long-term impacts of these factors. We will focus

only on the long term, aiming to identify how the financial markets of Southern Europe react over an extended period with several highly volatile sub-periods characterized by vastly different economic, political, and social conditions.

1 Theoretical Background

1.1 Inflation

Inflation is a widely researched topic, particularly concerning its impact on stock prices. Inflationary and non-inflationary periods, influence various aspects of economic life, including stock markets. However, the literature presents contradictory results on the nature of this relationship. Some empirical studies suggest a negative short-run effect on stock returns, while others conclude in a positive long-run Fisher effect, concluding in a positive relation between stock returns and inflation over the long run (Anari and Kolari, 2001).

In contrast, extensive literature suggests a negative impact of inflation on stock performance, following Fama approach (a negative relation exists between inflation and real economic activity, affecting corporate profitability and investment). Low inflation is generally beneficial for financial growth (Huang et al., 2010) while high inflation can negatively impact financial markets as highlighted in studies for China (Zhao, 1999), Greece (Spyrou, 2001), and the US (Alagidede and Panagiotidis, 2012).

A different impact seems also to appear between the short- and long-term analysis, with a negative relationship in the short term but a positive one over a longer period. Boudouch and Richardson (1993) find that inflation positively impacts stocks in the UK and US stock markets, but this trend is interrupted by short-term intervals of one to five years with a reverse impact. Other studies also provide evidence supporting this argument (Gultekin, 1983; Yeh and Chi, 2009). Finaly, in a more recent study on Spanish stock market, Botey-Fullat et al. (2023), conclude in a non-significant relationship between inflation and stock market performance.

1.2 Industrial Production

The impact of industrial production on the stock market remains rather inconclusive, with some studies finding a positive relationship and others reporting contradictory or insignificant results. Some research indicates that stock market performance can stimulate economic growth (Atje and Jovanovic, 1993). Chen et al. (1986) identify industrial production as a key risk factor for stock returns, while Cutler et al. (1989) find a strong positive correlation between industrial production and stock returns.

Research by Nasseh and Strauss (2000) highlights a positive correlation between industrial production and stock prices, attributing this to increased future cash flows and dividend expectations..

In contrast, Errunza and Hogan (1998) report that volatility in industrial production negatively affects the stock market, while other studies suggest that stock market volatility can negatively influence economic activity (Harris, 1997). Compared to industrial production, interest rates have a closer relationship with stock returns. An increase in interest rates encourages the growth of the industrial sector but also negatively impacts stock prices. As a weaker factor compared to interest rates, industrial production subsequently creates a delayed positive reaction in stock prices.

1.3 Interest Rates

The relationship between stock prices and bond yields is complex, with theoretical models suggesting both positive and negative correlations.

A negative relationship is expected because rising bond yields make bonds more attractive, leading to a decrease in stock prices, and vice versa. Kim and In (2007), in their research on G-7 countries, find that the correlation between stock prices and bond yields varies by country and period examined, while Nissim and Penman (2003) conclude that bond returns may move together or in opposite directions, depending on model parameters.

Conversely, a positive relationship is possible if bond yield changes are linked to expectations of future dividends (Shiller and Beltratti, 1992). Estrella and Mishkin (1997) found a positive correlation for US, Germany, France, the UK, and Italy. Similarly, positive correlations are found in emerging markets, including research in the Turkish stock exchange (Erdem et al., 2005).

Another group of studies examined the joint movement between stock prices and interest rates in stock markets across different countries, reaching conflicting results. Wongbangpo and Sharma (2002) examined the effects of long-term interest rates (LTR) on stock prices in five Asian countries. A negative long-term relationship between stock prices and interest rates was observed in the Philippines, Singapore, and Thailand, whether a positive relationship was identified in Indonesia and Malaysia.

2 Methodology & Sample

The methodology, as developed in the literature, focuses on methods of simple and/or multiple linear regressions and multivariate VAR/VECM models. In this paper, which is the first part of a work in progress, we develop a panel data analysis for the entire examined period. Our sample covers the countries of Southern Europe (Portugal, Italy, Greece, and Spain). We examine the data for these countries for a period of more than 20 years, starting from the introduction of the common currency (euro) in January 2002 until March 2024.

Stock market performance (monthly data) expressed in logarithms is the dependent variable. To analyze the impact of strictly economic factors on stock market returns, inflation, bond interest rates, and the industrial production index were selected as predictors. The inflation rate was measured by the Consumer Price Index (CPI), relative to the EU average (2015=100). The bond interest rate was measured by the return on 10-year government bonds, and industrial production was measured by the index of economic activity (excluding construction), relative to the EU average (2015=100).

All data were collected from the Federal Reserve Bank of St. Louis database, except for one index from Greece, which was sourced from the Bank of Greece database, and from national stock market indexes.

Our basic model is summarized as follows:

$$SPi_j = a_1 + a_2 CPI_j + a_3 BY_i + a_4 IP_j \qquad (1),$$

where a (1−4) are the coefficients, j represents time, SP is the stock price return for each country, CPI is the consumer price index, BY is the yield of 10-year government bonds, and IP is the index of industrial production.

This equation is examined using panel data analysis to examine the impact of each indicator on stock prices of Southern European countries. The analysis covers the period between 2002 and 2024. Since our datasets consist of either percentage rates or values relative to a base year (2015=100), we use the logarithmic transformations. A panel data analysis is performed for all countries, for the period examined, with the necessary transformations, as data are monthly. The software used for the econometric model is STATA.

3 Empirical Analysis

In this section, the results of the empirical model are presented, in regard to the impact of inflation rates, 10-year government bond interest rates, and industrial production on stock prices in Southern European countries. To assess significant differences in the impact of these indicators between countries, we also include a dummy variable representing each country's size in the analysis. This additional variable assigns values from 1 to 4, where Italy (the largest GDP) is assigned 1, Spain 2, Portugal 3, and Greece 4 (the smallest GDP).

Thus, the final model is expressed as follows:

$$SPi_j = a_1 + a_2 CPI_j + a_3 BY_j + a_4 IP_j + a_5 C\_id_j \quad (2),$$

Where,

C_id is the dummy variable identifying country.

A panel data analysis model, adjusted for monthly data, was then performed. Initially, a random effects model was selected as more suitable for the use of the dummy (country) variable, as in the fixed effects model, this variable was omitted. However, all other results (e.g. significance levels, coefficient signs and overall model fit), were identical to those of the random-effect output. Table 1 demonstrates the results of the empirical model.

Table 1: Empirical Model's Output (random effect)

				Wald chi2(4) =	1083.06
				Prob > chi2 =	0.000
LSP	Coef.	Std. Err	z	P> | z |	[95% Conf. Interval]
LCPI	1.432595	.1295741	11.06	0.000	1.178634 1.686555
LBY	-.0223127	.0124924	-1.79	0.074	-.0467973 .002172
LIP	2.718098	.1124573	24.17	0.000	2.497686 2.93851
C_id	.060216	.0041798	14.41	0.000	.0520238 .0684082
_cons	-6.49093	.4406906	-14.68	0.000	-7.332831 -5.60535
R-sq: within = 0.3409, between = 0.8383, overall = 0.5049					

As shown in the results, a clear, significant, and positive relationship exists between inflation and stock returns, confirming the part of the literature that highlights a positive long-term relationship between these two factors. A larger coefficient (also significant and positive) is observed in the relationship between industrial production and stock returns, indicating that

an increase in aggregate output leads to higher stock returns. Conversely, a negative and marginally significant effect (at the 10% level) is found for government bond yields.

As previously mentioned, similar findings are observed in the fixed effects model, excluding the country variable. When this factor is included, a slight positive and significant impact on the stock market is also observed, suggesting that smaller economies and stock markets experience larger changes in stock market performance. Model predictability is adequate, as Rsquare is between .34 and .83, with the overall value to be .50.

Next, the model was tested for heteroskedasticity using a relevant test. The results indicate that heteroskedasticity is indeed present in the dataset. However, no evidence of autocorrelation was found.

Table 2: Heteroskedasticity test

Coefficients:	generalized least squares	Wald chi2(4)	= 670.67
Panels:	heteroskedastic	Prob > chi2	= 0.0000
Correlation:	no autocorrelation		

LSP	Coef.	Std. Err	z	P>|z|	[95% Conf.	Interval]
LCPI	1.526358	.1295741	11.06	0.000	1.398964	1.745098
LBY	-.0173727	.0124924	-1.79	0.074	-.0398964	.005151
LIP	2.258556	.1124573	24.17	0.000	2.055085	2.462028
C_id	.0443897	.0041798	14.41	0.000	.0370255	.0517539
_cons	-5.683919	.3921635	-14.49	0.000	-6.452545	-4.915293

R-sq: within = 0.3409, between = 0.8383, overall = 0.5049

We then proceeded to correct the heteroskedasticity problem, and the following output presents the results adjusted for heteroskedasticity.

Table 3: Heteroskedasticity corrected model

Coefficients:	generalized least squares	Wald chi2(4)	= 1088.16
Panels:	homoskedastic	Prob > chi2	= 0.0000
Correlation:	no autocorrelation		

LSP	Coef.	Std. Err	z	P>|z|	[95% Conf.	Interval]
LCPI	1.432595	.1292702	11.08	0.000	1.17923	1.685959
LBY	-.0223127	.0124631	-1.79	0.073	-.0467399	.0021145
LIP	2.718098	.1121935	24.23	0.000	2.498203	2.937993
C_id	.060216	.00417	14.44	0.000	.052043	.68389
_cons	-6.469093	.4396569	-14.71	0.000	-7.330805	-5.607382

Conclusion and Discussion

We analyzed the long-term impact of inflation, bond yields, and industrial production on stock markets over a period of 22 years for four Southern European countries. From the panel data analysis, the following equation was obtained:

$$SP_t = 1.432595CPI - .0223127BY + 2.718098IPR + .060216C\_id \quad (3)$$

The findings clearly show that inflation had a positive impact on the stock market, confirming the Fisher effect. As we are analyzing countries heavily affected by the 2008 economic crisis, this finding seems logical. During the period examined, non-inflationary or even deflationary periods were associated with low economic activity (and as a result, lower return in stock markets) and austerity measures due to the debt crisis. The opposite effect is observed during periods of high inflation, such as the years before the economic crisis and after the COVID-19 pandemic.

The interest rate of 10-year government bonds negatively affected stock markets, although with a relatively low coefficient and lower significance. In southern Europe, for the period examined, the part of the literature that mainly conclude a negative relation, seems to be confirmed.

The impact of industrial production is more evident, as a strong and significant positive effect on stock markets is observed. Specifically, a one-unit change in industrial production could lead to an almost threefold (2.7) increase in stock prices. These findings align with the main body of literature that highlights such a relationship.

Finally, the country-specific factor also affects stock markets, albeit to a lesser extent. Smaller countries exhibit higher increases in stock indices, which could be attributed to the fact that we are analyzing a highly volatile period with many ups and downs, especially for the smaller economies.

Limitations and Future Work

Several additional aspects could be explored in future research. Firstly, instead of analyzing the entire period, it would be interesting to examine smaller sub-periods with common characteristics (e.g., pre- and post-crisis years, the pandemic, the Russia-Ukraine war). Additionally, separate models could be developed for each country to identify potential differences among them.

Regarding the empirical model, further tests could be conducted, including examining the issue of reverse causality. Finally, other countries with different characteristics, such as Germany, could be included in the analysis to identify potential differences compared to Southern European countries, particularly during the period examined.

References

Alagidede, P., & Panagiotidis, T. (2012). Stock returns and inflation: Evidence from quantile regressions. *Economics Letters*, *117*(1), 283–286. https://doi.org/10.1016/j.econlet.2012.04.043

Anari, A., & Kolari, J. (2001). Stock prices and inflation. *Journal of Financial Research*, *24*(4), 587–602. https://doi.org/10.1111/j.1475-6803.2001.tb00832.x

Atje, R., & Jovanovic, B. (1993). Stock markets and development. *European Economic Review*, *37*(2–3), 632–640. https://doi.org/10.1016/0014-2921(93)90053-d

Botey-Fullat, M., Marín-Palacios, C., & Arias-Martín, P. (2023). Macroeconomics and the Spanish stock market, impact-response analysis. *Economic Research-Ekonomska Istraživanja*, *36*(1). https://doi.org/10.1080/1331677x.2023.2180062

Chen, N.-F., Roll, R., & Ross, S. A. (1986). Economic Forces and the stock market. *The Journal of Business*, *59*(3), 383. https://doi.org/10.1086/296344

Chiang, T. C., & Chen, X. (2017). Stock market activities and industrial production growth: Evidence from 20 international markets. *Advances in Pacific Basin Business, Economics and Finance*, 39–75. https://doi.org/10.1108/s2514-465020170000001003

Chowdhry, B., Roll, R., & Xia, Y. (2005). Extracting inflation from stock returns to test purchasing power parity. *American Economic Review*, *95*(1), 255–276. https://doi.org/10.1257/0002828053828554

Cutler, D. M., Poterba, J. M., & Summers, L. H. (1989). What moves stock prices? *The Journal of Portfolio Management*, *15*(3), 4–12. https://doi.org/10.3905/jpm.1989.409212

Erdem, C., Arslan, C. K., & Sema Erdem, M. (2005). Effects of macroeconomic variables on Istanbul Stock Exchange indexes. *Applied Financial Economics*, *15*(14), 987–994. https://doi.org/10.1080/09603100500120365

Errunza, V., & Hogan, K. (1998). Macroeconomic determinants of European Stock Market Volatility. *European Financial Management*, *4*(3), 361–377. https://doi.org/10.1111/1468-036x.00071

Estrella, A., & Mishkin, F. (1995). *The Term Structure of Interest Rates and Its Role in Monetary Policy for the European Central Bank*. https://doi.org/10.3386/w5279

Gutelkin, N. B. (1983). Stock market returns and inflation: Evidence from other countries. *The Journal of Finance*, *38*(1), 49–65. https://doi.org/10.1111/j.1540-6261.1983.tb03625.x

Harris, R. D. F. (1997). Stock markets and development: A re-assessment. *European Economic Review*, *41*(1), 139–146. https://doi.org/10.1016/s0014-2921(96)00021-9

Huang, H.-C., Lin, S.-C., Kim, D.-H., & Yeh, C.-C. (2010). Inflation and the finance–growth nexus. *Economic Modelling*, *27*(1), 229–236. https://doi.org/10.1016/j.econmod.2009.09.003

Kim, S., & In, F. (2007). On the relationship between changes in stock prices and bond yields in the G7 countries: Wavelet analysis. *Journal of International Financial Markets, Institutions and Money*, *17*(2), 167–179. https://doi.org/10.1016/j.intfin.2005.10.004

Nasseh, A., & Strauss, J. (2000). Stock prices and domestic and international macroeconomic activity: A cointegration approach. *The Quarterly Review of Economics and Finance*, *40*(2), 229–245. https://doi.org/10.1016/s1062-9769(99)00054-x

Nissim, D., & Penman, S. H. (2003). The association between changes in interest rates, earnings, and equity values*. *Contemporary Accounting Research*, *20*(4), 775–804. https://doi.org/10.1506/ykrx-huqu-9v28-ea16

Shiller, R., & Beltratti, A. (1990). *Stock Prices and Bond Yields: Can Their Comovements Be Explained in Terms of Present Value Models?* https://doi.org/10.3386/w3464

Spyrou, S. I. (2001). Stock returns and inflation: Evidence from an emerging market. *Applied Economics Letters*, *8*(7), 447–450. https://doi.org/10.1080/13504850010003280

Wongbangpo, P., & Sharma, S. C. (2002). Stock market and Macroeconomic Fundamental Dynamic Interactions: ASEAN-5 countries. *Journal of Asian Economics*, *13*(1), 27–51. https://doi.org/10.1016/s1049-0078(01)00111-7

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