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CORRELATION BETWEEN MACROECONOMIC, FINANCIAL VARIABLES AND STOCK MARKET: EMPIRICAL EVIDENCE FROM SAUDI STOCK EXCHANGE

This paper examines the impact of macroeconomic, financial variables and the stock market in Saudi Stock Exchange. For this purpose, macroeconomic, financial variables, and Saudi stock index were analyzed for the period of 2000 to 2018. The variables were: Imports, Exports, Listed domestic companies, Foreign direct investment, GDP, Broad money, Inflation rate, and Tadawul stock index (TASI). Correlation was used to capture the relationship. The study showed strong relationships between IMP-GDP, IMP-EXP, IMP-LD, IMP-BM, GDP-EXP, GDP-LD, GDP-BM, and LD-BM while TASI has weak relationship with the financial and economic variables.

Key words: macroeconomic variables, financial variables, Saudi Stock Exchange, TASI, correlation.

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КОРРЕЛЯЦИЯ МЕЖДУ МАКРОЭКОНОМИЧЕСКИМИ, ФИНАНСОВЫМИ ПЕРЕМЕННЫМИ И ФОНДОВЫМ РЫНКОМ: ЭМПИРИЧЕСКИЕ ДОКАЗАТЕЛЬСТВА САУДОВСКОЙ ФОНДОВОЙ БИРЖИ

В этой статье исследуется влияние макроэкономических, финансовых переменных и фондового рынка Саудовской фондовой биржи. С этой целью были проанализированы макроэкономические, финансовые переменные и фондовый индекс Саудовской Аравии за период с 2000 по 2018 год. Переменными были: импорт, экспорт, котирующиеся на бирже отечественные компании, прямые иностранные инвестиции, ВВП, широкая денежная масса, инфляция и фондовый индекс Тадавула (TASI). Корреляция использовалась, чтобы зафиксировать взаимосвязь. Исследование показало тесную взаимосвязь между IMP-GDP, IMP-EXP, IMP-LD, IMP-BM, GDP-EXP, GDP-LD, GDP-BM и LD-BM, в то время как TASI имеет слабую связь с финансовыми и экономическими переменными.

Ключевые слова: макроэкономические переменные, финансовые переменные, саудовская фондовая биржа, TASI, корреляция.

Introduction. There is a continuous interest in examining all factors affecting stock markets since they are being traded. Many factors are studied in the literature to explain stock prices as stakeholders are keen interested in every factor affecting share price. While many determinants within firms affects the share prices of them, the macroeconomic and financial variables of the country within which the firm operates can be other factors explaining share prices. Hence, the paper analyzes the relationship between various economic and financial variables and stock market in Saudi Arabia.

Studies concerning stock markets were focusing on financial factors, macroeconomic factors, or combining the financial and economic fields.

The Tadawul All Share Index (TASI) is the variable used to show the performance of all firms listed on the Saudi Stock Exchange as it is the major stock market index. TASI is the only stock exchange in Saudi Arabia and the main one among the Gulf Cooperation Council (GCC) countries [1].

This study is to determine the impact of the financial and macroeconomic variables on the Saudi Stock Exchange, by analyzing data extracted from the World Bank and Saudi Stock Exchange. The next sections are divided as follows: Section III shows literature review. Section IV reveals the data collection method and the methodology used. Then results are found in section V. Section VI concludes and presents the implications. Finally, the list of references is listed.

I. Theoretical framework. Scholars adopted various theoretical frameworks to capture the impact of macroeconomic variables and stock market

performance. In this study, Efficient market hypothesis (EMH) and Arbitrage pricing theory (APT) are used.

A. Efficient market hypothesis (EMH). EMH developed by Fama is a milestone in the modern financial theories [2]. It states that stock prices reflect all information where the stocks are traded in exchanges according to their fair values. The EMH consider that that there are no possibility for an investor to outperform the market, and that market anomalies will bearbitraged away. Famastates that if in case of market efficiency, current prices will reflect all relevant available information concerning the actual value of the assets. Thus, efficient market is able to incorporate information that maximizes opportunities to purchasers and sellers of securities. Whether or not markets are efficient, and the extent of efficiency, is a controversialdebate among academics. While many academics show evidence supporting EMH, others are opponents as they consider it is pointless to predict the market via either fundamental or technical analysis.

B. Arbitrage pricing theory (APT). Arbitrage pricing theory (APT) developed by Ross is a multi-factor model for asset pricing that provides relationship between macroeconomic variables which capture systematic risk and the asset's expected return [3]. Under APT it takes a vast amount of research to determine the sensitivity of an asset is to different macroeconomic risks. APT assumes markets misprice securities price may be deviated from their intrinsic value, which would be an opportunity for arbitrageurs to take advantage before the correction of the market occursmoving the securities back to theirfair value. APT factors form the systematic risk that investors cannot be reduce by diversificationtheir portfolios. However, the choices of the factors are subjective which will give varying results for investors according to the different determinants used. Determinants would be gross domestic product (GDP), gross national product (GNP), unexpected changes in inflation, commodities prices, market indices, corporate bond spreads, exchange rates, and yield curve shifts.

II. Literature review. Various studies tested the relationship between financial and economic indicators and stock markets. Frank and Young examined the association between exchange rates and stock market prices and their results revealed no association [4]. Aggarwal study revealed a positive relationship between U.S. stock prices and effective exchange rates. Aydemir and Demirhan showed that there exists a two-way causation between Istanbul Stock Exchange index and exchange rate [5]. Apergis and Eleftherio revealed that a strong relationship exists between Athens stock index and inflation, while Rapach, examined a weak relationship between inflation and stock

prices [6, 7]. Liu and Shrestha showed that inflation, interest rate, and exchange rate have negative relationships with the Chinese stock market index [8, 9]. Brahmasrene and Jiranyakul, revealed that money supply has a positive impact on the stock market index in Thailand, while industrial production index, the exchange rate and oil prices have negative impact in the post-financial liberalization period, and money supply is the only variable positively affecting the stock market in the post financial crises [10]. Alexius and Spang found that GDP is cointegrated with stock market indices in G7 countries [11]. Chaudhuri and Smile found a significant relationship between money supply and stock market in Australia [12]. Humpe& Macmillan found that money supply may affect positively stock market due to increased investments and economic activity, but the effect may be negative due to unanticipated inflation [13]. Hossain and Hossain found thatthe relationshipbetween theeconomic growth and stock market in Japan, U.S., U.K., does not exist [14].

III. Data and Research methodology. The study examines the effect of financial and economic variables on Saudi Stock market index (TASI). The data of financial and economic indicators are collected from World Bank database and the index prices are collected from the Saudi Stock Exchange. The study uses data for the period (2000–2018). Descriptive statistics, correlation matrix are employed to explore the relationship and find the empirical results.

The following economic and financial variables were used (Table 1) in the study.

Thus the conceptual framework model is represented in Figure.

Model framework
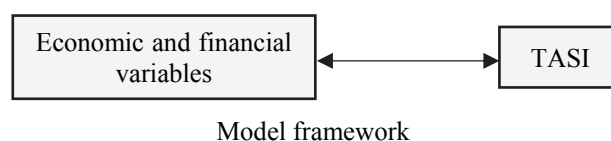
To achieve the objective of the study, the following hypothesis will be tested:

H1: there is a relationship between Imports of goods and services and TASI stock market index.

H2: there is a relationship between Foreign direct investment and TASI stock market index.

H3: there is a relationship between GDP and TASI stock market index.

H4: there is a relationship between Inflation and TASI stock market index.

H5: there is a relationship between Exports of goods and services and TASI stock market index.

H6: there is a relationship between Listed domestic companies and TASI stock market index.

H7: there is a relationship between Broad money and TASI stock market index.

Table 1

Economic and financial variables

Variable	Definition
Imports of goods and services (BoP, current US$)	All transactions between residents of a country and the rest of the world involving a change of ownership from nonresidents to residents of general merchandise, nonmonetary gold, and services. Data are in current U.S. dollars
Foreign direct investment, net (BoP, current US$)	Are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows total net FDI
GDP (current US$)	The sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars
Inflation, consumer prices (annual %)	The annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly
Exports of goods and services (current US$)	The value of all goods and other market services provided to the rest of the world
Listed domestic companies, total	Foreign companies which are exclusively listed, are those which have shares listed on an exchange at the end of the year. Investment funds, unit trusts, and companies whose only business goal is to hold shares of other listed companies, such as holding companies and investment companies, regardless of their legal status, are excluded. A company with several classes of shares is counted once. Only companies admitted to listing on the exchange are included
Broad money (current LCU)	The sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper

Source: done by the author depending on World bank data [15].

The correlation is used to show the relationship between the variables. The correlation is a measure of the degree of association (magnitude and sense) between two variables.

According to Hejase and Hejase the standards of the coefficient of correlation (R) are:

0–0.19, then don't even think about a correlation between X and Y [16];

0.2–0.39, then there is weak correlation between X and Y;

0.4–0.59, then there is a moderate correlation between X and Y;

0.6–0.79, then there is a strong correlation between X and Y;

0.8–1, then there is a very strong correlation between X and Y.

If the sign of R is negative, this means that it is a negative relation between X and Y.

If the sign of R is positive, this means it is positive relation.

IV. Research results

A. Descriptive Statistics. Table 2 extracts the descriptive statistics of the variables used in the model. The data belongs to the variables during the period of 2000 to 2018. It is found that average Saudi Stock market index is 6,965.44 SAR with a range of 2,258.29 to 16,712.64.

The mean, minimum, maximum and volatility are show in Table 2.

B. Correlation Analysis. Table 3, represents the association among all variables. This table illustrates that among the financial and economic variables, strong relationships are between IMP-GDP, IMP-EXP, IMP-LD, IMP-BM, GDP-EXP, GDP-LD, GDP-BM, and LD-BM.

Moderate relationships are among: IMP-INF, EXP-INF, EXP-LD, EXP-BM, and INF-FDI.

TASI has a weak positive relationship with IMP, GDP, EXP, and INF, while it holds a weak negative relationship with LD, BM, and FDI.

Table 2

Descriptive statistics

Indexis	N	Minimum	Maximum	Mean	Std. Deviation
IMP	19	47,887,800,000	259,007,000,000	152,131,616,140.36	72,802,226,098.13
GDP	19	184,137,000,000	786,522,000,000	490,566,315,789.47	218,793,765,567.04

End of the Table 2

Indexis	N	Minimum	Maximum	Mean	Std. Deviation
EXP	19	72,980,533,333	399,420,000,000	231,749,901,754.36	107,399,335,856.58
INF	19	−1.12	9.87	2.4004	2.78
LD	17	68	200	133.4118	44.54
BM	18	315,095,000,000	1,810,180,000,000	1,022,548,777,777.77	560,568,463,334.11
FDI	19	−35,958,243,929	18,740,259,934	−7,961,225,039.26	14,225,471,583.31
TASI	19	2,258.29	16,712.64	6,965.44	3,283.06
Valid N (listwise)	16				

Source: done by the author from SPSS output depending on data retrieved from [15].

Where: TASI – Saudi Stock market index;

IMP – imports;

FDI – foreign direct investment;

GDP – gross domestic product;

EXP – exports;

BM – broad money;

INF – inflation;

LD – listed domestic companies.

Table 3

Correlation matrix

	Indexes	IMP	GDP	EXP	INF	LD	BM	FDI	TASI
IMP	Pearson Correlation	1	.967**	.846**	.448	.925**	.947**	−.050	.250
	Sig. (2-tailed)		.000	.000	.054	.000	.000	.838	.302
	N	19	19	19	19	17	18	19	19
GDP	Pearson Correlation	.967**	1	.876**	.382	.949**	.947**	.100	.270
	Sig. (2-tailed)	.000		.000	.107	.000	.000	.684	.263
	N	19	19	19	19	17	18	19	19
EXP	Pearson Correlation	.846**	.876**	1	.628**	.661**	.684**	−.210	.338
	Sig. (2-tailed)	.000	.000		.004	.004	.002	.387	.157
	N	19	19	19	19	17	18	19	19
INF	Pearson Correlation	.448	.382	.628**	1	.161	.230	−.737**	.073
	Sig. (2-tailed)	.054	.107	.004		.538	.358	.000	.767
	N	19	19	19	19	17	18	19	19
LD	Pearson Correlation	.925**	.949**	.661**	.161	1	.976**	.266	−.065
	Sig. (2-tailed)	.000	.000	.004	.538		.000	.302	.804
	N	17	17	17	17	17	16	17	17
BM	Pearson Correlation	.947**	.947**	.684**	.230	.976**	1	.082	.201
	Sig. (2-tailed)	.000	.000	.002	.358	.000		.748	.424
	N	18	18	18	18	16	18	18	18
FDI	Pearson Correlation	−.050	.100	−.210	−.737**	.266	.082	1	−.142
	Sig. (2-tailed)	.838	.684	.387	.000	.302	.748		.563
	N	19	19	19	19	17	18	19	19
TASI	Pearson Correlation	.250	.270	.338	.073	−.065	.201	−.142	1
	Sig. (2-tailed)	.302	.263	.157	.767	.804	.424	.563	
	N	19	19	19	19	17	18	19	19
** Correlation is significant at the 0.01 level (2-tailed).									

Source: done by the author depending on SPSS extracts.

V. Conclusion and implications

A. Conclusion. The study explored the correlation between Imports, Exports, Listed domestic companies, Foreign direct investment, GDP, Broad money, Inflation rate, and Tadawul stock index (TASI).

We can conclude from the study that in general, strong relationships are between IMP-GDP, IMP-EXP, IMP-LD, IMP-BM, GDP-EXP, GDP-LD, GDP-BM, and LD-BM while TASI has weak relationship with the financial and economic variables.

B. Study Limitations. There are several limitations in this study. First, the study shows the correlation of macroeconomic variables and stock market in Saudi Arabia only. The study may be extended to include other GCC countries. Second, the study is limited to the duration between 2000 to 2018. Third, the study covered seven macroeconomic and financial indicators. Fourth, the correlation analysis is used to capture the relationship. Thus, it would be worthwhile to extend the research beyond these limitations.

C. Future Research Suggestions. Extension of the study may overcome the limitations and improve the results. Including other GCC countries in the observations may give better analysis, as GCC countries share a lot of economic and financial characteristics.

Other factors would be added to reflect the relationship between the macroeconomic financial indicators and stock market. These include for instance: oil price, bank credit, market capitalization, and industrial production index. Also, the stock market indices would be classified according to the sectors. Furthermore, other methods may be used to reveal the results as regression or other econometrics methods.

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