



# The Usefulness of The Capital Asset Pricing Model in Predicting Total Shareholder Return

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## Abstract

This research aims to study the usefulness of CAPM in predicting total shareholders return, and its effectiveness in a UK-listed stock portfolio. Pearson Co. chose to compute the equity cost by calculating total shareholder return (TSR) using appropriate dividend yields and capital gains along with the CAPM and related data. This was done within the framework of 2016 to 2021 according to Pearson's financial reports. It was concluded that CAPM is suitable as a UK share price indicator. It demonstrates that CAPM is linear but does not need to capture unique and systematic risks. CAPM can be used by managers as a proxy to evaluate stock returns and diversify portfolios in order to minimise unsystematic risk, so they can implement the right policies in management to maximize profits while increasing shareholder wealth.

**Keywords:** CAPM, abnormal returns (Ab. R), and Cost of equity.

## 1. Introduction

Entering the new century, equity investment is not only traded in a large number of institutions at home and abroad, but also individual investors' participation in the stock market has become very common. This is due to transparency in public company reporting requirements and new advanced technologies and software. Investors use CAPM to examine returns or changing behaviour of stocks (Kolari et al., 2022).

The birth of asset pricing theory was marked by the CAPM of William Sharpe (1964) and John Lintner (1965) which led to the Sharpe Nobel Prize in 1990 (Kazmi et al., 2021). After forty years, CAPM is still broadly used in the following applications. Estimating capital cost of a firm and assessing a managed portfolio performance. It is at the heart of the MBA investment curriculum (Zerbib, 2022). The attractiveness of CAPM is that it provides impressive and intuitive estimates about the measurement of risk and predictable risk-return ratios (Rasyad, 2022).

Many studies have conducted on this issue all around the world. For instance, Rahman (2010) examines the factors of CAPM exposure using commercial banks in Malaysia. Likewise, Lean and Parsva (2012) studied the performance of the Malaysian Islamic Index using CAPM. Their research focuses on the performance of the CAPM and the Malaysian Islamic Index or commercial banks, rather than stocks from various sectors that may be more characteristic of the Malaysian stocks performance. In addition, the researchers used the Markowitz Model Portfolio Diversification Study to compare the oil samples in Malaysia by Mansourfar et al. (2010) and Kassim and Kamil (2012) Islamic unit trusts are narrower in explicit industries. Hence, Goh et al. (2014) examined portfolio diversification by examining only the stocks of 25 companies in the portfolio, which may be less persuasive due to the small range of sample data.

When the level of risk changes, or other factors in the market make an investment riskier, the formula need to be used to assist re-determine pricing and predicting for



predictable earnings. Consequently, investors need to use a method to evaluate the fair value of a share. In this regard, this study investigates CAPM to realize whether it is effective or not in predicting the behavior of the stock. Thus, this paper attempts to explore whether CAPM is effective in predicting the behaviour of each stock and an empirical assessment of its returns. It also tested the effectiveness of CAPM in a UK-listed equity portfolio. This research will study on the related literature review in the next section, detailing the methodology, presenting the data and interpreting the outcomes. Finally, the last section summarizes the main findings and includes some concluding observations.

## 2. Theoretical background and literature review

Many techniques employ by investors to reduce risk while optimizing returns. Approaches include the Markowitz model settled by Harry Markowitz in 1952, followed by the subsequent progress of CAPM by Treynor (1962), Sharpe (1964), Lintner (1965), and Mossin (1966) (Lee et al., 2016). CAPM considers the sensitivity of an asset to non-diversifiable risk (systematic risk), which is expressed in the industry in terms of beta (beta), the market's expected return, and the predictable return of a theoretically risk-free investment. The CAPM provides an accurate estimate of the connection that must be observed among predictable return of an asset and its risk (Lee et al., 2016). Markowitz's model attempts to increase the predictable return of a portfolio for a certain collection risk, or to uniformly reduce risk at a given level of predictable return given the correct ratio of different securities.

Modern portfolio theory is used by CAPM to clarify whether a stock is fairly valued. The theory reliance on the risk and return distribution, market rudiments and investors behavior (Kostin et al., 2022).

According to the model investors assumed to be rational, and markets to be efficient, which tend to represent asset returns as typically spread casual variables, identify risk as the returns' standard deviation, and present portfolios. By combining different assets whose returns are not fully positively correlated, modern portfolio theory attempts to decrease the overall change in collection returns. This model attempts to reduce the total change in collection returns by merging different assets whose yields are not entirely confident (Lee et al., 2016). Hassan et al. (2011) used this framework on the Dhaka Stock Exchange (DSE) to examine the risk-reward relationship with CAPM using the monthly stock returns of 80 non-financial firms from 2005 to 2009. The results show that the objection term is significantly non-zero, and the beta coefficient is positively correlated with stock returns.

The results contradict the CAPM assumption, suggest unique risks, and insignificant interactions in the DSE, but suggest linearity in the security market line. Novak (2015) made methodological changes to the methods used to validate CAPM beta that affect hypotheses about the link between beta of CAPM and equity yields. In fact, traditional beta proxies are mostly independent of comprehended equities, so the researchers' use of forward-looking betas and elimination of impractical expectations about predictable market yields makes it substantial. It suggests that the weaker practical provision for CAPM Beta may be due to the complexity of CAPM implementation rather than theoretical concepts. Thus, the application of the additional theory of market returns to the risk-free returns of investment is sufficient to explain the surplus returns to equity.

This suggests that examining multifactor models to study the behaviour of equity yields is not constantly suitable. Tsai et al. (2015) suggest that the optimum level of change that maximizes value of bank is asymmetric and depends on the corporate sequence, using practical evidence from Taiwan. Systemic risk is small throughout extension, so the impact of unsystematic risk from collection change is small. The advantage of decreasing personal risk then determines any losses from increasing systemic risk, bringing greater value to the bank by holding a varied collection of assets. Systemic risks are high throughout recessions. More

impressive, the losses from increased systemic risk outweigh the benefits from reduced individual risk from collection change. Therefore, greater change result in minor bank value.

Guermat (2014) discusses the testability issue of CAPM, using a simple combination of ordinary least squares coefficients of determination to test the validity of the metrics used in empirical tests. Then, it exams the effective index hypothesis through the market portfolio. This clearly shows that to exam CAPM, not only specific resources but also collection investments can be tested. (Lee et al., 2016) show that risk percentages can be eliminated by taking a broadly diversified collection in each of some states in the western region. It is found that as the size of equities in a collection increase, the influence of individual equities to the variance of the portfolio tends to zero. In addition, the contribution of the term covariance (systematic risk) tends to average variance with increasing stock size.

This demonstrates that specific equity risks can be diversified, but the impact of systemic risk on overall risk cannot be diversified. Therefore, the test can be confirmed using non-Western stock markets to approve the rationality of the concept. Furthermore, (Alekneciute et al., 2012) examines the effect of change on equity market of the Lithuania based on everyday share prices from 2009 to 2010. It examines research based on criteria (1) the highest number of negative correlation coefficients, (2) negative correlation with other equities constructed on quantifiable faces, (3) Stocks in diverse businesses. Results confirm that portfolios with simple choices have better change results than standard portfolio choices.

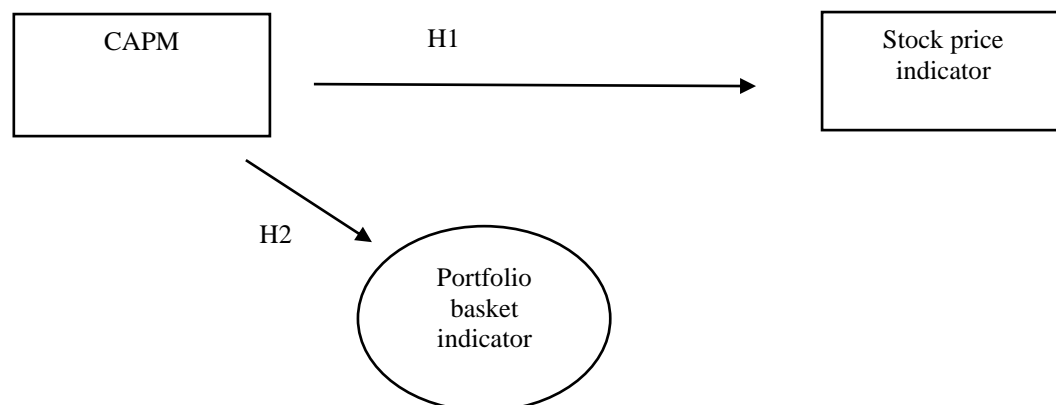
Therefore, it offers a more efficient technique to select portfolios based on criteria and daily stock returns, but recommends random selection of stocks with weekly returns in the portfolio, since most researchers use weekly, Monthly or yearly yield figures as instability daily equity returns are very high, that can reverse the drive of collection change in minimizing risk (Alamer, 2015a; 2015b; Hiraki et al., 2015; Marshall et al., 2015; Dutt and Mihov, 2013; Serepina and Siswantini, 2022).

Thus, the literature of this paper covers three aspects. First, whether CAPM is suitable for capturing risk and return analysis in a portfolio. Therefore, two test phases (period sequence and cross-sectioned sequence) test whether specific shares can be assessed by CAPM, followed by portfolio creation that passes the CAPM test. Secondly, it tends to reveal insights on whether investors can find confident change value in the UK equities. Finally, the role of diversification in reducing risk in UK equity portfolios will also be examined. Thus, the following hypothesis have formulated:

H1: CAPM can be useful as a stock price indicator.

H2: CAPM can be useful as a portfolio basket indicator

**Fig. 1:** study model





### 3. Methodology

The data selects Pearson shares listed on the main UK market between 1 January 2016 and 31 December 2021, using weekly data for all variables. The past 5 years were chosen to avoid structural disruptions like a major economic crisis. Firms in the financial sector were excluded because the reporting systems of financial firms differed from those of non-financial firms (Aletkin, 2014). Avoid using daily data because the risk/reward ratio is too volatile according to Basu and Chawla (2010). Calculation results created by Microsoft Excel.

**3.1** Compute TSR through using proper dividend yield and capital gains for Pearson Company for the (2006-2011) reporting years.

(1) TSR calculation by using this formula: **Total Shareholders Return = (ending price – beginning price + Divi.) / Beginning price,**

	2016	2017	2018	2019	2020
<b>Divi.</b>	29.3p	31.6p	33.8p	35.5p	38.7p
<b>Equity Beta</b>	1.41	1.31	0.9	0.71	0.74

#### Stock Price

Time	Opening	High	Low	Closing
2021 (January 2021)	1,019.00	1,229.00	971.5	1,210.00
2020 (January 2020)	893	1,069.00	851.5	1,008.00
2019 (January 2019)	641.5	895.78	566.5	887.5
2018 (January 2018)	726	743	492	641
2017 (January 2017)	778.5	925	693.5	732
2016 (January 2016)	685.5	819	665	771.5
2015 (January 2015)	625	697	604	687.5

Total Shareholder Return through Share prices average (pence)				
Year	Beginning Price	Ending Price	Divi.	Total Shareholder Return
2020	890.25	1013.5	38.7	18.192
2019	641.25	890.25	35.5	44.366
2018	729	641.25	33.8	-7.401
2017	775	729	31.6	-1.858
2016	686.5	775	29.3	17.160

**3.2** Using CAPM and relevant data, calculation of the cost of equity for Pearson Company for (2006-2011) reporting years.

Year	Risk-free-rate	Beta	ERP (Rm - Rf)	CAPM	TSR	Ab. R
2020	0.49	0.74	4.40	3.75	18.19	14.45
2019	0.69	0.71	4.40	3.81	44.37	40.55
2018	3.97	0.90	4.40	7.93	-7.40	-15.33
2017	5.26	1.31	4.40	11.02	-1.86	-12.88
2016	4.65	1.41	4.40	10.86	17.16	6.30



#### 4. Results and Discussion

2016-2020 share price collected from reliable sources since the 2021 dividend information will be published in the annual report in late March 2022. It is more appropriate to use the year-end average stock price than the year-end spot stock price. It found that there is a significant difference between this year's closing spot price and the beginning of next year's spot price. Therefore, the average better reflects returns and increases consistency.

When determining the best method for estimating the risk-free rate, the 41/2 Treasury bond yield due for the year 2020 was used. The annual average is obtained to reflect the fair value of the risk-free rate for a given year through taking a monthly rate. Returns in 2016-18 were reasonable, but things have changed dramatically. This has reached a point of return of less than 0.5% in 2020.

By looking at the various studies in the field and understanding that not only a short-term view is needed, this will not provide the correct numbers owing to the high instability of the stock market. It is likewise unsuitable to compute ERP on the basis of past decades, as government bonds have outperformed stocks in recent years, thus likely leading to negative values. This essentially does not provide a reasonable overview over a long period of time, as well as indications of increased rates of economic and ERP follow-up in the future. A lot of research has been done to come up with various equity risk premium figures. Dimson et al., (2003) derived an average UK market risk premium of 9% using historical UK market returns over the period 1919-77.

A similar study by Campbell et al. (2019) came up with a premium market risk of 9.1% in the UK because a lengthier time from 1829 to 1929 was used. If we look ahead to the study, use a time frame prior to the year we're considering, and typically end up with higher numbers, we won't get an accurate and fair ERP value. It is important to use characters representing "bull" and "bear" times. As stated in the core text, Barclays Capital made one of the updated calculations for the ERP in 2017. The rate found over the 101-year period was 4.4, broadly in line with the numbers used by industry regulators, which ranged from 3.5% to 5%. Going back a little further, Dimson et al., (2003) derive a geometric risk premium of 4.5% based on the period 1900-2001. Millennium Book II has a 4.4% premium to UK risky stocks (Dimson et al., 2003). Therefore, a figure of 4.4% was used.

In their book Watson and Head (2010) notes that using Gilts and a 107-year figures, Barclays Global Investors arrives at a mathematics UK ERP of 4.2%. This represents numbers from current research and considers a wider range of periods, including the best periods of the 1990s and the hardest periods after 2001s. Arguably this number should be lower than it has been over the past 10 years, but it's a fair number considering that a "time-smoothed average" is desirable. Therefore, it would not be suitable to adjust the premium of equity risk every time, since estimations and studies are created on large-scale data over many decades, e.g., eighty to a hundred years. Thus, it will not change significantly.

The London Business School Risk Assessment Book was used to acquire the beta version of a particular company.

Since these values are calculated on a quarterly basis, the October-December numbers are used as these are nearby to the ending year of the company on December 31. The betas for the relevant (2016 & 2017) years were significantly higher than 1, implying that the security is more likely to be significantly riskier than the market. The 2018-20 beta has improved significantly, reaching sub-level 1. Indeed, the beta in 2020 (0.74) is nearly half of the 2016's beta which is (1.41). Securities with less than 1 beta are called defensive securities and are more interested in stakeholders once the stock market drops (Watson, Head 2010).

Abnormal returns are a term used to describe returns that deviate from expected returns from a particular security or portfolio over a period of time. Predictable returns are those estimated based on asset pricing models that consume historical long-term averages or



different estimates. Hence, it is known as alpha, which is regularly thought to be the value added or subtracted by the portfolio manager from the fund's proceeds.

On the basis of the calculation, Ab. R indicate that yields vary widely from year to year. A positive number of 6.30 in 2016 indicates that the companies we have allocated have exceeded the expected return of the CAPM, and investors have made excess returns on their investments over the years. However, with a negative abnormal return of -12.88 in 2017 and a negative -15.33 abnormal return in 2018, this should not be a concern for shareholders looking for long-term returns as Pearson Plc has increased its dividend every year since 2016. The main reason for negative abnormal returns is that stock prices fall sharply during recessions. Then, what's behind the impact of Pearson Plc's performance? It is therefore significant to notice that using these two methods of calculating returns lead to a large gap in returns, since different factors and assumptions taken into consideration.

Compared to TSR, CAPM will not make much difference in calculating 5-year return. The abnormal return percentage also varies widely between certain years. For instance, a 40.55% of positive return in 2019 and a 14.45% of positive return in 2020. This is mostly owing to the volatile stock price and dividend obtainable by the business, that directly affects total shareholder return.

The assumptions when consuming CAPM include that capital markets are perfectly operating and that all diversifiable risks are spread out. Accordingly, the projected rate of return (CAPM) in 2017 and 2018 is positive, while the actual rate of return is negative. Since the CAPM does not account for unsystematic risk in the market, this assumption would raise significant questions about the validity of the returns predicted by the method. Negative growth in shareholder returns may likewise be owing to a financial recession, because investors are more unwilling to capitalize in capital markets.

Hsiao et al., (2022) discussed that the market consists of diversifiable risk by 66% and undiversifiable risk diversifiable by 34%, while in the UK, undiversifiable risk is about 34% of the total risk of a single stock". All unsystematic risks can only be spread over a limited range. Therefore, it is important to consider both of these risks when calculating an investor's return on investment. For calculating CAPM, a number of data must be available. Gathering information and estimating main variables—risk-free rates and market rates of return—is not continuously readily available and can create issues. Likewise, it decreases the rationality and dependability of the model, which means it can be used to predict shareholder returns. Much research has been done on equity risk premiums, the problem is that most of them are based on historical data and do not use proper time series. The consequence of ERP is that when using shorter periods of time, ERP converts adverse for sampling data as long as 2 decades. Each company's beta is different and also based on historical data. An average and an estimate of the risk-free rate should be available in the period. The distance that the dated information consumes for these estimates can differ extensively.

This paper quite similar to the study completed by (Chiaramonte et al., 2020) in which the introduction of term deposit insurance reduced risk and trust in banks. In turn, term deposits create a larger banking system to ensure financial stability. Therefore, investors with secure credits can promise a smallest amount equal to the return of the principal, but in contrast to stocks, investors can get a return that is less than the principal. However, there is a risk-reward ratio between time deposits and stocks.

This study differs from some other studies, since the usefulness of a mathematical or scientific model depends largely on the rationality, accurateness as well as dependability of the data it provides and the rationality of the expectations on which it is constructed. CAPM appears to be built on some impractical expectations, for instance investor makes rational decisions, borrows at risk-free rates, as well as holds a varied portfolio. There are several other situations, such as if investors do not properly diversify their portfolios and are therefore exposed to unsystematic risk, which also distorts the appropriateness of beta as a risk



measure. Betas must generally be useful to guarantee that business risk is reflected in the portfolio of the investors. The beta's problem is that it has old information. Thus, the rationality of the beta of the current and forecast upcoming beta will depend heavily on its constancy in the long period of time past. Several studied argued that such a model must be previously experienced in order to be useful to investors (Okaro, 2022). Besides, (Tilfani et al., 2020) claims that it is hard to exam CAPM because indicator of stock market is used to estimate that market returns are bad proxies.

## 5. Research implication

CAPM has implications for asset pricing because it indicates what required rate of return should be used to determine the present value of an asset with a certain level of systematic risk ( $\beta$ ). In equilibrium, the expected return and systematic risk factor for each asset should be expressed as a point on the CAPM. The study's measured beta could help professionals make predictions.

## 6. Conclusions and Further Research Developments

This study examines the effectiveness of CAPM on individual stock and portfolio investments. It was concluded that CAPM is suitable as an indices of UK equity prices and an indicator in a basket of portfolio from 2016 - 2021. The results for each stock support that a linear CAPM relationship is sufficient to explain stock returns. Furthermore, we tested whether unique risk and its interaction with systemic risk should be an important aspect of CAPM capture, and the result reveal that only systemic risk alone is sufficient to clarify CAPM.

Regarding Markowitz's model, diversification of portfolio under Malaysia does not support the way in which higher returns are generated and risks are reduced. This may be because investing in a short period is not appropriate for diversification of portfolio. Nevertheless, the outcomes confirm that as the number of portfolio stocks increases, diversifiable risks are more diverse, but undiversifiable risks are not. Accordingly, it makes sense that positive investors with a low tolerance for risk are in better health investing in term deposits to earn risk-free interest and avoid annoying stock instability that could lead to undesirable returns.

Finally, investor can practise CAPM to measure UK stock performance and undiversifiable risks before investing in stock market. When they understand the company's stock trends and invest rationally accordingly, this can be a way to minimize downside risk. Additionally, UK companies' directors can practise CAPM as an agent to assess shareholder return and apply the right strategies in their management to increase earnings in meanwhile enhancing shareholder capital maximization. Although CAPM has some unrealistically important fundamental assumptions and problems arising from data collection, it is still a valuable model for investors and managers, and the alternatives may contain some problematic issues that could give the same result to investors and managers. Since then, each new model will have its own advantages and disadvantages.

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### سوودى مۆدئلى نرخبىدان به كاغزه داراييه كان له پيشبينيكردى داهاى خاوهن پشكه كان

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### پوخته

وه به رهينه ره كان به شيوه يهكى فراوان مۆدئلى و شيوه نرخبىدان به كاغزه داراييه كان به كارده هئىن، ئەمەش به مەبەستى ئاشكراكردنى داهاهه كان ياخود تېگه بىشتن له بارودۆخى پشكه كانىن. ئەم توئزىنه وه يه؛ لىكۆلئنه وه له سووده كانى ئەم مۆدئله (CAPM) له پيشبينيكردى داهاى خاوهن پشكه كان دهكات، به تاييهت كارايى ئەم مۆدئله له ههگبهى بازاره داراييه كانى به ريتايدا. به پى راپۆرته داراييه كانى كۆمپانىاى پيرسن، له سالانى 2016 تاكو 2021، كۆمپانىاى ناوبراو كۆى گشتى داهاى خاوهن پشكه كان (TSR) ي هه لىزاردوو به هه ژماركردنى تىچووى مۆلكه كان (Equity Cost)؛ ئەوهش به به كارهينانى قازانجى دابه شكارو و قازانجى هه بووه كان، شانبه شانى مۆدئلى (CAPM) ده رهنجام؛ ده رده كه وپت كه (CAPM) مۆدئلىكى گونجاوه بۆ ئاماژهى نرخی پشكه كان له به ريتانيا. ههروهها رېگه ده دات به به رپۆه به ران مۆدئلى (CAPM) وهك جىگه وه يهك به كاربهين، بۆ هه لسه نگاندى داهاى پشكه كان و هه مه جوركردنى هه گبه داراييه كان، به مەبەستى كه مكرده وهى مه ترسيه نارېكه كان، كه دواچار ده توانن سياهه تى دروست به كاربهين له به رپۆه بردندا بۆ زيادكردنى قازانج و سامانى خاوهن پشكه كان.

وشه سه ره كه يه كان: CAPM، داهاهه نااساييه كان و تىچووى مۆلكه كان.

### فائده نمودج تسعير الأصول الرأسمالية في التنبؤ بإجمالي المساهمين

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### ملخص

يستخدم المستثمرون على نطاق واسع نموذج تسعير الأصول الرأسمالية لفحص العوائد أو تغيير سلوك الأسهم. تتناول هذا البحث فائدة CAPM في التنبؤ بالعائد الإجمالي للمساهمين، وفعاليتها في محفظة الأوراق المالية المدرجة في المملكة المتحدة. اختارت شركة Pearson حساب تكلفة حقوق الملكية عن طريق حساب إجمالي عائد المساهمين (TSR) باستخدام عوائد توزيعات أرباح مناسبة ومكاسب رأس المال جنباً إلى جنب مع CAPM والبيانات ذات الصلة. تم ذلك في إطار عام 2016 إلى 2021 وفقاً لتقارير بيرسون المالية. وخلص إلى أن CAPM مناسب كمؤشر لأسعار الأسهم في المملكة المتحدة. يوضح أن CAPM خطي ولكنه لا يحتاج إلى التقاط المخاطر الفريدة والمنظمة. يمكن للمديرين استخدام CAPM كبديل لتقييم عوائد الأسهم وتوزيع المحافظ من أجل تقليل المخاطر غير المنتظمة، حتى يتمكنوا من تنفيذ السياسات الصحيحة في الإدارة لتعظيم الأرباح مع زيادة عائد المساهمين.

الكلمات الرئيسية: CAPM، العوائد غير الطبيعية و تكلفة حقوق الملكية