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ECONOMIC GROWTH, INFLATION, AND CAPITAL MARKET PERFORMANCE: IS THERE A LINK IN JORDAN?

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ABSTRACT

Purpose - The relationship between some macroeconomic variables and stock market returns still attracts the attention of researchers. Indeed, this interest lies in the fact the stock development enhances real economic growth. Within this context, the objective of this paper is to examine the Jordanian capital market (Amman Stock Exchange / ASE) in terms of the nexus between macroeconomic variables and the stock price index.

Methodology - To examine the relationship between real Gross Domestic Product (GDP) and consumer price index (CPI) and the ASE's market index, this paper covers the period 1980 – 2019, and uses time series techniques including stationarity test, lag length selection criteria, co-integration, Vector Error Correction Model (VECM), and some stability tests.

Findings – In contrast to most of the published literature, the impact of real GDP on the ASE's market index and on its market capitalization is negative and significant. In addition, while the impact of consumer price index on the market index is not significant, its impact of market capitalization is negative and significant.

Conclusion – Based on the estimated results, we argue that the ASE's performance does not reflect the performance of the national economy. On the contrary, the relationship is negative. In addition, we argue that the ASE's market index does not hedge investors against inflation. These results indicate that the ASE's market index should not be used as a proxy measure of the performance of the national economy.

Keywords: Amman Securities Exchange, macroeconomic variables, market index, co-integration, Fisher.
JEL Codes: G10, G12, G14

1. INTRODUCTION

The importance of stock markets (and banks) in the process of economic growth and development of nations has always been an issue that interests researchers, as well as international organizations, such as the World Bank and the International Monetary Fund (IMF).

Financial systems encourage savings, facilitate trading activity in the issued financial securities, allow investors to diversify their investment portfolios, improve the allocation process of scarce capital resources, and monitor the performance of company managers (Levine, 1997). Given these important services, both the World Bank and the IMF maintain their own databases that measure financial development across the globe. The World Bank's framework relies on four proxy dimensions that characterize a well-functioning financial system, and these are depth, access, efficiency, and stability. The IMF's framework on the other hand, relies on depth, access, and efficiency dimensions.

To measure their dimensions of financial development, the IMF and the World Bank use a wide set of almost similar variables. For example, they both the depth of financial institutions in terms of market capitalization to GDP ratio.

The market capitalization to GDP ratio in general, and what affects market indices (and market capitalization) in particular, has been a challenging issue to the economic and finance research community. Indeed, publicly traded companies take their stock prices seriously because they reflect their overall financial health. In addition, if a company decides to raise capital, the higher its prevailing stock price, the less shares its needs to issue. Finally, when a company's stock price rises, the likelihood / probability of a takeover decreases.

The seminal paper by Fisher (1930) has led to the publication of many empirical papers that examine the relationship between stock returns and some macroeconomic variables. According to Fisher (1930), in efficient markets, the nominal returns on financial securities consist of expected and unexpected inflation rate, and risk premium. In other words, Fisher predicts a positive relationship between stock returns and expected inflation. Following this, Bodie (1976), Jaffe and Mandelker (1976), Fama and Schwert (1977), and Fama (1981), have all reported a negative relationship between expected inflation, unexpected inflation, and changes in the expected inflation and nominal and real stock returns. These early papers are still relevant and attract the research community to examine the nexus between macroeconomic variables and stock prices.

This paper examines the relationship between real GDP and inflation rate and the performance of the ASE in terms of its weighted market index and market capitalization. In section 2, a brief review of the literature is presented. In sections 3 and 4, we outline the data and methodology, and present and discuss the results. Finally, section 5 summarizes and concludes the paper.

2. THE MACROECONOMY AND STOCK MARKET PERFORMANCE: LITERATURE REVIEW

As implied in the introduction, the pioneering idea about the relationship between financial assets' returns and inflation is due to the work of Fisher (1930). This effort has resulted in the publication of a number of early papers in this area. These include, for example, Lintner (1975), Bodie (1976), Jaffe and Mandelker (1976), Fama and Schwert (1977), and Fama (1981). Following these publications, numerous other papers have emerged. These include Fama (1990), Chen et al. (1986), Fama and French (1989), Chen (1991), Thornton (1993), Kaneko and Lee (1995), Abdalla and Murinde (1997).

Fama and Schwert (1977) estimate the extent to which assets are a hedge / protection against the expected and the unexpected components of inflation rates in the USA during the period 1953 – 1971. The analyzed assets are common stocks' (New York Stock Exchange (NYSE) equally-weighted portfolio, value-weighted portfolio, US treasury bills, long-term US government bonds, Home Purchase Price Index (HPPI), and labor income. The empirical results indicate that while treasury bills and bonds are a hedge against expected inflation, the HPPI is a hedge against both expected and unexpected inflation. Labor income does not reflect any relationship with inflation (expected and unexpected). Finally, common stock returns are negatively related to inflation. These findings are also documented by Lintner (1975), Jaffe and Mandelker (1976), and Nelson (1976).

More recent papers include Phylaktis & Ravazzolo (2005), Humpe and Macmillan (2009), Eita (2012), Ibrahim & Agbaje (2013), Tripathi & Kumar (2014) , Hunjra, Chani, Shahzad & Khan (2014), Boonyanam (2014), Barakat et al. (2016), Okoro (2017), Badullahewage (2018), Al-Kandari and Abul (2019), Khataybeh et al.(2019), Radha and Gopinathan (2019), and Olokoyo et al. (2020).

Humpe and Macmillan (2009) examine the impact of four macroeconomic variables (industrial production index, consumer price index, money supply, and long-term interest rates) on stock prices in the USA and Japan. The results indicate some conflicting conclusions. For example, while the USA's analysis finds one co-integrating vector, the Japanese findings find two co-integrating vectors. In the USA, stock prices are positively related to the industrial production index, and negatively related to the consumer price index and long-term interest rate. The relationship between stock prices and the money supply is not significant. For the Japanese findings, on the other hand, stock prices are positively related to the industrial production index, and negatively related to money supply. For the second co-integrating vector, the estimated results indicate that the industrial production index is negatively affected by the consumer price index and long-term interest rate. These contrasting findings, it is argued, are due to the recession that hit the Japanese economy during the 1990s.

Finally, Olokoyo et al. (2020) use time series econometric techniques to examine the impact of various macro-economic variables on the market capitalization of the Nigerian stock exchange. The macro-economic variables include interest rate, exchange rate, GDP, inflation, foreign capital inflows, and trade openness (exports and imports to GDP ratio). Based on the Johansen co-integration test and vector error correction model (VECM), Olokoyo et al. (2020) document a negative relationship between interest rate, inflation and trade and market capitalization, and a positive relationship between GDP growth rate and market capitalization.

3. THE DATA AND METHODOLOGY

This paper examines the impact of real GDP and inflation on the stock market performance in Jordan during the period 1980-2019. To carry out this exercise, we specify models 1 and 2.

$$SMI_t = \lambda + \beta GDP_t + \psi CPI_t + \varepsilon_t \quad (1)$$

$$MC_t = \lambda + \beta GDP_t + \psi CPI_t + \varepsilon_t \quad (2)$$

where, SMI is the stock market index, MC is the market capitalization of the stock exchange, GDP is real GDP, CPI is the consumer price index. All four variables are in their logarithmic forms. The expected signs of the parameters are $\lambda>0$, $\beta>0$, $\psi>0$. The error term (ε) is assumed to be is independent and identically in its distribution. Finally, the subscript (t) stands for the period used in the analysis (1980-2019).

The fact that the paper uses time series data and covers the period 1980 – 2019 (40 observations), we follow five steps.

First, we examine the stationarity of the data using the Augmented Dickey-Fuller (ADF) test.

Second, we use the Schwarz information criterion (SC) to select the optimum lag number through an unrestricted vector autoregressive model (VAR) model.

Third, we apply the Johansen co-integration test to detect the long run relationship among the variables. This co-integration is tested using the maximum eigenvalue (λ_{max}) and the trace test (λ_{trace}).

$$\lambda_{max} = -T \log(1 - \lambda_{r+1}) \quad (3)$$

where, the null is r = g co-integrating vectors with (g = 0, 1, 2, 3, …) against the alternative ($r \leq g + 1$).

$$\lambda_{trace} = -T \sum_{i=r+1}^{k} \log(1 - \lambda_i) \quad (4)$$

where, the null is r = g against the general specification $r \leq 1$.

Fourth, the restricted vector auto-regression (Vector Error Correction Model / VECM) model is then estimated to examine the short run effect of the macro-economic variables (GDP and inflation) on the performance of the ASE.

We then estimate a vector error-correction (VEC) model to examine the long-run relationship between the set of variables.

$$\Delta SMI_t = \alpha + \lambda e_{t-1} + \sum_{i=1}^{n} b_i \Delta GDP_{t-i} + \sum_{i=1}^{m} c_i \Delta CPI_{t-i} + \varepsilon_t \quad (5)$$

$$\Delta MC_t = \alpha + \lambda e_{t-1} + \sum_{i=1}^{n} b_i \Delta GDP_{t-i} + \sum_{i=1}^{m} c_i \Delta CPI_{t-i} + \varepsilon_t \quad (6)$$

Finally, we estimate Breusch-Godfrey Serial Correlation LM test, and CUSUM test for the stability of the residuals.

4. THE EMPIRICAL RESULTS

Before we present the empirical estimations, it is useful to outline a number of observations about the ASE. First, the ASE was established in 1978. As expected, in 1978, the ASE was a small market in terms of, for example, number of listed companies (66), market capitalization to GDP ratio (36.0 percent), and in terms of its trading volume to GDP ratio / turnover ratio (2.0 percent). Second, around the year 2008, the market hit record levels in capitalization, number of listed companies, and turnover ratio. However, since 2008 – 2010, the market has experienced falls in all of these measures. In 2020, the market had 179 listed companies (down from 277 in 2010), 41.5 percent capitalization to GDP ratio (down from 162.9 percent in 2010), and 8.1 percent turnover ratio (down from 80.0 percent in 2008).

Table 1: The ASE: Basic Information

Year	Number of Listed Firms	Capitalization to GDP Ratio	Turnover Ratio
1978	66	36.0%	2.0%
1998	150	74.1%	11.2%
2008	262	298.8%	80.0%
2010	277	162.9%	30.6%
2012	243	116.5%	10.3%
2018	195	56.7%	14.4%
2019	191	49.7%	10.6%
2020	179	41.5%	8.1%

In Table 2, we report of the ADF test results. It is clear that all four variables are not stationary at their level forms and once first-differenced, they become stationary.

Based on these results, we can move to the next step in the analysis and apply the Johansen co-integration test to detect the long-term co-integrating relationship among our set of variables. However, before this step, we need to determine the lag structure for the estimation of models 1 and 2.

Table 2: Unit Root Test - Augmented Dickey-Fuller Test

	Level			First-Difference		
	None	**Constant**	**Constant & Trend**	**None**	**Constant**	**Constant & Trend**
Overall Stock Market Index	0.974	-1.306	-1.469	-5.810*	-5.797*	-5.703*
Market Capitalization	2.397	-1.792	-0.800	-2.862*	-4.922*	-4.941*
Real GDP	3.345	0.263	-2.154	-3.772*	-5.382*	-5.341*
Consumer Price Index	2.105	-1.470	-2.011	-1.397*	-3.699*	-3.858*

In Tables 3 and 4, we present the results of lag structure determination during the period 1980-2019. On average, the reported results indicate that the optimum lag for both estimations is 2. This lag is used in estimating the Johansen co-integration test.

Table 3: Endogenous Variables - Overall Market Index, Real GDP, and Consumer Price Index

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-18.64213	NA	0.000647	1.169845	1.300460	1.215893
1	159.1503	317.1432	7.07e-08	-7.954070	-7.431610*	-7.769878
2	173.0605	22.55710*	5.48e-08*	-8.219487*	-7.305182	-7.897152*
3	178.5275	7.978796	6.82e-08	-8.028511	-6.722362	-7.568032

Table 4: Endogenous Variables - Market Capitalization, Real GDP, and Consumer Price Index

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-24.81329	NA	0.000903	1.503421	1.634036	1.549469
1	160.0159	329.6953	6.74e-08	-8.000858	-7.478398*	-7.816667
2	175.1613	24.56015*	4.89e-08*	-8.333043*	-7.418739	-8.010708*
3	182.1923	10.26151	5.59e-08	-8.226613	-6.920463	-7.766134

In Table 5-8, we report the Johansen co-integration test results. The reported trace and maximum eigenvalue statistics indicate that there is at least one co-integrating relationship at the 5 percent significance level exits in all four estimations. In other words, there is a long-run relationship between the stock market index, GDP and inflation. There is also a long-run relationship between market capitalization, GDP, and inflation. These conclusions indicate that the estimation of a Vector Error Correction Model (VEC) is the second step.

Table 5: Johansen Multivariate Co-Integration Test

Hypothesized No. of CE(s)	Eigen Value	Trace Statistic	5 Percent Critical Value	P-Value
None *	0.446054	30.59660	29.79707	0.0404
At most 1	0.188780	8.741120	15.49471	0.3899
At most 2	0.026668	1.000108	3.841466	0.3173

Overall Market Index, Real GDP, and Consumer Price Index.

Table 6: Johansen Multivariate Co-Integration Test

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 percent Critical Value	Prob.**
None *	0.446054	21.85548	21.13162	0.0395
At most 1	0.188780	7.741012	14.26460	0.4056
At most 2	0.026668	1.000108	3.841466	0.3173

Overall Market Index, Real GDP, and Consumer Price Index.

Table 7: Johansen Multivariate Co-Integration Test

Hypothesized No. of CE(s)	Eigen Value	Trace Statistic	5 Percent Critical Value	P-Value
None *	0.484639	33.71083	29.79707	0.0168
At most 1	0.190305	9.183977	15.49471	0.3487
At most 2	0.036437	1.373346	3.841466	0.2412

Market Capitalization, Real GDP, and Consumer Price Index

TABLE 8: Johansen Multivariate Co-Integration Test

Hypothesized No. of CE(s)	Eigen Value	Max-Eigen Statistic	5 Percent Critical Value	P-Value
None *	0.484639	24.52686	21.13162	0.0160
At most 1	0.190305	7.810632	14.26460	0.3983
At most 2	0.036437	1.373346	3.841466	0.2412

Market Capitalization, Real GDP, and Consumer Price Index

In Tables 9, we report the results of the co-integrating equations. The results indicate that real GDP has a negative and significant impact on both the ASE's market index and its market capitalization. However, the consumer price index affects (negatively) the ASE's market capitalization only. In addition, the VECM results (Table 10) indicate that the error correction terms is negative and significant in both estimations. These terms indicate that there is a long-run equilibrium relationship between real GDP, inflation, and stock market index, and between real GDP, inflation, and market capitalization.

Table 9: Co-Integrating Regressions

Dependent Variable - Stock Market Index			Dependent Variable - Market Capitalization		
Variable	**Coefficient**	**t-Statistic**	**Variable**	**Coefficient**	**t-Statistic**
C	+29.682		C	+20.669	
GDP	-1.620	6.354*	GDP	-1.707	-5.337*
CPI	+0.140	0.576	CPI	-0.787	-2.626*
* Significant at the 99 percent level.					

Table 10: VECM Estimation Results

ΔSMI_t	t-statistic	ΔMC_t	t-statistic
$-0.261ECT_{t-1}$	**-1.411**	**$-0.1994ECT_{t-1}$**	-1.543
$+0.226\Delta SMI_{t-1}$	1.245	$+0.357\Delta SMI_{t-1}$	2.058
$+0.311\Delta SMI_{t-2}$	1.660	$+0.283\Delta SMI_{t-2}$	1.510
$+2.061\Delta GDP_{t-1}$	1.474	$+2.283\Delta GDP_{t-1}$	1.731
$-1.510\Delta GDP_{t-2}$	-1.227	$-1.355\Delta GDP_{t-2}$	-1.282
$+0.196\Delta CPI_{t-1}$	0.158	$+0.309\Delta CPI_{t-1}$	0.267
$-0.022\Delta CPI_{t-2}$	-0.022	$-0.157\Delta CPI_{t-2}$	-0.179
-0.018	-0.138	-0.017	-0.172
R^2	0.301	R^2	0.340
Adjusted R^2	0.132	Adjusted R^2	0.181
*indicates significant at the 5% level. Δ indicates first difference			

To analyze the residuals in terms of their serial correlation behavior, we conduct the LM test as a residual diagnostic test. The results are reported in Tables 11 and 12. Clearly, the results indicate the absence of serial correlation in the error terms.

Table 11: Breusch-Godfrey Serial Correlation LM Test (MARKET INDEX, GDP & INFLATION)

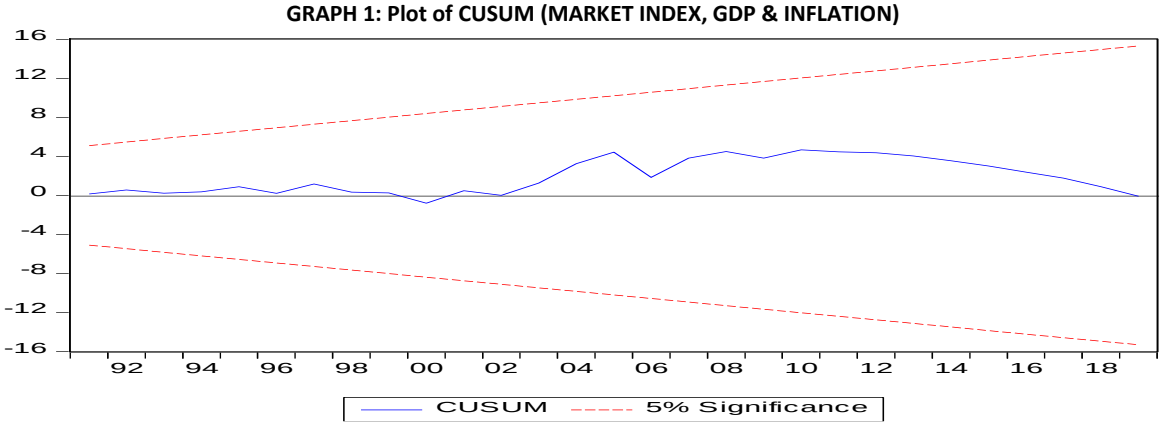
F-statistic	0.444357	Prob. F(2,27)	0.6458
Obs*R-squared	1.179058	Prob. Chi-Square(2)	0.5546

Table 12: Breusch-Godfrey Serial Correlation LM Test (MARKET CAPITALIZATION, GDP, & INFLATION)

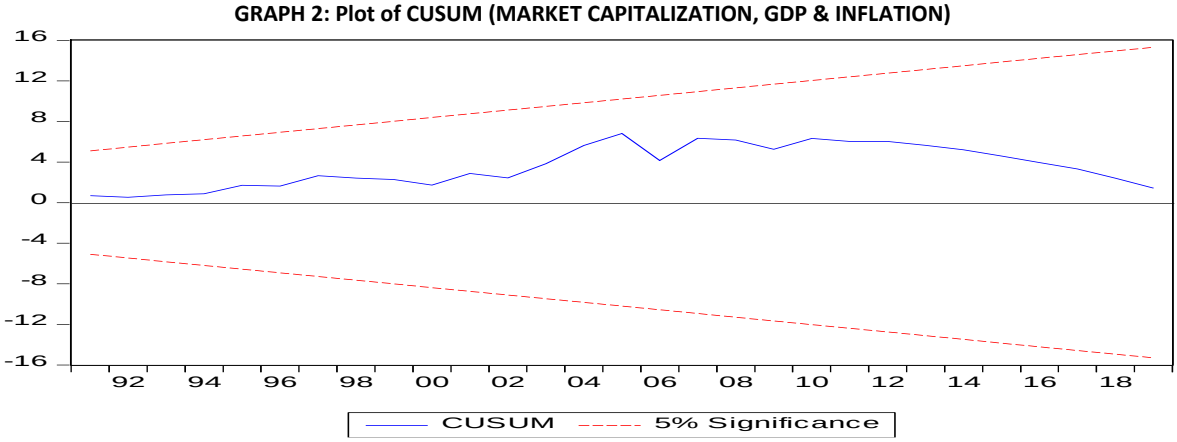
F-statistic	**0.389835**	**Prob. F(2,27)**	**0.6809**
Obs*R-squared	1.038451	Prob. Chi-Square(2)	0.5950

Finally, we conduct the CUSUM test for the parameters' structural stability. The results are shown in Graphs 1 and 2. In both cases, the CUSUM plots for the estimated ECMs show no movement outside the 5% critical lines. Therefore, the estimated ECMs are stable.

GRAPH 1: Plot of CUSUM (MARKET INDEX, GDP & INFLATION)



GRAPH 2: Plot of CUSUM (MARKET CAPITALIZATION, GDP & INFLATION)



5. SUMMARY AND CONCLUSIONS

The purpose of this paper is to investigate the impact of real GDP and inflation on the Jordanian stock exchange's market index and its market capitalization. The fact that the annual data covers the period 1980 – 2019, we use time series techniques including the Augmented Dickey Fuller test, lag section criterion, Johansen co-integration test, and vector error-correction model (VECM).

The empirical findings confirm the existence of a long-run relationship between stock market index, real GDP, and consumer price index, and between market capitalization, real GDP, and consumer price index. Our findings do not support the hypothesis that economic growth has a positive impact on the performance of the stock market in terms of its overall market index or market capitalization. On the contrary, the impact of real GDP on these performance measures is negative. In addition, while the consumer price index has no impact on the overall market index, its impact on market capitalization is negative and significant. In other words, stock market prices in the ASE do not hedge investors against inflation rate.

Based on the reported results, three main conclusions are worth raising. First, it is surprising to find that real GDP has a negative impact on the overall market index and on market capitalization. After all, the ASE lists the largest companies in the country in terms of their total assets, number of employees, and net income. Moreover, all Jordanian banks are listed

on the market. The performance of the economy should be reflected in the market's index and its capitalization. However, the fact that this is not the case, one can argue that the reason behind the negative impact is lack of efficiency in the pricing of the listed firms themselves.

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