

# The Analysis of Profitability and Macroeconomic Variables Affecting to the Stock Prices in Indonesia: An Approach of Error Correction Models (ECM) (A Case Study in the Retail Trade Subsector Listed on the Indonesia Stock Exchange for the 2010-2019 Period)

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## Abstract

*This study aims to analyze the effect, both in the short and long term, of profitability and macroeconomic variables on stock prices in the retail trade subsector in Indonesia. Return on equity (ROA) and earning per share (EPS) are proxies for profitability, while exchange rate (ER) and inflation (IFL) are proxies for macroeconomic variables. The data is only stationary in the first difference and has a cointegration relationship between variables so that the short-run balance is seen using Error Correction Model (ECM) analysis. This research uses panel data from 1999 to 2019. The results of the data test show that both in the long term and in the short term the effect on stock prices is earnings per share (EPS). Meanwhile, return on assets (ROA), exchange rate (ER), and inflation (IFL) have no effect on stock prices.*

**Keywords:** stock price; profitability; macroeconomic variables; ECM.

## INTRODUCTION

The sub-sector of retail trade is a rapidly evolving industry, with heavy competition and a very significant role in the Indonesian economy. This shows that shares in the retail trade sub-sector are able to survive amid the rising and falling share prices that occur in the midst of this unpredictable global economic situation, so that this sub-sector must really set the right strategy for sustaining its market. Changes in shopping patterns that move to the online world, decreasing people's buying power and preparing goods according to customer preferences are the problems that occur in this sub-sector. Researchers are also interested in using data from retail trading sub-sector companies by looking at the financial results of the firm so that it can influence stock prices, which would also impact the interest of investors in making decisions about whether or not to invest their shares.

One of the significant components of a free market economy is the stock market. In developing and developed countries, it plays an important role in the mobilization of capital that contributes to economic growth. The stock market is affected by a number of factors that number from a nation's economic, political, and socio-cultural conduct. In particular, stock markets in emerging economies appear to be vulnerable to shifts in macroeconomic fundamentals, systems and policies that play an important role in achieving financial stability. Economists, financial analysts, investors, practitioners, and policy makers have become concerned about the complex relationship between macroeconomic variables and stock prices (Allahawiah & Al-Amro, 2012). Much attention has been drawn to the relationship between stock prices and financial ratios.

Financial literature and accounting. In general, by investing in stocks, shareholders seek to achieve capital gains through increasing the value of shares. In order to optimize profits, investors will benefit from financial ratios, which are undoubtedly included in the decision-making process on behalf of the correct investment policy being pursued. The profitability ratio is one of the financial ratios that can be an indicator of investors making a choice for the shares they are going to invest in based on financial reports (Shower and Al-Ajlouni, 2018).

Profits are the economic justification for a firm's survival. Theories of financial management conclude that the key purpose that business management must pursue is to optimize shareholder capital (Rosikah, Azis, 2018).

It is a good idea for investors to analyze stock markets first before an investor spends, since stock price fluctuations cannot be forecast with certainty. Investors need to know what sort of stock price to purchase. There are several factors, namely internal factors and external factors, that can influence stock prices. Internal factors or it can also be said that fundamental factors, namely microeconomic performance factors affecting stock exchange operation, can typically be handled by each firm, such as: profitability, liquidity, solvency (Haque & Faruquee, 2013).

External factors include factors influencing the operation of stock exchanges arising from macroeconomic results and other factors beyond the context of economic problems. External factors include factors that businesses, such as inflation, interest rates, exchange rates, economic development, political circumstances, stability, etc., cannot regulate (Demir, 2019).

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Stock prices in the retail trade sub-sector industry listed on the Indonesian Stock Exchange also fluctuated alongside the growth of the economy, as well as internal profitability factors (return on assets, earnings per share) and external macroeconomic variables (exchange rate of value, inflation) fluctuated, as can be seen in Table 1.

Table 1. Stock Prices (SP), Return On Assets (ROA), Earning Per Share (EPS), Exchange Rate (ER), Inflation (IFL) Retail Trade Subsector 2014-2019 Period

Year	SP	ROA	EPS	ER	IFL
2014	748.2	7.21	71.68	12440	6.42
2015	1742.67	5.66	61.84	13795	6.38
2016	1619.87	-4.92	64.73	13436	3.53
2017	1212.13	1.65	54.35	13548	3.81
2018	1081.20	4.03	35.32	14481	3.2
2019	577.10	4.36	59.49	13901	3.11

Sources: BEI, BI

In Table 1, it can be seen that the share price of the retail trade subsector has fluctuated each year, but the trend has decreased between 2014 and 2019. From 2014 to 2016, the ROA value decreased so that the stock price decreased in the same time as well, but it rose from 2016 to 2018, but share prices have decreased. The pattern also decreased for the EPS value, but EPS decreased from 2014 to 2015, but SP experienced an increase, and EPS experienced an increase from 2018 to 2019, but SP experienced a decrease.

The relationship between macroeconomic variables and stock prices in the retail trade subsector shows that the trend of the rupiah exchange rate against the US dollar decreased as well as the inflation rate decreased in the period from 2014 to 2019, accompanied by a decrease in the trend of share prices.

Centered on the Data Table Description 1, there is a difference between stock prices and profitability and macroeconomic variables, so the authors will analyze whether there is an effect on stock prices, both in the short and long term, between profitability and macroeconomic variables.

There are many hypotheses and empirical studies, both internal factors (profitability, liquidity, solvency) and external factors / macroeconomic variables (exchange rates, interest rates, inflation, economic growth, supply of capital, etc.), on factors that can influence stock prices. Analysis can be explained as follows on the relationship between stock prices and internal factors and external factors or macroeconomic variables:

Thuy Chu (2020) clarifies the effect on share prices in Vietnam of internal factors (liquidity, profitability, solvency, dividend policy, firm size) and external factors (economic growth, inflation, interest rates and money supply) using linma-year panel data. The findings showed that the policy of dividends, business size, inflation, and supply of capital have an effect on stock prices.

This research, Asuil Alaagam (2019) aims to investigate whether, using panel data using an autoregressive distributed lag model, there is a relationship between profitability as measured by asset return, return on equity, and net profit margin with the stock market price in Saudi Arabia (ARDL). The findings obtained show that there is no association between profitability and stock prices in the long run, but that it has a positive impact on stock prices in the short term.

Chu Thi Thu Thuy (2018) analyzes the impact on share prices in Vietnam of internal and external variables. Liquidity, solvency, profitability, dividend paid, foreign ownership ratio, and size of the company are internal considerations. Economic growth, inflation, interest rates and the provision of liquidity are external influences. By using panel data and the effects, it is shown that inflation and money supply are the factors influencing stock prices for external factors, whereas dividends, business size, and foreign ownership ratio are for internal factors.

Ho, Yu-Sin; Odhiambo (2018), investigates the effect on the production of the Philippine stock market price of changes in the inflation rate, exchange rate, economic growth, trade transparency and stock market liquidity. Using the ARDL model, it can be inferred that long-term trade openness has a negative effect on the growth of the Philippine stock market, while the exchange rate has a positive impact on the Philippine stock market in the short term.

In Aty Herawati, Angger Setiadi Putra (2018), the purpose of this study is to determine the effect on stock prices in the food and beverage industry using panel data of fundamental factors such as debt equity ratio, return on assets, current ratio, price earning ratio, and total asset turnover. The findings concluded that return on assets and total asset turnover were the fundamental factors influencing stock prices.

By using panel data, Shakeel Muhammad (2018) explores the effect of fundamental factors (liquidity, profitability, solvency) on stock prices in Pakistan, the results obtained show that key factors influence stock prices and can evaluate forecasts of potential stock price gains.

The results show that exchange rates have a positive impact. Vikram Megaravalli, Gabriele Sampagnaro (2018) whose study aims to investigate the long-term and short-term relationship between macroeconomic variables (exchange rates, inflation) and stock prices of India, China, and Japan using time series data. Meanwhile, inflation has a detrimental impact on asset prices in the long run. Neither the exchange rate nor inflation would impact stock prices in the short term.

Aty Herawati, Angger Setiadi Putra (2018) uses panel data to analyze the effect of fundamental factors such as debt equity ratio, return on assets, current ratio, price earning ratio, total assets turnover to stock prices and the results show that return on assets and total assets Turnover has an impact on stock prices, while other factors (debt equity ratio, current ratio, price earning ratio).

Maryyam Anwaar (2017) explores the effect of the success of a company (earning per share, rapid ratio, return on assets, return on equity, net profit margin, stock return) using panel data on stock prices. The findings obtained are that the net profit margin, the return on assets have a positive impact on stock prices, while stock prices have a negative impact on earnings per share, the return on equity and the rapid ratio have no effect on stock prices.

The effect of earnings per share on the stock price of cases in South Africa was analyzed by Natasha Robbette et al. (2017), and the results showed that EPS correlates with stock prices.

Robert D. Gay, Jr., Nova (2016), Used time series data to analyze the relationship between macroeconomic variables, namely the exchange rate and oil prices on stock prices in the USA, and the test results concluded that neither exchange value nor oil price had any impact on prices. Stock.

The effect of Dividend Policy, Earnings per Share, Return on Equity, Profit after Tax on Stock Prices was examined by Hunjra, Ijaz (2014). The test results concluded that the dividend had a negative impact on stock prices, that the after-tax profit and the earnings per share had a positive impact on stock prices, while the return on equity had no effect on stock prices.

Examining whether macroeconomic variables influence stock market performance as calculated by the stock price index, macroeconomic variables are assessed by real gross domestic product, consumer price index, private sector credit and interest rates (Ahmad, 2014). By using the model for vector error correction (VECM). The findings showed that between macroeconomic variables and stock prices there was a long-term effect. There is a two-way relationship between private sector loans and stock prices, and another inference is that the stock price often increases as the interest rate rises.

Ahmed Sadek Yousuf (2013) analyzed the effect of macroeconomic variables on Bangladesh's stock market prices, using time series data, the macroeconomic variables he studied were interest rates, exchange rates, consumer price index, oil prices, and money supply. The findings suggest that the interest rate, oil price and money supply have a positive relationship with stock prices, while the exchange rate has a positive relationship with the vector error correction model (VECM), impulse response functions (IRF) and variance decomposition (VDC) analysis. Which, for the stock price, is negative. In the long run, macroeconomic vector shocks, meanwhile, just marginally justify the variance in stock prices.

The relationship between return per share and stock prices in Iran was examined by Vahid Shabani et al. (2013), and the results showed that earnings per share had a positive relationship with stock prices.

Mohamed Asmy et al. (2009), using error correction model (ECM) analysis, variance decomposition, explores the short and long-term relationship between the Kuala Lumpur composite index and macroeconomic variables consisting of: inflation, money supply, and exchange rates before and after the economic crisis, and the role of impulse response. The results indicate that the composite index is affected significantly by inflation, money supply and exchange rates.

Chi-Wei Su et al. (2008) Study on the complex relationship of four macroeconomic variables with prices (consumer price index, producer price index, exchange rate and interest rate). The results of this study show that there is a clear cointegration between macroeconomic variables and stock prices in stocks in Pakistan using cointegration and granger causality tests, the analytical model used is error correction models where in the long run there is a two-way relationship between macroeconomic variables and stock prices excluding the index of consumer prices. Another inference is that stock prices in the short term are influenced by the interest rate.

## **METHOD**

This research uses independent variable data, namely: return on assets and earnings per share as proxies of internal company factors, and as proxies of external factors (macroeconomic variables), exchange rates and inflation rates.

The model used is:  $LNSP_t = f(\text{ROA}, \text{LNEPS}, \text{LNER}, \text{IFL})$ .

LNSP = Stock Prices (In natural logarithms)

ROA = Return on Asset

LNEPS = Earning Per Share (In natural logarithms)

LNER = Exchange Rate (In natural logarithms)

IFL = Inflation

The data used in this analysis are secondary data based on panel data from 14 companies listed on the Indonesian Stock Exchange in the retail trade subsector from 2010 to 2019. Secondary data sources from Bank Indonesia and the Indonesian Stock Exchange were collected.

Using the unit root test, the data features will be checked. To determine whether the data is stationary or not, the unit root test is required, namely through the PP Fisher test. The unit root test results would state if the data is stationary at the level or stationary at the first difference, if the data is stationary at the first difference, then by conducting a cointegration test, it must be verified if the data has a relationship between variables. If the model used is the Error Correction

Model (ECM), if there is cointegration, a cointegration relationship can be seen as a long-term (equilibrium) relationship, but short-term imbalance is suspected.

The Pedroni and Kao methods (which use the simple Engle-Granger cointegration test) and the combined person test (Fisher / Johansen) are methods that can be used to perform cointegration tests.

The FMOLS (Fully Modified Ordinary Least Square) panel is then analyzed to assess the long-term effect between the dependent and independent variables after obtaining the results of the cointegration test. Popular models (Pedroni, 2000) of FMOLS panels:

$$Y_{it} = \alpha_i + \beta_i X_{it} + \mu_{it}, \text{ with } X_{it} = X_{it-1} + \varepsilon_{it}$$

The Error Correction Model (ECM) is a model used for evaluating short-term relationships. If the variable has a long-term relationship (cointegration exists), it is presumed that the variable does not have a balance relationship in the short term, then it is important to correct the model in the short term by using the residuals obtained from the previous stage so that the variables can return to long-term equilibrium in the process. An ECM panel's general model can be written with the following equation:

$$\Delta Y_{it} = \beta_0 + \beta_1 \Delta X_{1it} + \beta_2 \Delta X_{2it} + \beta_3 ECT_{it-1} + \varepsilon_{it}$$

If the difference is  $\Delta$ , Y is the dependent variable, X is the independent variable,  $\beta$  is the independent variable's slope, ECT is the correction of errors or salvage lag 1. From the initial equation, the error or salvage is  $\varepsilon$ , the person and time are i and t.

Research hypothesis:

1. Profitability (return on assets, earnings per share) and macroeconomic variables (exchange rate, inflation) have an effect on the long-term stock price of the retail trading subsector of the Indonesian stock exchange.
2. Profitability (return on assets, earnings per share) and macroeconomic variables (exchange rate, inflation) influence the short-term stock price of the Retail Trade Subsector Industry on the Indonesian Stock Exchange.

## RESULTS AND DISCUSSION

The test starts with the stationarity test of the data, which is to see whether or not the data is stationary. Using the ADF test, the data stationary test used the unit root test.

Table 2. The Results of Unit Root Test on Panel Data

Var.	Prob. At a level				Prob. First difference			
	LLC	PS	ADF	PP-fisher	LLC	PS	ADF	PP-fisher
LNSP	0.000	0.234	0.213	0.048	0.000	0.000	0.000	0.000
ROA	0.899	0.716	0.886	0.002	0.045	0.031	0.026	0.000
LNEPS	0.999	0.999	1.000	0.999	0.017	0.046	0.009	0.000
LNER	0.847	0.679	0.944	0.178	0.000	0.049	0.046	0.000
IFL	0.983	0.522	0.366	0.000	0.000	0.026	0.000	0.000

Sources : result of data processing

Table 2 shows that the return on assets (ROA), inflation (INF) and stock price (SP) variables from the root test with the PP-fisher test are stationary at the level, while all variables LNSP,

ROA, LNEPS, LNER, IFL are not stationary at the level but stationary in the first difference with the results showing that the likelihood value of all variables is less than 5 percent. A cointegration test is required after performing the stationarity test to see if there is a long-term relationship between variables or not. The results of the Cointegration Test for Pedroni are as follows:

**Table 3. The result of Pedroni Cointegration Test**

Pedroni Residual Cointegration Test				
Series: LNSP ROA LNEPS LNER IFL				
Sample: 2009 2019				
Newey-West automatic bandwidth selection and Bartlett kernel				
Alternative hypothesis: common AR coefs. (within-dimension)				
	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-1.724920	0.9577	-1.750457	0.9600
Panel rho-Statistic	2.390150	0.9916	2.583498	0.9951
Panel PP-Statistic	-11.14239	0.0000	-6.028645	0.0000
Panel ADF-Statistic	1.976390	0.9759	-0.458800	0.3232

Sources : result of data processing

It shows that the findings of the PP-Statistic Panel test at the 5 percent real level reject the null hypothesis (no cointegration) based on Table 3, which means that the variables used in this analysis will be co-integrated. The results of the cointegration test concluded that, confirmed by the results of the cointegration test, all the variables in it will co-integrate with each other, as shown in the following table:

**Table 4. The result of Kao Cointegration Test**

Kao Residual Cointegration Test				
Series: LNSP ROA LNEPS LNER IFL				
Sample: 2009 2019				
Null Hypothesis: No cointegration				
Newey-West automatic bandwidth selection and Bartlett kernel				
		t-Statistic	Prob.	
ADF		-1.703930	0.0442	
Residual variance		1.318288		
HAC variance		1.148058		

Sources : result of data processing

It can be shown in Table 4 that the likelihood is 0.0442, which implies significant at the real level of 5 percent, which means denying the null hypothesis that there is no cointegration. This means that there is a long-term equilibrium, and the long-term regression data processing method uses the FMOLS (Fully Modified Least Squares) panel method, with the following results:

**Tabel 5. The Result of Long Run Regression**

Dependent Variable: LNSP				
Method: Panel Fully Modified Least Squares (FMOLS)				
Cointegrating equation deterministic: C				
Long-run covariance estimates (Quadratic-Spectral kernel, Andrews bandwidth)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROA	-0.416115	0.231857	-1.794704	0.0768
LNEPS	0.546058	0.247253	2.208496	0.0303
LNER	-0.620221	0.694199	-0.893434	0.3745
IFL	-0.058523	0.331670	-0.176451	0.8604
R-squared	0.416895	Mean dependent var	6.871004	
Adjusted R-squared	0.251419	S.D. dependent var	1.068566	
S.E. of regression	0.924529	Sum squared resid	63.25182	
Long-run variance	0.638924			

Sources : result of data processing

Only the LNEPS (Earnings Per Share) variable has a major effect on LNSP (Stock Prices) based on the effects of the long-term regression with a likelihood value of 0.0303 below the 5 % significant level and a positive trend with a coefficient of 0.546. This coefficient means that if the value of earnings per share increases by one percent, the value of the share price will rise by 0.54 percent in the long run. And vice versa, if one percent of the value of earnings per share decreases, the value of the stock price will decline by 0.54 percent.

In the long run, Return on Asset (ROA) only affects the stock prices (LNSP) vector at the confidence level of 92 percent or important at the level of 8 percent with a coefficient of -0.416, which means that the SP value will decrease by 0.416 percent as ROA rises by one percent. Conversely, the SP value would increase by 0.416 percent when the ROA decreases by one percent.

Based on the results of the FMOLS method data, the variable exchange rate (LNER) and inflation (IFL) do not affect the stock price (LNSP) since the likelihood is greater than 5 percent, but the exchange rate displays a negative direction when viewed from the coefficient value. This negative path indicates that the share price (LNSP) rises when the exchange rate (LNER) falls, or vice versa, if the exchange rate rises, the share price falls. Inflation also has a negative path, which means that stock prices decline as inflation increases, and vice versa, stock prices also decline as inflation decreases.

In the following table, we can see the short-term model equation:

Table 6. The Result of Short Run Regression with ECM Model  
Dependent Variable: D(LNCL)  
Method: Panel Least Squares  
Total panel (unbalanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.101642	0.128891	-0.788586	0.4324
D(ROA)	-0.127475	0.124408	-1.024646	0.3083
D(LNEPS)	0.316466	0.124772	2.536358	0.0129
D(LNER)	1.735268	1.511069	1.148371	0.2539
D(IFL)	-0.522076	0.467105	-1.117686	0.2667
RESID01(-1)	-0.873225	0.097430	-8.962566	0.0000
R-squared	0.484047	Mean dependent var		0.009564
Adjusted R-squared	0.455383	S.D. dependent var		1.192875
S.E. of regression	0.880320	Akaike info criterion		2.643399
Sum squared resid	69.74672	Schwarz criterion		2.803671
Log likelihood	-120.8832	Hannan-Quinn criter.		2.708184
F-statistic	16.88689	Durbin-Watson stat		2.383678
Prob(F-statistic)	0.000000			

Sources : result of data processing

Results of the collection of data for the equation of short-term regression in Table 6. The resid01 (-1) value has a likelihood of 0,000 percent or less than 5 percent alpha, which indicates that the error correction model (ECM) used is accurate, so it is possible to interpret the OLS formula and the inference to the t test coefficient.

ECM's calculation results include knowledge that only the earnings per share (LNEPS) variable with a likelihood of 0.0129 or less than 5 percent alpha with a positive direction and a coefficient of 0.316466 is the variable that influences the stock price (LNCL) in the short term. This implies that the stock price will rise by 0.316 percent when income per share rises by one percent, or vice versa if income per share falls by one percent, the stock price will decline by 0.316 percent.

Other variables such as asset return (ROA), exchange rate (LNER), inflation (INF) have no effect on stock prices (LNCL) because the probability value is greater than 5% alpha, with a negative trend between asset return and stock price. A negative trend between exchange rates and stock prices, and a positive trend between stock prices and inflation.

The implications of the results show that the stock price in the retail trade subsector is substantially influenced by earnings per share (EPS) in a positive direction in the short and long term, such that when EPS rises, stock prices will actually rise, and vice versa when EPS falls. EPS is a ratio that determines how many dividends per share will be paid to investors after dividends for business owners have been deducted. It will trigger a fall in share prices. There will be more buyers willing to purchase the stock if the EPS of the company is high, which will cause the share price to be high. The greater the valuation of the EPS, the greater the benefit that will be offered to shareholders, the happier the shareholders will be.

Return on Assets (ROA) has no major impact on stock prices in both the short and long term, this can occur because investing in stocks helps investors to get a higher return or benefit in a very short period (high return), but stocks often have a high risk nature, that is, one day the stock price can also decrease rapidly for investors to get the return they expect. Therefore, the trade-off

balance between return and risk must be understood by any investor when investing. The greater the return that investors hope to earn, the greater the likelihood that the investor is at likelihood. The exchange rate (ER) has no long-term or short-term impact on stock prices in the retail sector. This implies that the depreciation or appreciation of the rupee would not impact the increase or decrease in share prices in the retail trade subsector, and that it can be understood that this subsector plays an important role as a connection between the output and public consumption sectors, which means that it directly serves the needs of the end user. In this situation, customers will still purchase the goods needed for their primary needs, even if the price of the commodity has risen due to the depreciation of the rupee, so that the market value in the retail trade subsector is not affected, and thus the stock price is not affected.

Inflation (IFL) has no effect, both in the short and long term, on stock prices. Inflation is a force capable of representing an increase in the price of products when inflation, which causes the price of goods to rise in the retail sector, does not impact consumer demand for the purchasing of the goods required. And the willingness of the company to move the inflation scare to the sale price more and more and eventually does not affect the stock price.

The findings of the study showing that long-term earnings per share (EPS) have a positive impact on stock prices are consistent with research conducted by Hijra Ijaz (2014) and Vahid Shabani (2013), while research by Maryyam Anwar (2017) has a negative effect. It is not, however, in line with studies by Asuil (2019) and Ati Herawaty, who have concluded that earnings per share have little effect on stock prices.

In the long term, return on assets (ROA) has no effect on stock prices in line with studies conducted by Assuil (2019) and Shakeel (2018), but not in line with studies conducted by Ati Herawaty (2018) and Maryyam Anwaar (2017) which concluded that the stock price is affected by ROA. Short-term inflation, in line with research conducted by Vikram (2018), Jung wan Lee (2018), does not affect stock prices in the short term, but not in line with research conducted by Thuy Chuy (2020), Vikran (2018), Ahmad Al Majali (2014), which notes that inflation has an effect on stock prices. In line with studies carried out by Vikram (2018), Robert D Gay (2016), but not in line with studies by Ho Sin Yu (2018), Vikram (2018), Ahmed Sadek (2013) and Muhammad Asmy (2009), exchange rates have no effect on stock prices.

## **CONCLUSION**

1. Profitability (earnings per share) has an influence on stock prices, while profitability (return on assets), exchange rate (ER) and inflation (IFL) have no effect in the short term on the stock price of the Indonesian Stock Exchange retail trade subsector.
2. Profitability (earnings per share) affects stock prices, although profitability (return on assets), currency exchange rate (ER) and inflation (IFL) have no impact on the long-term share price of the Indonesian Stock Exchange retail trade sub-sector.

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