

CAPM and Fama and French Three-Five Factor Models

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Contributor: Asmâa Alaoui Taib, Safae Benfeddoul

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1. Introduction

There is a keen interest in the finance literature in the comprehension and explication of the relationship between risks and returns. Scientific researchers are particularly interested in modeling the relation between the return that investors expect to earn from their placements in stocks and the risk level associated with their investments.

The work of [Markowitz \(1952\)](#) marked the starting point of modern theoretical developments underlining the risk factors of expected returns. The original model, as theorized simultaneously and independently by [Sharpe \(1963, 1964\)](#), [Lintner \(1965\)](#) and [Mossin \(1966\)](#), includes only the market factor in explaining asset returns; this is the Capital Asset Pricing model (hereafter CAPM). The latter was and remains a guide for academics and practitioners given its simplicity and rigorous construction. However, the model has shown itself to be relatively empirically flawed.

The desire to revisit the model as a response to its imperfections has spurred several researchers into providing a variety of new empirical models. The most discussed financial asset valuation model is assigned to [Fama and French \(1992, 1993\)](#). Entitled the Fama and French three-factor (hereafter, FF3F) model (1993), it embraces others risk factors in addition to the CAPM beta, such as the mimicking returns for the size factor and the mimicking returns for the book-to-market factor. Despite the empirical success of the FF3F model, some studies have deemed it to be incomplete, and documented the improvements achieved with additional factors. Prompted by these conclusions, [Fama and French \(2015\)](#) put forward a new multi-index asset pricing model, the Fama and French five-factor (hereafter FF5F) model. The authors added two other factors to their traditional model (FF3F model): the investment and profitability factors.

The studies conducted on the risk–return relationship, especially those that are interested in the validity of the Fama and French models, first tend to investigate developed markets, before turning to emerging markets, in particular Asian markets such as China, India, Malaysia, Thailand, etc. However, the results show some discrepancies between the markets. The emerging markets have specific characteristics that can challenge established asset pricing models ([Zaremba and Czapkiewicz 2017](#); [Arabadi and Arabadi 2018](#) and [Ragab et al. 2020](#)). Very few studies have investigated African emerging markets (apart from South Africa), and specifically North African markets, where there is a remarkable gap. The literature regarding the application of asset pricing models in this market is sparse. Only two studies so far have been interested in the Moroccan context. [Aguenaou et al. \(2011\)](#) tested the explanatory power of the FF3F model and [Tazi et al. \(2022\)](#) compared the applicability of the FF3F model and the Carhart four-factor model¹ (hereafter, C4F model).

2. The Empirical Explanatory Power of CAPM and the Fama and French Three-Five Factor Models in the Moroccan Stock Exchange

In accordance with the theoretical advances of [Markowitz \(1952\)](#), [Sharpe \(1964\)](#) developed the CAPM, which is the basis of standard financial theory. Known as the one-factor model, it asserts that the expected asset return is explained by the single systematic factor beta (the market factor). However, [Roll \(1977\)](#) criticizes the CAPM's assumptions. For this author, the hypotheses of the model are idealistic. In addition, several empirical tests have revealed little support, such that the CAPM leaves stock returns unexplained. Despite its shortcomings, the model is still being considered as the fundamental milestone for all succeeding financial asset valuation models. [Fama and French \(1992, 1993\)](#) developed a new model by including in the CAPM beta two further factors, the size and the value premiums, in its reply to the two popular anomalies introduced, respectively, by [Banz \(1981\)](#) and [Stattman \(1980\)](#). The Fama and French three-factor model (1993) (hereafter

FF3F) has been used in describing the variation in stock returns in developed markets, and many studies have confirmed the significant role of the two additional factors in explaining stock returns (e.g., [Fama and French 2008](#); [Bhatnagar and Ramlogan 2012](#); [Walkshäusl and Lobe 2014](#)). Identical findings have also been acquired in studies carried out in emerging markets. [Bundoo \(2008\)](#) emphasized the robustness of the FF3F in describing the variation in Mauritius' returns even when taking into account time-varying betas. [Pasaribu \(2009\)](#) concluded a considerable increase in the explanatory power of FF3F compared to CAPM using data from the Brazilian market. For their part, [Xie and Qu \(2016\)](#) concluded that the FF3F can satisfactorily explain the variation in China's Shanghai stock exchange. [Ajlouni and Khasawneh \(2017\)](#) and [Shah et al. \(2021\)](#) derived similar results to [Pasaribu \(2009\)](#) when their models were tested on Amman and Pakistan's markets, respectively.

Furthermore, the FF3F model can span a number of areas, explaining its position in the literature. [Vidal-García et al. \(2018\)](#) tested the short-term market efficiency of the mutual fund industry using the CAPM, FF3F and C4F models. Additionally, [Boubaker et al.'s \(2018\)](#) study contributes to the literature on the FF3F model by examining the risk factors that best capture the financial distress risk in the French stock market.

Despite its success amongst academics and practitioners, many studies offer evidence that the FF3F model may be incomplete. In other words, adding the other two factors to the traditional CAPM model leads to insufficient improvements in capturing all the variations in stock returns. The important role of the investment factor and the profitability factor in describing the average stock returns is emphasized, respectively, by [Titman et al. \(2004\)](#) and [Novy-Marx \(2013\)](#). Motivated by the authors' conclusions, [Fama and French \(2015\)](#) expanded the FF3F model and introduced two further factors to take into account profitability and investment patterns. Therefore, the Fama and French five-factor (hereafter FF5F) model outperforms the traditional FF3F model. [Fama and French \(2017\)](#) compared the abilities of both their models to explain returns in an international sample of 23 developed markets in Asian, Europe and North America. Although formal tests may commonly reject the FF5F model, the results highlight the prevalence of the model over the FF3F model in describing returns in these regions. Furthermore, [Lin \(2017\)](#) confirmed the robustness of the FF5F model in China's stock market. [Leite et al. \(2018\)](#) derived similar results when the model was tested in Chinese, Indian, Malay and Thai markets.

However, the FF5F shows little sensitivity to some markets' average equity returns in other studies. [Chiah et al. \(2016\)](#) reported that, despite the preeminence of the FF5F model over the FF3F model, it could not explain all the variations in Australian returns. Contrary to [Lin \(2017\)](#) and [Leite et al. \(2018\)](#), [Guo et al. \(2017\)](#) found a marginal contribution of the investment factor in explaining Chinese returns. In Poland, [Zaremba et al. \(2019\)](#) compared four popular factor models—CAPM, the FF3F model, the C4F model and the FF5F model. As a result, the authors concluded that the four-factor model is the most appropriate model for Polish market returns. From the same perspective, [Foye and Valentinčič \(2020\)](#) conducted a comparative test of the competing model on the Indonesian stock exchange. Despite the improvement induced by the FF5F model compared to the FF3F model, the study's results are not very encouraging as regards using the FF5F model in Asian countries, which confirms the findings of his previous study ([Foye 2018](#)). Similarly, [Dolinar et al. \(2020\)](#) noticed that the FF5F model works more effectively than the FF3F model, but only marginally. Approximately half of the variation in Croatian stock returns remains unexplained by the model.

Regarding the African emerging markets, the literature on testing the explanatory power of asset pricing models is sparse. While studying the Egyptian market, [Ragab et al. \(2020\)](#) found that despite the superiority of the FF5F model over competing models, it provides incomplete explanations of the variations in returns. On the South African market, [Charteris et al. \(2018\)](#) found that the FF5F model performed better compared to the FF3F and C4F models. Similarly, [Cox and Britten \(2019\)](#) emphasized the superiority of the FF5F model over the FF3F model, as well as other factor combinations, on the Johannesburg Stock Exchange. However, neither study's results show the same magnitude as those reported by [Fama and French \(2015\)](#).

[Aguenau et al. \(2011\)](#) tested the explanatory power of the FF3F model. However, inconsistent with [Fama and French's \(1993\)](#) methodology, the authors include both non-financial and financial companies (banks, financial institutions, and assurance companies) in their study sample. As [Fama and French \(1993\)](#) argued, those stocks are excluded because of their high financial leverage. [Tazi et al. \(2022\)](#) investigated whether the FF3F model or the C4F model performs better in capturing the variation in the Moroccan stock exchange. Their findings show that both models are partially effective in predicting Moroccan stock returns.

References

1. Markowitz, Harry. 1952. Portfolio Selection: Efficient Diversification of Investments. New York: Yale University Press.
2. Sharpe, William F. 1963. A Simplified Model for Portfolio Analysis. *Management Science* 9: 277–93.
3. Sharpe, William F. 1964. Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *Journal of Finance* 19: 425–42.
4. Lintner, John. 1965. The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *Review of Economics and Statistics* 47: 13–37.
5. Mossin, Jan. 1966. Equilibrium in a capital Asset Market. *Econometrica* 4: 768–83.
6. Fama, Eugene F., and Kenneth R. French. 1992. The Cross-Section of Expected Stock Returns. *Journal of Finance* 47: 427–65.
7. Fama, Eugene F., and Kenneth R. French. 1993. Common risk factors in the returns on stocks and bond. *Journal of Financial Economics* 33: 3–5.
8. Fama, Eugene F., and Kenneth R. French. 2015. A five-factor asset pricing model. *Journal of Financial Economics* 116: 1–22.
9. Zaremba, Adam, and Anna Czapkiewicz. 2017. Digesting anomalies in Emerging European markets: A comparison of factor pricing models. *Emerging Markets Review* 31: 1–15.
10. Alrabadi, Dima Waleed Hanna, and Hanna Waleed Hanna Alrabadi. 2018. The Fama and French Five Factor Model: Evidence from an Emerging Market. *Arab Journal of Administration* 38: 295–304.
11. Ragab, Nada S, Abdou K. Ragab, and Ahmed M. Sakr. 2020. A Comparative Study between the Fama and French Three-Factor Model and the Fama and French Five-Factor Model: Evidence from the Egyptian Stock Market. *International Journal of Economics and Finance* 12: 52–69.
12. Aguenau, Samir, Jawad Abrache, and Brahim El Kadiri. 2011. Testing The Fama French Three Factor Model in The Moroccan Stock Market. *International Journal of Business, Accounting and Finance* 5: 57–66.
13. Tazi, Omar, Samir Aguenau, and Jawad Abrache. 2022. A comparative study of the Fama-French three factor and the Carhart four factor models: Empirical Evidence from Morocco. *International Journal of Economics and Financial Issues* 12: 58–66.
14. Roll, Richard. 1977. A critical of the asset pricing theory's tests Part 1: On part and potential testability of the theory. *Journal of Financial Economics* 4: 129–76.
15. Banz, Rolf W. 1981. The relationship between return and market value of common stocks. *Journal of Financial Economics* 9: 3–18.
16. Stattman, Dennis. 1980. Book values and stock returns. *The Chicago MBA: A Journal of Selected Papers* 4: 25–45.
17. Fama, Eugene F., and Kenneth R. French. 2008. Dissecting anomalies. *The Journal of Finance* 63: 1653–78.
18. Bhatnagar, Chandra Shekhar, and Riad Ramlogan. 2012. The Capital Asset Pricing Model versus the three-factor model: A United Kingdom perspective. *International Journal of Business and Social Research* 2: 51–65.
19. Walkshäusl, Christian, and Sebastian Lobe. 2014. The alternative three-factor model: An alternative beyond US Markets? *European Financial Management* 20: 33–7.
20. Bundoo, Sunil Kumar. 2008. An Augmented Fama and French three factor model: New evidence from an emerging stock market. *Applied Economics Letters* 15: 1213–18.
21. Pasaribu, Rowland. 2009. Stock Portfolio with Fama-French Model in Indonesian Stock Exchange. *Journal of Accounting and Business* 9: 1–12.
22. Xie, Shiqing, and Qiuying Qu. 2016. The three-factor model and size and value premiums in China's stock market. *Emerging Markets Finance and Trade* 52: 1092–95.
23. Ajlouni, Moh'd Mahmoud, and Maher Khasawneh. 2017. Empirical test of Fama and French three-factor model in Amman Stock Exchange. *European Scientific Journal* 13: 78–106.
24. Shah, Syed Hamid Ali, Attaullah Shah, Muhammad Kamran Khan, and Hamidullah Ullah. 2021. The Risk and Return Relations: New Evidence from Pakistani Stock Market. *Journal of Accounting and Finance in Emerging Economies* 7: 195–204.
25. Vidal-García, Javier, Marta Vidal, Sabri Boubaker, and Majdi Hassan. 2018. The efficiency of mutual funds. *Annals of Operations Research* 267: 555–84.

26. Boubaker, Sabri, Taher Hamza, and Javier Vidal-García. 2018. Financial distress and equity returns: A leverage-augmented three-factor model. *Research in International Business and Finance* 46: 1–15.
27. Titman, Sheridan, K. C. John Wei, and Feixue Xie. 2004. Capital investments, and stock returns. *Journal of Financial and Quantitative Analysis* 39: 677–700.
28. Novy-Marx, Robert. 2013. The other side of value: The gross profitability premium. *Journal of Financial Economics* 108: 1–28.
29. Fama, Eugene F., and Kenneth R. French. 2017. International tests of a five-factor asset pricing model. *Journal of Financial Economics* 123: 441–63.
30. Lin, Qi. 2017. Noisy prices and the Fama–French five-factor asset pricing model in China. *Emerging Markets Review* 31: 141–63.
31. Leite, André Luis, Marcelo Cabus Klotzle, Antonio Carlos Figueiredo Pinto, and Aldo Ferreira da Silva. 2018. Size, value, profitability, and investment: Evidence from emerging markets. *Emerging Markets Review* 36: 45–59.
32. Chiah, Mardy, Daniel Chai, Angel Zhong, and Song Li. 2016. A better model? An empirical investigation of the Fama–French five-factor model in Australia. *International Review of Finance* 16: 595–638.
33. Guo, Bin, Wei Zhang, Yongjie Zhang, and Han Zhang. 2017. The five-factor asset pricing model tests for the Chinese stock market. *Pacific-Basin Finance Journal* 43: 84–106.
34. Zaremba, Adam, Anna Czapkiewicz, Jan JakubSzczygielski, and Vitaly Kaganov. 2019. An Application of Factor Pricing Models to the Polish stock Market. *Emerging Markets Finance & Trade* 55: 2039–56.
35. Foye, James, and Aljoša Valentinčič. 2020. Testing factor models in Indonesia. *Emerging Markets Review* 42: 100628.
36. Foye, James. 2018. A comprehensive test of the Fama-French five-factor model in emerging markets. *Emerging Markets Review* 37: 199–222.
37. Dolinar, Denis, Sara Lončarević, and Zrinka Orlović. 2020. Test of the Fama-French Five-Factor Model on the Croatian stock market. Paper presented at the FEB Zagreb International Odyssey Conference on Economics and Business, Šibenik, Croatia, June 16–20; vol. 2, pp. 286–97.
38. Charteris, Ailie, Mukashema Rwishema, and Tafadzwa-Hidah Chidede. 2018. Asset pricing and momentum: A South African perspective. *Journal of African Business* 19: 62–85.
39. Cox, Shaun, and James Britten. 2019. The Fama-French five-factor model: Evidence from the Johannesburg Stock Exchange. *Investment Analysts Journal* 48: 240–61.

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