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CAPM LQ 45 Analysis on IDX: Comparison Between the Property & Building Sector and the Agricultural Sector Before COVID-19

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ABSTRACT

This study maps the risk and returns with the CAPM approach, looking at stock issuers and comparing the property with agricultural sectors. The aim is to dig deeper into the differences in risk and return faced by these two sectors. In addition, this study has practical value for investors who want to mitigate risk and optimize portfolios and for decision makers who need to consider which sectors are more vulnerable to economic changes. The property sector and the agricultural sector behave quite differently in changing market conditions during the observation period. Based on empirical testing, it was found that stocks in the property and building sector are aggressive compared to the share in the sector of Agriculture. This is seen from each shared sample research's mark beta (β). Ultimately, these findings can help manage portfolios with more measurable risks.

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INTRODUCTION

Economic growth is one indicator of a country's success. Many things can be done to achieve economic growth by encouraging investment activities (Chikwira & Mohammed, 2023). This activity requires a massive flow of capital. In this case, the role of the capital market is needed as a forum to mobilize public funds in addition to financial institutions. The capital market is one of the effective means of mobilizing funds from the community to be further distributed to productive activities; (CM,Authority, 2021; Baioni et al., 2025). Investors, as parties who have excess funds, can invest their funds in various securities to obtain returns in the capital market. The capital market is also an important milestone in the world economy today; many industries and companies use this institution as a medium to absorb investment and strengthen the financial position of their companies. In addition to being a source of financing, the capital market is also used as a means of investment. Investment can be interpreted as a commitment to invest a certain amount of funds at this time with the aim of obtaining profits in the future (Margono & Gantino, 2021).

Indonesia's macroeconomic environment underwent several significant changes that affected stock market volatility, particularly in the property and agriculture sectors. One of the most influential factors was the interest rate. As Bank Indonesia raised its benchmark interest rate, borrowing costs increased, directly affecting property demand and developers' access to financing. A study by (Tejokusumo et al., 2023) found that real interest rates had a significant influence on stock returns in the property sector, indicating heightened volatility driven by fluctuating capital costs and investor perceptions of economic uncertainty (Tejokusumo et al., 2023). Inflation also played a critical role in driving stock volatility. The same study highlighted that inflation negatively affected property sector stock returns in the long run. In the agriculture sector, inflation had an equally disruptive impact. Rising prices of essential inputs like fertilizer and fuel eroded profitability for farmers and agribusiness firms, causing uncertainty in cash flows and heightened stock volatility (Puspitasari et al., 2019).

Before making a decision to invest, information is an element that is important for investors and businesspeople. For investors, the rise and fall and constancy of stock prices in the market will signal whether it is positive or negative. One of the advantages for the party that owns the shares is that it receives dividends. The concept of dividend signalling theory here becomes very important. The dividend signalling theory was first put forward by Bhattacharya (1979). One of the assumptions is that investors have information that is not perfect regarding the profitability of the company. In conditions of imperfect information, the function dividend is a signal from current cash, which is expected. Signal information, this is needed by investors to determine whether investors will plant their shares on the company, which is concerned or not. Investment in market capital is done with a formation portfolio. Investors can form a portfolio (diversification) share that is with an investment in Lots of shares so that risk loss on one share can closed with profit on the shares that other (Mehta & Yang, 2022).

The approach used to find out which stocks have the best level of high profits with certain risks and can minimize one of the risks is an approach with the use of the Capital Asset Pricing Model (CAPM). Capital Asset Pricing Model (CAPM) is a model of the equilibrium relationship between risk and expected return on securities or portfolios (Kumar et al., 2023; Lai & Stohs, 2021). CAPM is based on the theory portfolio proposed by Markowitz. Based on Markowitz's model, each investor is assumed to diversify its portfolio and choose the optimal portfolio on the basis of his preference for return and risk. Treynor, Sharpe, and Litner introduced the CAPM model. Model CAPM is a development theory portfolio found by Markowitz with the introduced term new that is risk systematic (systematic risk) and risk specific/risk not-systematic (specific risk/unsystematic risk). In 1990, William Sharpe received the Nobel Prize in Economics for his theory of formation price asset finance, which was then called the Capital Asset Pricing Model (CAPM).

Use Capital Asset Pricing Model (CAPM) rated because CAPM own one macro factor, namely sensitivity to the market portfolio, so that it can be used to know the connection balance between risk with level return, which is expected for every letter valuable (Airinen, 2021). Objective main use of CAPM is to give predictions that are appropriate about the connection between risk and asset and the return expected, determine the price of an asset and use CAPM as the base to determine the group share, which can be chosen as a place investment. Size risk, which is an indicator which influences share in CAPM, is shown by variable β (Beta). The more big β a share, so the more big also risk which sometimes inside it.

Black et al. (1972) tried to do research related to the model suitable for accurate CAPM calculations. They carried out the development of the model- The previous traditional CAPM model was carried out by Sharpe (1964) and then expanded and clarified by (Lintner, 1975);(Mossin, 1966); and (Fama, 1968). From the existing theories and models, a good portfolio evaluation model was developed. Black and Jansen serve a number of test additions from model determination price assets. Overall, the contributions of Black et al. (1972) remain a significant milestone in the development of asset pricing theory, particularly in refining the classical CAPM model to make it more applicable. Recent empirical research confirms that although the CAPM and its variants cannot perfectly explain all market phenomena, these models remain highly relevant as a theoretical basis. Further development and testing, incorporating new risk factors and modern analytical techniques, continues to be a significant focus in the current financial economics literature to improve the accuracy of risk and asset return assessment models.

This avoids some of the problems of previous studies and makes new contributions to structure return securities. In the development model determination price asset, it is assumed that (1) all investors are risk-averse terminal utilities of the period single maximization riches and can choose between portfolios solely on base mean and variance, (2) there are no taxes or transaction fees, (3) all investors have view homogeneous about parameter distribution probability combination from all return securities, And (4) all investors can borrow and lend on level certain interest without risk. Leal et al. (2023) on their research, stated that the relationship between premiums, the expected risk on individual assets, and systematic risk are disproportionate to using traditional models. While with testing based on data division into the interval, cross-sectional testing is considered. No bias error measurement. This provides a solution to the problem through procedure grouping and shows how the cross-sectional method is relevant. For the test form, two factors were expanded from the model, which made it so that the result did not deviate.

Next, in 1990, Ostermark conducted a CAPM analysis on two stock exchanges. Effects in Saxony between Sweden and Finland. CAPM between these two countries There is an anomaly in the Finnish and Swedish Stock Markets, and it is not much different from observations. Studying internationally, which there was previously. This research strengthens the relevant proof of international anomaly price share for conditions in Finland and Sweden. This finding is consistent with recent evidence that interdependence between individual asset returns is higher on the Finnish Stock Exchange than in Sweden in all test periods. Similar to Pandey and Joshi (2022) they studied the phenomenon of asset pricing anomalies in major Western European economies, namely France, Germany, Italy, and Spain. Based on their findings, they tested several different countries and obtained the best test results, and their findings suggested that the CAPM was a better model in explaining returns specifically in Italy and Spain. Their findings also revealed that even though a market is considered mature, there are still opportunities for portfolio managers to utilize this strategy to generate extra-normal returns for their investors.

Nurwulandari (2021) analyzed the relationship between risk and return using the Capital Asset Pricing Model (CAPM) in the Indonesian stock market. This study utilized primary data sourced from the Indonesia Stock Exchange (IDX) publications for four years, from 2016 to 2019. Adopting a quantitative approach combined with a descriptive research strategy, the analysis was conducted on key variables such as stock returns (Ri), market returns (Rm), risk-free returns (Rf), systematic risk, and expected returns (E(Ri)). To test the relationship between risk and return, Pearson Correlation was used as a statistical analysis method. The results of the correlation coefficient test revealed two main findings: first, there is a strong positive relationship between beta and CAPM expected returns, where an increase in beta is directly proportional to an increase in expected returns, and vice versa (Rojo-Suárez et al., 2022); second, of the 52 company stocks included in the study sample, 33 stocks are included in the productive stock category, while 19 stocks are classified as inefficient.

Prabowo (2013) conducted research on stock portfolio analysis using the method CAPM and Markowitz in Indonesia. The study was conducted to determine the expected return and choose the best stocks to get an optimal portfolio. composition and profitable for investment. Study This uses secondary data, namely LQ 45 data, stock prices, SBI Stock Exchange availability levels, and Bank Indonesia. The research results show the selection of 5 stocks that are most profitable for investors, namely PT stock UNTR, SMCB, ASII, INDF and BBRI. Companies that issue Stocks must interact more with the public and capital markets to attract more investors (Gao et al., 2022).

Iqbal and Brooks (2007) investigate the implementation of CAPM to explain return share in Exchange Effect Karachi for the period September 1992 until April 2006. Unlike the study previously in the market country development, this study was conducted with a wider scope. First, testing is conducted on individual stocks, portfolio size, and portfolio industry. Second, the test takes into account effect intervals by using three data frequencies, namely daily, weekly, and monthly data. Third, while keeping an eye on the rare trades in emerging markets in general and the Pakistan equity market in particular, testing is also done on Beta, which is corrected for infrequent trades using the Dimson (1979) procedure. Contrary to previous studies in emerging markets, the premium for beta risk and the slope is in accordance with the expected model. However, the relationship between returns and risk is not linear (Ah Mand et al., 2023; Cotter & Salvador, 2022).

Lastly, Assagaf (2015) conducted research to ensure that the concept of CAPM is still relevant and strong. It is used by expert finance, decision makers co, company management and investors in the capital market to determine or measure risk or share beta (β). The method used is to approach econometrics and compare model studies previously, which have been used by researchers in several different places and periods. The samples selected are the most active trading shares on the Indonesia Stock Exchange (IDX) in the period from September to November 2014. Results obtained from the this study: First, the model which used or developed the result the same in Beta (β) assessment but different in alpha (α) values in each model because the risk-free return (Rf) is constant during the observation period, or there is the difference in Beta (β) and alpha (α) values when Rf is varied over a period observation. Second, a ratio model, non-linear or quadratic, is more relevant. For use in assessing beta stocks, a linear and linear comparison coefficient (R2) non-linear model for all company shares is observed. Third, the results of the measurement estimation stock return (Ri), both with linear and non-linear models, show that the concept of the Still relevant or model CAPM used in measurement shares beta (β). Fourth, the Ln-based non-linear model cannot be used when there are returns.

The goal of investors is to minimize risk and increase acquisition through minimize risk and maximize return (Lathief et al., 2024; Zaimovic et al., 2021). The general assumption is that individual investors who are rational are people who do not like risk (risk aversive), so an investment risk must be able to offer high rates of return. Therefore, investors really need information about the risks and returns. The investment risks faced by investors consist of market risk (risk), default risk, inflation risk , currency risk, and political risk (Fabozzi, 2025; Khalfaoui et al., 2025; Mohammed & Zheng, 2023). The central bank's interest rate, determined by its policies, inherently carries risks. However, it is assumed that the country will not default on its payments, although the possibility still exists. This assumption is often based on the returns from risk-free assets (Rf) linked to the central bank's rates (Fahrbach, 2023; Hull, 2023).

The Capital Asset Pricing Model (CAPM) attempts to explain the relationship between risk and return. In assessing risk, ordinary shares are usually classified as risky investments. Risk itself means the possibility of deviation from actual earnings from the expected gain (possibility), while the degree of risk is the amount of possible fluctuations (number of potential fluctuations). Risky stocks can be combined in a portfolio to become a profitable investment. more low risk than normal single share. Diversification will reduce systematic risk (systematic risk), but no can reduce risk no systematic (unsystematic risk). Unsystematic risk is part of risk, which is not general in a company and can separated. Systematic risks are part of which no can separate, which is related to the overall movement of the stock market and cannot be avoided. Return shares of the company can counted with equals:

$$R_{i,t} = \frac{P_t - P_{t-1}}{P_{t-1}}$$

Furthermore For count return market (market) counted based on data index market, Where the formula is:

$$R_{m,t} = \frac{IHSG_t - IHSG_{t-1}}{IHSG_{t-1}}$$

Furthermore, Beta is a gauge of volatility (volatility) return securities or return the portfolio to return market. Beta For the portfolio market is value 1. The greater the Beta of a stock, the greater the risk it contains inside it. Securities which have a Beta smaller than 1 (β <1) are said to be at risk smaller than the risk of the market portfolio. On the other hand, a security that has a beta value greater than 1 (β > 1) is said to have a systematic risk that is greater than the risk market. Meanwhile, to measure the risk in this case, systematic risk can be calculated by looking for mark β as follows:

$$\beta_i = \frac{Cov\ (R_t - R_m)}{Var\ R_m} = \frac{\sigma_{i,m}}{\sigma_m}$$

This research was conducted in the property sector and the agricultural sector with shares companies listed on the Indonesia Stock Exchange. The selection of these objects is based on the underlying reason that there is a difference in characteristics risk between the property sector and the sector of agriculture. The property sector tends to be more influenced by factors economic macros like tribe interest, inflation and policy government-related taxes or regulations of property (Pratami et al., 2024). Property is also more affected by fluctuations relative to market value and liquidity low compared to other sectors. While the sector of Agriculture, on the other hand , is more vulnerable to factors in nature such as weather, disasters nature, the price of global commodities, and policies related to agriculture (Rozaki et al., 2021). The risks in this sector may be higher because of uncertainty in production and fluctuations in the price of commodity agriculture.

In a situation full of uncertainty, it is certainly very useful to know which stocks distribute dividends consecutively, which will ultimately help investors obtain investment profits as well as help investors know which companies reflect profitability. tall. This study aims to analyze choice investment, which is efficient on all over stocks listed on the Indonesia Stock Exchange using the CAPM approach seen from side risk and the return. This study aims to explain the analysis of the stock performance of a company which is at in the sector of property and agriculture listed on the Stock Exchange Indonesia based on the level of return and risk.A title of article should be the fewest possible words that accurately describe the content of the paper

RESEARCH METHOD

The data collected in this study are daily closing prices on the composite stock index on the stock exchange. The company in studies consists of two sectors, namely sector service building & property And sector agriculture. The sample selected 15 companies. Nine companies were from the property & building sector, and six companies were from the agricultural sector. The study period spans from early 2015 to the end of 2019, which is equivalent to 5 years of accurate data. The year and the analysis are based on daily data from companies in the LQ 45 and listed on the IDX with the use of the software Eviews.

William Sharpe, in building the CAPM model, was inspired by portfolio theory. Proposed by Harry Markowitz. Markowitz proposed a model to explain the correlation between security returns. This model assumes that the return of the i-th security depends on an underlying factor, the value of which is represented by an index, in the notation mathematics stated as:

$$r_i = \alpha_i + \beta_i .F + u_i$$

ri = return of security i
βi = Beta of security i
F = index (not necessarily market index)
ui = error term
Then, the study by Miller and Scholes (1972) explains How return securities tend to go on And down along with the rise and fall of the general market index, specifically using the equation as follows:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + e_{i,t}$$

R it = return from asset i on period t
R mt = return of the market index in period t
α i = components non-market from return asset i
β i = ratio covariance from return asset i and return index market to variance return index market
e it = zero mean random error term

This model is called the single index market model or often called the market model. Seen here in the Markowitz model, the index is not necessarily the index market, but in the market model the market index is used. To test the CAPM model in estimating β is done using OLS. However, it should be noted that the CAPM model This is a ceteris paribus model. It is only valid under a specific set of assumptions. listed below this: (a) There is no fee transaction. (b) Fully divisible. (c) There is no tax income. (d) Investors cannot influence stock prices by buying or selling stocks. (e) Investors act on expected value considerations using standard deviation returns (f) Short sales are allowed. (g) There is a riskless lending and borrowing rate. (h) Homogeneous expectations. (i) All assets can be traded.

RESULTS AND DISCUSSIONS

Election share based on 3 periods (January 2015 - December 2019) has obtained 15 share which merged in LQ45 And registered in IDX , that is APLN, ASRI, BIPP, BSDE, CTRA, PTPP, PWON, WIKA, WSKT, AALI, BISI, LSIP, SGRO, SMAR, SSMS.

Table 1. Calculation Return share and Standard deviation

Share	Stda. Deviation (σ)	Return Share (μ)
Property and building Sector		
APLN	2.719080	-0.01472
ASRI	2.302184	-0.04290
BIPP	3.097195	-0.00556
BSDE	2.275294	-0.00307
CTRA	2.766520	0.02353
PTPP	2.490403	-0.03074
PWON	2.514431	0.04198
WIKA	2.401086	-0.01638
WSKT	2.271793	0.02888
Agriculture Sector		
AALI	0.874249	-0.02132
BISI	0.430408	0.05312
LSIP	2.529179	0.00779
SGRO	1.704816	0.03272
SMAR	2.730991	-0.02638
SSMS	1.945148	-0.03374

From the results of measuring standard deviation and return in the table above, it is in accordance with the theory. allocation risk most minimum can seen that alternative choice share best is BISI with mark std. deviation 0.43 and return 0.05. The results of the determination and measurement of Beta of 15 stocks for 3 time periods are as follows. Some stocks in the agricultural sector exhibit negative or near-zero beta values, indicating a weak—or even inverse—relationship with the broader market movements. This phenomenon arises from the unique characteristics of the agricultural industry, which is more heavily influenced by non-market factors such as seasonal cycles, climate conditions, global commodity prices, and government interventions like subsidies and price supports. Unlike cyclical sectors such as property or manufacturing, agriculture is often considered a defensive sector, as demand for agricultural products tends to remain relatively stable—even during economic downturns—due to their essential nature. In periods of market turbulence, agricultural stocks may even serve as a natural hedge against systematic risk, as their price movements often diverge from or move in the opposite direction of market indices.

The practical implications of this for portfolio management are significant. Stocks with negative or near-zero beta serve as effective diversification tools within an investment portfolio. By incorporating these stocks into a portfolio dominated by high-beta assets—such as technology or cyclical industry stocks—portfolio managers can reduce overall volatility and enhance return stability. In particular, agricultural stocks can offer downside protection during market downturns, making them attractive to conservative or institutional investors, such as pension funds, who prioritize capital preservation and risk management. However, under the Capital Asset Pricing Model (CAPM), a very low or negative beta also implies a lower expected return, as the stock contributes little or negatively to the portfolio's exposure to systematic market risk. Thus, while these stocks may not be ideal for maximizing returns, they play a strategic role in stabilizing portfolio performance, especially amid economic uncertainty or bearish market conditions. In practice, portfolio managers must balance systematic risk, return potential, and long-term investment goals when integrating low-beta agricultural stocks into asset allocation strategies.

Table 2. Period I 1 January 2015 – 21 July 2017

Share	Ri	B	Coeff. (α)	t-static
Property and building Sector				
APLN	-0.0529	0.323	-0.00084	0.3015
ASRI	0.0086	1,010	-0.00142	0.1209
BIPP	-0.0644	0.074	0.00002	0.9886
BSDE	0.0221	1.009	-0.00055	0.4988
CTRA	0.0655	1,083	-0.00064	0.5289
PTPP	0.0209	0.540	-0.00051	0.5157
PWON	0.0006	0.778	-0.00009	0.9271
WIKA	-0.0607	0.638	-0.00122	0.1509
WSKT	0.0983	0.432	0.00057	0.4442
Agriculture Sector				
AALI	-0.0337	0.517	-0.00087	0.3631
BISI	0.1519	0.605	0.00093	0.4194
LSIP	-0.0108	0.492	-0.00062	0.5350
SGRO	0.0243	-0.001	0.00025	0.7069
SMAR	-0.1144	0.028	-0.00113	0.1709
SSMS	0.0122	0.327	-0.00021	0.8033

Table 3. Period II 22 July 2017 – 14 November 2018

Share	Ri	B	Coeff. (α)	t-static
Property and building Sector				
APLN	-0.0692	0.580	-0.00033	0.8172
ASRI	0.0281	0.538	0.00035	0.7479
BIPP	0.0014	0.055	0.00032	0.8455

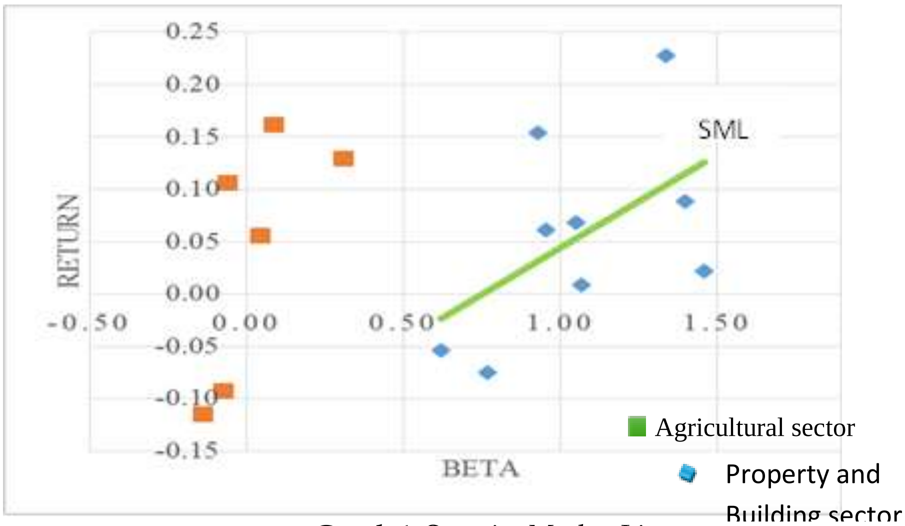
BSDE	-0.1006	0.685	-0.00057	0.5980
CTRA	0.0176	0.789	0.00027	0.8456
PTPP	-0.0231	1,060	-0.00119	0.4094
PWON	-0.1800	0.600	0.00056	0.6568
WIKA	-0.1279	0.608	-0.00090	0.4870
WSKT	-0.0871	0.674	-0.00045	0.7494
Agriculture Sector				
AALI	-0.1094	-0.036	-0.00112	0.2955
BISI	0.0054	0.076	0.00010	0.9209
LSIP	-0.0738	0.098	-0.00068	0.6111
SGRO	0.0413	0.099	0.00048	0.2415
SMAR	0.0275	0.054	0.00031	0.8628
SSMS	-0.0733	-0.107	-0.00080	0.4375

Tabel 4. Period lll 15 November 2018 – 11 December 2019

Share	Ri	B	Coeff. (α)	t-static
Property and building Sector				
APLN	0.1536	1,027	0.00075	0.7542
ASRI	-0.0756	0.767	-0.00118	0.3176
BIPP	-0.0534	0.620	-0.00128	0.6177
BSDE	0.0612	0.952	-0.00020	0.8883
CTRA	0.0222	1.456	-0.00035	0.8284
PTPP	0.0885	1,398	-0.00050	0.7511
PWON	0.0680	1,048	-0.00067	0.6288
WIKA	0.2271	1,335	0.00114	0.4385
WSKT	0.0083	1,066	-0.00082	0.5677
Agriculture Sector				
AALI	0.1295	0.307	0.00104	0.3876
BISI	-0.1145	-0.140	-0.00103	0.2811
LSIP	0.1622	0.084	0.00155	0.3510
SGRO	0.0560	0.042	0.00053	0.7411
SMAR	0.1070	0.063	0.00112	0.6013
SSMS	-0.0924	-0.077	-0.00086	0.3927

From the results obtained, all the F-test results from the data above are 0.0000. This means F probability < 0.05, which means variable independence, that is, market risk premium (Rm- Rf), in a way that gives influence significant to variable dependent 15 types the shares. Meanwhile, for the results of the C test (intercept), all types of shares showed a probability result of 0.5235, which means it is more than 0.05. This means that if the probability of t count > (0.05), then the effect is not significant. So, the intercept (C) individually is not significant. influence each excess return share. Thus, share on own abnormal return because the results of the test probability intercept show results that are Not significant.

Based on the analysis, 60% of the 15 selected stocks have a Beta (β) greater than one from various periods. Period l, which has β greater than 1, is ASRI; BSDE; CTRA, for period ll, which has β greater than 1, is PTPP; and for period III that, have β more than 1 are APLN; CTRA; PTPP, PWON, WIKA, WSKT. What is unique about these results is that the shares that have a β value > 1 are the shares that are in the property & building sector. Meanwhile, for shares in the agricultural sector, all of the 3 test period has a value of β < 1. From the overall test results that have, β the highest is CTRA shares in period III with a β value = 1.456 while the β value which lowest is share SGRO period I with mark β= -0.001. Matter This indicates that The sector that has a higher risk is the property & building sector. So shar, es from the property & building sector are among the aggressive shares for the time being. Shares in the agricultural sector are classified as shares in which cupboard. Judging from the return (Ri) of each share, when compared with the value beta (β), it has a linear relationship. This means that the greater the value of β, the more the return is also obtained, so this,s is in accordance with the theory that between β and returns are positively related. Furthermore can We Look on Picture 1 Security Market Line (SML) which is a graphical depiction of the CAPM model which shows the relationship between risk systematic (Beta) with return expectations For securities individual. Depiction of the Security Market Line (SML) of 15 stocks used as research samples is as follows:



Graph 1. Security Market Line

CONCLUSION

It can concluded that stocks in the property and building sector are aggressive compared to the share in the sector of agriculture matter, this is seen from the mark beta (β) of each share sample study. Furthermore, from all the results testing intercept (C) on share good sector proverty and also sector Agriculture No no significant influence so that these shares have abnormal returns. However, from the results of the single regression, each share is significantly influenced by an independent single factor (Rm-Rf). Judging from the return (Ri) of each share, if compared to the mark beta (β) own connection, which is linear. It means the bigger the mark, β so return, which is obtained. Also, the taller, so that matters. This is in accordance with the theory that between Beta (β) with return (Ri) is positively related, but of all the shares. Cross-sector diversification between the property and agriculture sectors is an effective strategy for balancing risk and return within an investment portfolio. The property sector, with its high beta, tends to offer higher returns during periods of economic growth but is more vulnerable to market fluctuations and interest rate shifts. In contrast, the agriculture sector, often characterized by low or negative beta, remains relatively stable and less correlated with market movements, serving as a defensive asset during downturns. By combining these two sectors, investors can build a portfolio that is more resilient to economic cycles, reduces overall volatility, and enhances risk-adjusted returns. This strategy also supports tactical adjustments—overweighting property in bullish markets and increasing exposure to agriculture during periods of uncertainty.

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