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CALCULATING EXPECTED STOCK RETURN USING ARBITRAGE PRICING THEORY MODEL AND ANALYZING INDEPENDENT VARIABLES THAT AFFECT STOCK EXPECTED RETURN (ANALYSIS CONDUCTED ON KOMPAS100 STOCK ISSUERS FOR THE PERIOD 2020 – 2022)

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Abstract: This study aims to determine which variable independent (IHSG, USD exchange, money supply (M2), and inflation) that has the most influence of expected returns using the Arbitrage Pricing Theory Model for selected stock issuers from the KOMPAS100 Index for the period 2020 – 2022. The population in this study are all stock issuers registered as members of the KOMPAS100 Index for the period 2020 – 2022 using a purposive sampling technique to obtain 57 selected stock issuers from the KOMPAS100 Index population for the period 2020 – 2022. Data on stock issuers who are members of the KOMPAS100 Index for the period 2020 – 2022 is taken from the doktorsaham.com website. The monthly stock price data for selected issuers and the monthly JCI stock data are taken from the Investing.com website. Monthly inflation data for the period 2020 - 2022 is taken from the BI.go.id website. Monthly data on the amount of money in circulation (M2) and monthly data on the USD exchange rate for the period 2020 – 2022 are taken from the saturated. kendang.go.id website. Arbitrage Pricing Theory is used to calculate the expected return of a sample of selected stock issuers using the Microsoft Excel application. JASP application is used to test the hypothesis using Linear Regression. The Linear Regression results conclude that inflation has a strong influence on the expected return of selected stock issuers who are members of the KOMPAS100 Index for the period 2020 - 2022, followed by the amount of money in circulation (M2), JCI, and the USD exchange rate which has the lowest influence.

Keywords: Jakarta Composite Index; KOMPAS100; inflation; money supply (M2); USD exchange; Arbitrage Pricing Theory; and Linear Regression.

INTRODUCTION

The early years of the 2020s were a bleak year for economies around the world. In the early 2020s, countries in the world experienced two events that shook their economies, namely the COVID-19 pandemic which caused most countries in the world to lockdown, and caused an economic recession even though it was still in a mild stage because economic growth was still supported by large profits obtained by companies in the technology industry sector, and logistics following the WFH (Work From Home) policy), and many purchases of goods through online stores such as Tokopedia, and Shopee. Governments around the world have also issued capital economic assistance programs to businesses, which are experiencing economic hardship during COVID-19 lockdowns, and low interest rates during the pandemic, causing booming technology companies to get a lot of funds from investors because their yields are higher than yields on bonds and deposits. Low-interest rates also make consumers prefer to buy luxury consumer goods using credit cards or in Indonesia using the services of online loan companies.

The outbreak of the COVID-19 pandemic was declared over at the end of 2021, and many economic observers and government officials around the world expect the world economy to begin to recover in 2022. However, these hopes were dashed following the Russia-Ukraine war on February 24, 2022, which resulted in the imposition of economic sanctions by the United States and its allies on Russia, in the hope that Russia would experience severe economic difficulties, which prompted the fall of Putin's government, and then replaced with a new government that would be pro-western and conclude a peace treaty with Ukraine. At first, everything went according to the plan of the United States and its allies, but in the end, throughout 2022 there was an increase in inflation in western countries due to rising prices of energy, commodities, and foodstuffs which increased interest rates to overcome inflation. This increase in inflation and interest rates is expected to cause a recession in Western countries, reduce demand for consumer products that are mostly imported from developing countries in Asia-Pacific, and consequently will cause economic recessions in developing countries due to reduced demand for their export products. The opposite happened with Russia after experiencing the highest inflation for 4 months, getting durian collapsed after Russia exported the commodity to developing countries in the Asia Pacific despite selling it at a discount.

Indonesia has also experienced negative and positive impacts caused by the COVID-19 pandemic, and the Russian-Ukraine war. The negative impact caused by COVID-19 is the decline in people's economic activities, especially those who do MSME businesses and have to temporarily close their sales places for 5 months due to the lockdown policy implemented by the government. When the government allowed the reopening of street MSME markets and shops in malls throughout Indonesia by implementing strict restrictive policies, the number of

sales was not as much as before the COVID-19 pandemic which resulted in many MSME businesses closing. The government conducted a monthly direct cash transfer program to MSME businesses during the lockdown period, and this program helped reduce the number of MSME businesses that closed. Another negative impact is due to declining demand for products, causing companies to reduce business expenses by laying off employees with deducted salaries, asking employees to resign voluntarily, and dismissing employees directly with severance pay. The positive impact of COVID-19 is the increasing number of Indonesians registering as investors on the Indonesia Stock Exchange, and the lockdown policy has helped increase the profits of online marketplace companies such as Tokopedia, and logistics companies that get delivery orders for goods sold on online marketplaces.

The negative impact of the Russia-Ukraine war on the Indonesian economy is the increasing cost of imported products from abroad due to the decline in the value of the Rupiah against the US $ due to the Fed's policy of raising the benchmark interest rate making storing funds in the Fed's Treasury more profitable than storing funds in Indonesia. The victims of the US$ exchange rate increase against Rp were the increase in subsidized fuel prices in Indonesia at the end of last year which helped increase inflation in Indonesia, and to help the poor due to the increase in subsidized fuel, the government reissued a BLT policy of Rp 600,000.00 / month. Another negative impact is that JCI often falls because foreign investors prefer to sell their shares on the IDX, and move these funds to foreign Stock Exchanges that provide more profitable returns. The increase in the exchange rate of US$ against Rp, rising inflation, and rising commodities in the world market caused the share prices of several issuers to fall, such as Barito Pacific (BRPT), Bank Jago (ARTO), Gojek Tokopedia (GOTO), and Tower Bersama Infrastructure (TBIG). The positive impact of the Russia-Ukraine war is that rising prices of mining commodities such as coal, natural gas, and nickel have collapsed for mining companies in Indonesia that reported an increase in net profits and provided high returns for investors. Other profitable companies are companies that provide mining equipment such as United Tractors which has increased profits from leasing mining equipment to its clients.

This research was conducted to determine the returns provided by stock issuers during COVID-19 and the Russia-Ukraine war which is still ongoing today. The calculation model used is Arbitrage Pricing Theory. The reason for using the Arbitrage Pricing Theory model is that this calculation model includes external factors, namely macroeconomic conditions in its calculations. The issuers used in this study are issuers listed as members of the KOMPAS100 Index from 2020 – 2022. The reason for choosing KOMPAS100 is because KOMPAS100 measures the level of the market capitalization of an issuer on the Indonesia Stock Exchange, and the number of index members totaling 100 issuers makes this index a wider spectrum of industrial sectors assessed than the LQ-45

Index.

The research was conducted by (Gusni &; Suskim Riantani, 2017) who researched the use of Arbitrage Pricing Theory to analyze Islamic stock returns from the period 2009 - 2014 with a regression model approach in the eviews9 application. The results of the model test found that there is a linear relationship between macroeconomic variables (inflation, exchange rates, and interest rates) and stock return variables. The hypothesis test results show that only variable interest rates hurt stock returns. Meanwhile, inflation and exchange rates do not affect the return of Islamic stocks incorporated in JII.

The research was conducted by Elly Zunara and Sri Hartoyo (2016) who conducted research on the influence of macroeconomic factors on stock return and risk premium using the Arbitrage Pricing Theory model on 90 selected stocks on the Indonesia Stock Exchange from January 2009 to December 2013. The observations from January 2009 – December 2013 found that beta inflation and price had a negative and significant influence on the expected return of the majority of selected shares. As the beta exchange rate of US Dollars has a positive and insignificant influence on the expected return of the majority of selected stocks

MATERIALS AND METHODS

This research is a type of quantitative research, which is research that uses calculations to obtain research results. The type of data in this study is secondary data, which is data obtained from a second party that obtains, compiles, and publishes raw data from the first party. Stock price data and JCI data are obtained from the Investing.com website, data on stock issuers included in KOMPAS100 members from 2020 - 2022 are obtained from the doktersaham.com website, inflation data is obtained from the BI.go.id site, USD exchange rate data, and the amount of money in circulation is obtained from the saturated. kendang.go.id site and bond data is obtained from the KSEI website.

The data collection method is carried out by collecting data from the internet (JCI, stock prices of selected KOMPAS100 issuers, inflation, USD exchange rates, money supply, bonds, and previous research articles), and through books on the Arbitrage Pricing Theory model, investment, capital markets, and macroeconomic variables that are used as objects in this study (inflation, currency exchange rates, and money supply). Monthly data include data on selected stocks, JCI, inflation, USD exchange rate, and the amount of money in circulation. The bond coupons taken come from the Indonesian Retail National Bond with the FR0042 series and are then divided by 12 months to get a monthly coupon for ORI with the FR0042 series. The population in this study is all stock issuers that are members of KOMPAS100 from 2020 – 2022. Evaluation and replacement of members in the KOMPAS100 index are carried out every 6 months, meaning that in a year there are twice (February – July, and August – January), and because the calculation is carried out annually, it is not calculated from the whole year. So, I decided to use KOMPAS100 issuer member data in the period February 2020 – July 2020, August

2020 – January 2021, February 2021 – July 2021, August 2021 – January 2022, February 2022 – July 2022, and August 2022 – January 2023. The sampling method in this study uses the purposive sampling method by determining the sample criteria of this study.

RESULTS AND DISCUSSION

A. JCI Beta Calculation Results, Inflation Beta, Money Supply Beta (M2), and US Dollar Exchange Rate Beta

The table below displays the results of the calculation of beta inflation, the beta of JCI, the beta of money supply (M2), and the beta of the US Dollar exchange rate as follows:

Table 1. Beta Inflation, beta JCI, Beta Money Supply (M2), and Beta US Dollar Exchange Rate

Issuer Name	bM	bk	bM2	bi
AALI	1.45152	-1.47195	0.9728	-0.0594
ACES	-0.02529	-1.38969	0.3304	-0.0518
CHURCHYARD	1.09717	-0.77458	3.7776	0.3242
ACRA	1.83789	-0.05695	0.5987	0.2010
ANTM	3.30263	1.47299	-0.3502	-0.2104
ASIA	0.92087	-1.41164	1.9570	0.0785
ASSA	2.36720	0.77000	-2.0686	-0.4250
BBCA	1.18837	0.54979	-0.1309	0.0026
BBNI	1.85193	-0.72015	-0.1778	0.1697
BBRI	1.27871	-0.44608	0.8795	0.0425
BBTN	2.58493	-0.25473	-0.9747	-0.0675
BMRI	1.36502	-0.30527	0.1697	0.0738
BRPT	0.80965	-1.78358	-3.1127	-0.0142
BSDE	1.29808	-0.83260	0.3459	0.1220
BTPS	1.19892	-1.75457	1.6154	-0.2693
CPIN	0.37771	-0.49746	1.0444	-0.0981
CTRA	1.91030	-1.03606	0.1323	-0.0257
ELSA	2.11318	-0.20845	-0.7166	-0.1056
ERAA	0.73771	-1.45117	-0.8203	-0.3133
EXCL	0.58608	-1.95732	1.2619	0.1870
GGRM	0.30959	-0.77112	0.3885	-0.2159
HMSP	0.57989	-0.79383	1.0309	-0.0856
ICBP	0.10480	0.36778	-0.4457	-0.0161
INCO	2.01004	0.70085	-0.3709	-0.0516
INDF	0.20377	-0.14722	0.2796	-0.0150
INDY	3.71970	3.10947	-2.2046	0.0917

INKP	1.45594	0.16891	-2.3752	-0.3228
INTP	0.82910	-0.88024	2.4085	0.1191
ITMG	1.94077	0.38909	0.5115	0.2290
JPFA	0.52438	-1.34307	-0.4307	-0.0031
JSMR	0.44424	-2.87898	1.0057	0.1337
KLBF	0.42505	0.01063	0.0716	-0.0622
LPKR	1.47570	-2.00904	0.8438	0.0018
LPPF	1.27933	-2.45728	3.4722	0.2493
LSIP	2.38318	1.76812	-0.3428	-0.0322
MAPI	0.93503	-2.18996	-0.3397	0.0894
MDKA	1.29361	-0.52318	0.5185	-0.0887
MEDC	2.27715	0.09115	-1.0958	-0.0431
MIKA	0.13853	-0.49447	0.6952	0.0470
MNCN	1.62206	-0.36673	0.0879	0.1244
PGAS	2.93464	0.38399	-0.3445	-0.0358
PTBA	1.62526	1.43253	0.1421	0.1929
PTPP	2.57262	-0.94379	-0.4782	0.0148
PWON	1.37805	-1.05495	-0.6639	0.0558
SCMA	1.32029	-1.05695	0.5124	-0.0507
BEEN	0.51786	0.60449	-0.5757	-0.0057
SMGR	0.60350	-1.51248	1.4350	-0.0575
SMRA	1.44574	-1.57599	0.6678	-0.0834
TBIG	0.34789	-0.13394	-2.8610	-0.2451
TINS	3.48775	1.92408	-1.8329	-0.2147
TKIM	2.86755	1.65090	-3.8501	-0.2948
TLKM	1.24585	0.42109	-0.6582	0.1443
TOWR	0.35171	-0.57466	-1.7941	-0.1541
TPIA	0.83183	-0.70884	-3.3834	-0.1914
UNTR	1.70098	1.73120	-0.0542	0.0587
UNVR	0.33953	0.58549	-0.8620	0.0072
WSKT	2.49876	-1.10547	-0.9994	0.0688

Source: Data processed by researchers

B. Total Expected Return of KOMPAS100 Shares for the 2020 - 2022 Period Selected Based on Calculation Results Using Arbitrage Pricing Theory

Table 2. Total Expected Return of KOMPAS100 Shares for the 2020 – 2022 Period

Issuer Name	Total APT
AALI	0.27405
ACES	0.51570

CHURCHYARD	0.57155
ACRA	0.14093
ANTM	-0.69419
ASIA	0.48518
ASSA	-0.60710
BBCA	-0.00150
BBNI	0.20424
BBRI	0.20402
BBTN	-0.19506
BMRI	0.16663
BRPT	0.35732
BSDE	0.30504
BTPS	0.23821
CPIN	0.28251
CTRA	0.11803
ELSA	-0.13632
ERAA	0.17126
EXCL	0.69267
GGRM	0.23901
HMSP	0.30330
ICBP	0.20343
INCO	-0.22069
INDF	0.29239
INDY	-0.88277
INKP	-0.27898
INTP	0.45505
ITMG	0.06539
JPFA	0.42053
JSMR	0.82663
KLBF	0.18697
LPKR	0.39793
LPPF	0.75636
LSIP	-0.45109
MAPI	0.55376
MDKA	0.11188
MEDC	-0.18284
MIKA	0.41710
MNCN	0.16327
PGAS	-0.32432

PTBA	-0.08619
PTPP	-0.00672
PWON	0.25217
SCMA	0.22202
BEEN	0.09271
SMGR	0.44943
SMRA	0.26686
TBIG	0.01311
TINS	-0.84806
TKIM	-0.80373
TLKM	0.09355
TOWR	0.17969
TPIA	0.04325
UNTR	-0.24910
UNVR	0.12914
WSKT	0.05649

Source: Researchers' preparations

C. Linear Regression Results using JASP to Determine the Independent Variables (JCI, USD Exchange Rate, Inflation, and Money Supply (M2)) that Most Affect the Dependent Variable (Expected Return of Shares) for the 2020 – 2022 Period

The table below displays the Linear Regression results of all selected stocks from the KOMPAS100 Index for the period 2020 – 2022.

Table 3. Linear Regression Period 2020 - 2022

Model Summary - Total APT

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	0.391
H_1	0.496	0.246	0.148	0.361

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	1.318	4	0.329	2.524	0.061
	Residual	4.046	31	0.131		
	Total	5.364	35			

ANOVA

Model	Sum of Squares	df	Mean Square	F	p

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p	95% CI Lower	95% CI Upper
H_0	(Intercept)	0.166	0.065		2.538	0.016	0.033	0.298
H_1	(Intercept)	0.153	0.066		2.326	0.027	0.019	0.288
	JCI	-1.999	1.904	-0.245	-1.050	0.302	-5.882	1.884
	USD course	1.835	3.179	0.153	0.577	0.568	-4.648	8.319
	M2	-5.462	4.176	-0.248	-1.308	0.201	-13.979	3.055
	Inflation	0.770	0.476	0.260	1.617	0.116	-0.201	1.741

The Summary Model Table gives the results of R, R 2, and Adjusted R^2 values respectively 0.496, 0.246, and 0.148. The meaning of each of the values mentioned earlier is, the value of R = 0.496 (49.6%) shows that the independent variables (JCI, USD exchange rate, money supply (M2), and inflation), have a correlation of 49.6% with the dependent variable (expected return). The value of R^2 = 0.246 (24.6%) indicates that the independent variables (JCI, USD exchange rate, money supply (M2), and inflation) can only explain the 24.6% variance of the dependent variable (expected return). The value of Adjusted R 2 = 0.148 (14.8%) shows that the independent variables (JCI, USD exchange rate, money supply (M2), and inflation) can only explain 14.8% of the variance of the dependent variable (expected return) after adjustment to R^2.

ANOVA table. It was found that the calculated F value of 2.524 had a slight difference in value from the table F value of 2.679 with α = 0.05, df1 = 4, and df2 = 31. The value of ρ-value = 0.061 is smaller than the α value used in this study, which is 0.050. The calculated F value and ρ-value are so thin the difference in value with the F table and α, shows that the independent variables (JCI, USD exchange rate, money supply (M20, and inflation) have little influence on the dependent variable (expected return).

The Coefficient table shows the t value and coefficient value of each independent variable (JCI, USD exchange rate, money supply (M2), and inflation) against the dependent variable (expected return). Based on the value of t above, it can be concluded that inflation strongly influences the formation of an expected return of 1,617, followed by the money supply (M2) of -1,308, JCI of -1,050, and finally the USD exchange rate of 0.577. The results of the t value of each independent variable support the third hypothesis (H_3) which states that there are one or two macroeconomic

variables that have a stronger influence than JCI, but there are one or two macroeconomic variables that have a lower influence than JCI. The regression formula is based on unstandardized standard values as follows:

$$Y = 0.153 - 1.999X_2 + 1.835X_2 - 5.462X_3 + 0.770X_4$$

The interpretation of the above formula is:

1. Constant (a)

It means that if all values of the independent variable are 0, then the value of the dependent variable (expected return) is equal to the value of the constant, which is 0.153.

2. JCI (X_1) to Y (expected return)

A negative JCI coefficient value indicates that there is a negative relationship between JCI and expected return. This means that every increase in one unit of JCI will cause the expected return to decrease by 1,999 assuming other independent variables from the regression model are assumed to be fixed.

3. Exchange rate USD (X_2) to Y (expected return)

A positive USD exchange rate coefficient value indicates that there is a positive relationship between the USD exchange rate and expected return. This means that every increase of one unit of the USD exchange rate will cause the expected return to increase by 1,835 assuming the other independent variables of the regression model are assumed to be fixed.

4. Money supply (M2) (X_3) to Y (expected return)

The negative value of the money supply coefficient (M2) indicates that there is a negative relationship between the money supply (M2) and the expected return. This means that every increase of one unit of money supply (M2) will cause the expected return to decrease by 5.462 assuming the other independent variables of the regression model are assumed to be fixed.

5. Inflation (X_4) to Y (expected return)

A positive inflation coefficient value indicates that there is a positive relationship between inflation and expected return. This means that every increase in one unit of inflation will cause the expected return to increase by 0.770 assuming the other independent variables of the regression model are assumed to be fixed.

Discussion

This study was conducted to determine the independent variables (JCI, USD exchange rate, money supply (M2), and inflation) that most influence the formation of expected returns of selected stock issuers from the KOMPAS100 Index for the 2020-2022 period. The results of the research above can explain as follows:

The results show that inflation has a major influence on the expected return of selected stock issuers of the KOMPAS100 Index for the 2020-2022 period. Most of the selected stock issuers from the KOMPAS100 Index in this study focus on domestic business, and the products sold by some of these issuers are inflation-sensitive products, such as SMRA, PWON, CTRA, BSDE, LPKR, WSKT, JSMR, and PTPP which focus on property and infrastructure

development in Indonesia such as houses, apartments, and toll roads that are paid using rupiah currency. If inflation increases, the issuers mentioned above will have to increase the price of the real estate they sell due to the increase in the price of building raw materials, and companies such as WSKT, and JSMR will have to increase toll road entrance fees to their users due to the increase in toll road maintenance costs due to inflation.

Issuers such as SMGR, and INTP, which are cement-producing companies in Indonesia, have high sensitivity to rising inflation. Inflation will directly result in a decrease in the value of the IDR currency against the USD currency which is often done in energy purchase contracts for the cement plants they operate. The main market share of SMGR, and INTP is the domestic market and they accept it in the form of Rp, and if there is an increase in inflation which is then followed by a decrease in the value of the IDR currency against the USD currency causes these two issuers to have to increase their cement prices to prevent losses if they insist on using the same price as before the increase in inflation.

Other issuers such as GGRM, and HMSP whose main business is to sell cigarette products that face cigarette excise duty increases every year, are also sensitive to rising inflation which will lead to higher prices of cigarette raw materials and increase cigarette prices if they do not stimulate will divert consumers to cheaper cigarette products. Issuers such as UNVR, INDF, MAPI, ICBP, LPPF, and JPFA sell processed food products, clothing, and other consumerist products, when there is an increase in inflation, these companies have two choices, increase the price or reduce the content of the products they sell to maintain the price of their products at the same price. For ICBP issuers that sell instant noodle products that have been considered as one of the staple foods, the choice is to increase product prices due to the increase in prices of wheat staples imported from abroad. MAPI issuers and LPPFs that have clothing-selling business lines will experience a decrease in the number of sales during times of rising inflation because consumers prefer to buy necessities rather than buy clothes. MAPI issuers that sell foreign branded products to the upper middle class, do not experience a decline in sales when inflation only rises 0.5-1% per year, but they will experience a decline in sales when inflation rises above 1% per year because consumers of its target market prefer to keep their money in deposits or other securities to protect their wealth.

Issuers such as ADRO, ANTM, INCO, MEDC, MDKA, PTBA, PGAS, ITMG, and TINS have the resilience to inflation because they sell mining products such as coal, oil and gas, tin, nickel, bauxite which they usually enter into sale and purchase contracts using USD both with business partners abroad and domestically. The USD currency is higher than the Rp, causing their income derived from the export of mining materials which is valued in USD to protect them from the increase in production costs, and labor costs which are valued in Rp.

The relationship between inflation and the money supply (M2), USD exchange rate,

and JCI can be explained as follows: High inflation will cause the money supply (M2) to increase, due to rising prices, people need more money when buying a product than in the previous year. Inflation will decrease the currency's value, resulting in the value of other currencies such as the USD higher than the previous year. Inflation if it cannot be controlled in one quarter or one year will result in a loss of confidence of foreign investors in the country's economic condition and they will attract investment on the Indonesia Stock Exchange which will result in local retail investors panicking so the value of JCI will drop dramatically.

CONCLUSIONS

The conclusions that can be obtained from this study are:

a. 57 stock issuers are consistently included as members of the KOMPAS100 Index for the 2020-2022 period.
b. Inflation has a major influence on the *expected return* of KOMPAS100 Index stock issuers for the 2020-2022 period.

The USD exchange rate weakly influences the *expected return* of KOMPAS100 Index stock issuers for the 2020-2022 period.

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