Modern Finance

Modern Finance Institute

Article

Exploring fundamental anomalies: Evidence from the Moroccan stock market

Safae Benfeddoul[1]* and Asmâa Alaoui Taïb[1]

[1] Laboratory of Research and Studies in Management, Entrepreneurship and Finance (LAREMEF), The National School of Business and Management, Sidi Mohamed Ben Abdellah University, Fez, Morocco

* Safae Benfeddoul, The National School of Business and Management, Sidi Mohamed Ben Abdellah University, Route D'immouzer, B.P A81, 30000, Fez, Morocco. E-mail: safae.benfeddoul@gmail.com.

Abstract: Fundamental anomalies are explored, for the first time, in the Moroccan stock market. The sample includes non-financial companies from July 2001 to June 2020. We carry out, initially, sorts of returns on anomaly indicators, then, we follow through a regression analysis using a fixed-effect model and the system generalized method of moments methodology. The findings emphasize a significantly positive relationship between returns and the book-to-market ratio and a significantly negative relationship between returns and each of the price-to-earnings and the price-to-cash flow ratios. Regarding the size and the leverage effects, the findings highlight their absence. Finally, we cannot ascertain the existence of a positive or negative price-to-sales effect considering the contradictory results of the tests.

Keywords: Fundamental anomalies; size effect; value effect; leverage effect; fixed-effect model; dynamic panel model; SGMM methodology; Moroccan stock market.

JEL Classification: G11, G12

1. Introduction

The pronounced association between the fundamental characteristics of firms and stock returns is heavily documented in the financial literature. The presence of abnormal returns, unexplained by the CAPM, is closely linked to the specific characteristics of firms. Size, book-to-market ratio (B/M), price-to-cash flow ratio (P/CF), price-to-earnings ratio (P/E), price-to-sales ratio (P/S), and debt-to-equity ratio (D/E) are the most extensively adopted and accepted fundamental ratios among researchers, partitioners, and investors. The in-depth examination of fundamental anomalies has revealed a crucial impact on investors' decisions to exploit market inefficiencies considering the semi-strong efficiency market hypothesis. Several researchers noticed dissimilarities between emerging and developed markets due to their divergent characteristics (Akhtar, 2021).

Studying anomalies in emerging markets is further emphasized by their distinctive attributes, such as information asymmetry, limited trading activity, higher volatility, and a smaller pool of investors. Harvey (1995) further emphasizes additional features, noting that emerging markets often violate the implicit assumption of full integration of world capital markets. Additionally, the author highlights that these markets are generally more predictable than developed markets and are likely more influenced by local information rather than global factors. The growing appeal of emerging markets for investment and diversification can be attributed to globalization, electronic trading, effective communications, and increased awareness of capital market opportunities. Examining anomalies in these markets provides valuable insights for both local and international investors, supporting the development of investment strategies, portfolio construction, and diversification decisions.

Citation: Benfeddoul, S., & Alaoui Taïb, A. (2024). Exploring fundamental anomalies: Evidence from the Moroccan stock market. *Modern Finance*, *2*(2), 120-135.

Accepting Editor: Adam Zaremba

Received: 8 October 2024
Accepted: 8 December 2024
Published: 12 December 2024

Emerging markets are predominantly inefficient, generating abnormal returns (Benfeddoul & Alaoui Taïb, 2024). This raises an important question: How do anomalies manifest in these markets, and how do they differ from those in developed markets? This study focuses on the Moroccan stock exchange, aiming to explore fundamental anomalies extensively reported in financial literature but scarcely examined in emerging markets. Existing research often tests asset pricing models to confirm or deny one specific anomaly rather than holistically investigating anomalies. To our knowledge, this study is the first of its kind to address this gap in the Moroccan market, making a valuable contribution to the literature on emerging markets.

The Moroccan stock exchange holds particular interest for several reasons. Established in 1929, it is the first stock exchange in the Maghreb and West Africa and the second in Africa after the Johannesburg stock market. The Casablanca stock exchange has made significant strides in innovation and modernization, joining the World Federation of Exchanges in 2010 and achieving ISO 9001 certification from 2011 to 2014. Furthermore, through the Casablanca Finance City initiative, Morocco has established itself as a leading financial hub in Africa, consistently ranked at the top of the Global Financial Centers Index for the continent since 2016.

In this study, we analyze all shares listed on the Casablanca Stock Exchange, excluding financial securities, over the period from July 2001 to June 2020. Two methodologies are chosen to address the study's question. Initially, we carry out sorts of returns on anomaly indicators. Secondly, we perform a regression analysis using a fixed-effect model and the system generalized method of moments (SGMM, hereafter) methodology.

The findings indicate a high degree of consistency across the methodologies employed, with results remaining homogeneous regardless of the approach used. Specifically, the analysis reveals a positively significant relationship between Moroccan stock returns and the B/M ratio, alongside a negatively significant relationship between returns and both the P/E and P/CF ratios. Conversely, the size and leverage effects appear absent, as evidenced by the insignificance of their coefficients. An exception is observed with the P/S ratio, where results diverge based on the methodology employed; univariate analysis suggests a significant negative relationship between the P/S ratio and returns, whereas regression analysis reveals a significantly positive relationship. The study's results underscore the presence of a value effect in the Moroccan stock market, consistent with observations of value phenomena in emerging markets, as highlighted by Barry et al. (2002).[1]

The analysis outcomes contribute to the expanding literature on fundamental anomalies in emerging and, specifically, African markets through the case study of the Moroccan market. Notably, the absence of both size and leverage effects is consistent with prior research in similar contexts. For instance, the lack of a size effect has been reported in other African markets such as Ghana by Abrokwa and Nkansah (2015) and Egypt by Abd-Alla and Sobh (2020). Similarly, the insignificance of the D/E effect aligns with findings from studies on emerging markets, such as the Karachi stock market (Shabib-ul-Hasan et al., 2015; Mustafa et al., 2017). Furthermore, the significant effects of B/M, P/E, and P/CF observed in this study are in harmony with the patterns documented by Cakici et al. (2017) in the Chinese stock market. Specifically, the positive B/M effect in the Moroccan market corroborates Alaoui Taïb and Benfeddoul (2023) findings, reinforcing its relevance in this local context. However, the P/S ratio presents a more complex picture, as univariate analysis yields different results than regression analysis, which employs both the fixed effects model and the SGMM methodology. Regression analysis is recognized in the literature for providing more precise and detailed insights than the portfolio approach (Jaffe et al., 1989; Cakici et al., 2017). The findings suggest that, in the Moroccan market, where two methodologies align against a single one, the P/S effect

[1] The authors found strong evidence supporting the presence of a value effect while studying 35 emerging markets.

might be inverse. While this divergence contrasts with much of the existing literature in developed markets (Barbee et al., 1996; Mukherji et al.,1997; Barbee et al., 2008), it is consistent with Akhtar's (2021) findings, which similarly reported an inverse P/S effect using comparable models.

The subsequent segments of our research are outlined as follows: We begin with a succinct literature review, followed by a description of the study's data and methodology. Ultimately, we summarize and discuss the empirical analysis findings.

2. Literature Review

The literature widely covers the size and the B/M effects. In this paper, our intention is not to provide an exhaustive literature review; instead, we will concentrate on pioneering studies and a handful of research studies conducted in emerging markets. Comparatively, there is a paucity of studies on the P/E, P/CF, P/S, and D/E effects. We will present the studies we have uncovered, especially in emerging markets.

2.1. The size effect

The size effect is one of the most investigated anomalies in the literature. Banz's (1981) study is the first to highlight its presence in the American market. According to the author, firms with small capitalization show higher returns than those with large capitalization. The pronounced size effect is also documented in subsequent publications of Fama and French (1992, 1993).

Concerning emerging markets, Barry et al. (2002) examined the robustness of the size and the B/M effects in 35 emerging markets and noticed that results related to the size effect lack robustness compared to the significant presence of the B/M effect. In disagreement with Banz's results, Kyriazis and Diacogiannis (2007) concluded that the small-firm effect is limited in the Athens stock exchange. In other words, when studying the effect in years separately, the authors observed its presence in some. However, when considering the entire study period, the difference in returns between small and large stocks is statistically insignificant. Nevertheless, Al-Mwalla (2012) confirmed the persistence of a strong size effect in the Amman stock market. In line with those findings, Akhtar et al. (2017) examined jointly size, value, momentum, and liquidity effects on stock returns for the Indian market. They lent significant support to the association between size and stock returns. Similarly, Leite et al. (2018) noted clear evidence of size effect in average stock excess returns of 12 emerging markets including Brazil, Chile, Mexico, Argentina, India, China, Thailand, Malaysia, Turkey, Poland, Romania, and Russia.

Concerning African markets, Page and Palmer (1991) studied the Johannesburg Stock Exchange and found no size effect on stock returns. In their paper, Acheampong et al. (2014) observed a minimal size effect within the manufacturing sector of the Ghana stock market. Abrokwa and Nkansah (2015) revealed that the relation between stock returns and size is statistically insignificant in the same market. Nevertheless, Boamah et al. (2017), concerning exploring regionality-integrated asset pricing on the African stock markets via the Fama and French model (1993), highlighted the presence of the size effect on the pooled African stock markets. In line with Page and Palmer (1991), in the context of testing the validity of the Fama and French three-factor model (1993) in explaining stock returns, Abd-Alla and Sobh (2020) concluded the absence of the small firm effect in the Egyptian stock market.

Considering the Moroccan market, while proposing an alternative three-factor model to describe the variation returns for the North African emerging markets, Hearn (2011) revealed the existence of the size effect in the Moroccan context, but it was the lowest level of significance compared to Egyptian and Tunisian Markets. Furthermore, Aguenaou et al. (2011) and Alaoui Taïb and Benfeddoul (2023) concluded that the size effect is not as pronounced as the value effect was.

2.2. The B/M effect

The B/M effect assumes that firms with a high B/M ratio tend to have higher returns than those with a low B/M ratio. Stattman's (1980) and Rosenberg et al. (1985) studies are the original works exploring the relationship between the inverse B/M (Market-to-book) ratio and stock returns in the American market. This relationship has been strengthened in the Fama and French papers. Initially, in 1992, while studying NYSE, AMEX, and NASDAQ markets, the authors found that companies with a high B/M outperform those with a lower ratio and the B/M ratio shows a greater explanatory power than the earnings/price ratio. Furthermore, Fama and French (1993) confirmed the B/M effect during a new study period. The positive association between the stock returns and the B/M ratio is strongly documented in several markets apart from the US. More recently, Fama and French (2017), while conducting an international test of their five-factor model, confirmed a strong positive relation between average stock returns and the B/M ratio among North American, European, and Asian Pacific markets.

Pertaining to emerging markets, the presence of the B/M effect is heavily proven in different studies. Barry et al. (2002) documented the significant presence of B/M effect in 35 emerging markets. In the context of testing the validity of the Fama and French three-factor model (1993) and its extensions, the presence of the B/M effect was confirmed in numerous markets, including New Zealand (Nartea, 2009), Amman (Al-Mwalla, 2012), Malaysia (Kheradyar et al., 2011). In accordance with those findings, Cakici et al. (2013) observed strong evidence for the value effect in all 18 emerging markets studied. In the Indian market, Akhtar et al. (2017) supported the significant association between stock returns and the B/M ratio. The role assigned to the B/M effect over other fundamental anomalies is confirmed by Nivoix and Guo (2018). The authors examined jointly the P/E and B/M effects in the Shanghai and Shenzhen markets and found, at the opposite of no P/E effect, a significant B/M effect in the markets. On the other hand, Hsu (2015) and Suyanto and Sibarani (2018) found no B/M effect in Taiwan and Indonesian stock markets, respectively. For their part, Leite et al. (2018) documented little evidence of a high B/M effect.

As far as African markets are concerned, Boamah et al. (2017), in their study of 10 African stock markets, including Morocco, concluded that the B/M effect was more pronounced than the size effect. Similarly, Aguenaou et al. (2011) and Alaoui Taïb and Benfeddoul (2023) highlighted the dominance of the value effect over the size effect.

2.3. The P/E effect

The P/E effect is the earliest fundamental anomaly documented in the literature. The study of Basu (1977) emphasized that portfolios including lower P/E ratio stocks realized greater returns, as opposed to portfolios with a higher P/E ratio. Since the publication of this pioneering research, a huge body of literature has developed on the P/E effect and confirmed its presence in different stock markets. However, the primary concern of researchers was whether one of the size and P/E effects does not dominate the other in average returns, even more, they affirmed that it is not obvious to dissociate the two effects (Ball, 1978; Banz,1981; Reinganum, 1981). In response to these advances, Basu (1983) again confirmed, in an updated version of his paper, that, even after controlling for size firms, the inverse relationship between the P/E ratio and average stock returns persisted. Similarly, Jaffe et al. (1989) identified, over the studied period, a significant earnings yield effect (the inverse P/E effect) but a significant size effect only in January. While studying, all NYSE, AMEX, and Nasdaq firms, Nathan et al. (2001) observed that the excess returns from trading strategies commonly used the P/E ratio is relatively low compared to those based on the P/S ratio.

When it comes to emerging markets, most studies have been directed toward Asian stock markets. Using data from Singapore and Malaysia, Lau et al. (2002) examined the relationship between stock returns and different indicators, including the inverse of the

P/E ratio (E/P). Regarding the Singapore market, the authors identified no E/P effect. However, the authors confirmed the positive relationship between returns and the E/P ratio in Malaysia. They noted that neither the E/P effect encompasses the size effect, nor does the size effect encompass the E/P effect. Contrary to Jaffe et al. (1989), they concluded that the E/P effect is only significant in non-January months. In accordance with Basu (1977, 1983), Kyriazis and Diacogiannis (2007) spotlighted the existence of the P/E anomaly in the Athens Stock Market. In the Taiwan stock market, Hsu et al. (2015) found that portfolios with a high E/P ratio have larger mean returns than those with a low ratio. In addition, the authors conclude that the E/P or dividend-to-price ratios are better than the B/M ratio as a value-growth proxy in Taiwan. Nevertheless, Cakici et al. (2017) hold a different opinion on the preeminence of the E/P indicator in China. They observed that the E/P ratio produced high differences in both risk-adjusted and raw returns between the top and bottom quintiles. However, these differences were not as pronounced as those resulting from the inverse of the P/CF (CF/P) ratio and the B/M ratio. The E/P ratio ranks last in terms of effect robustness. Conversely, Liu et al. (2019) joined Hsu et al. (2015) and considered that the E/P ratio is the best indicator for capturing the value effect in China. They used the E/P ratio instead of the B/M ratio to construct their value factor. From his perspective, Akhtar (2021) investigated the influence of market multiples on stock returns in emerging (ASEAN) markets in comparison with developed (European) markets. He concluded that, in ASEAN markets, the P/E indicator affects negatively stock returns. However, Alhashel (2021) agreed with the results of Lau et al. (2002). No significant relation has been found between the E/P ratio and average returns, whether in the overall GCC market or when examining the Kuwaiti and Saudi markets separately. The author argued that the absence of an E/P effect suggests that current earnings may not provide insights into future firm earnings.

In the context of African markets, Page and Palmer (1991), based on the Fama and MacBeth regression, found that the E/P effect is economically and statistically significant in the Johannesburg Stock Exchange. The opposite is true when considering the Ghana market. Indeed, Abrokwa and Nkansah (2015) found that the relation between the P/E ratio and stock returns is not statistically significant.

2.4. The P/CF effect

The fundamental anomaly associated with the P/CF ratio is indicated by the presence of an abnormally high return for stocks with a lower ratio unlike those with a higher ratio. Such a pattern in stock returns is highlighted for the first time by Chan et al. (1991) in the Japanese stock market. The authors tested the predictive power of four fundamentals (size, B/M ratio, earnings yield, and cash flow yield). They concluded that the CF/P ratio has the most significant positive impact on expected returns. Similar results were reported by Lakonishok et al. (1994) in the American market. Moreover, the authors revealed that stocks with high CF/P ratios exhibited greater return spreads than stocks with high B/M or E/P ratios. In 1998, Fama and French confirmed the presence of the CF/P effect besides three others (B/M, E/P, and Dividend/P) in 12 core markets, consisting of the US, the UK, France, Switzerland, the Netherlands, Germany, Belgium, Hong Kong, Singapore, Australia, Sweden, and Japan.

As with the P/E effect in emerging markets, most studies on the P/CF effect strongly focus on Asian markets. Lau et al. (2002) also examined the relationship between returns and CF/P ratio in Singapore and Malaysia. Based on the univariate analysis, the portfolio of high CF/P stocks outperforms the portfolio of low CF/P stocks in both countries, but neither is statistically significant. A negatively significant relationship between stock returns and the P/CF ratio is reported by Akhtar and Rashid (2015) while examining, in the case of the Pakistan stock market, the relationship between market multiples and portfolio returns. Consistently to Chan et al. (1991) and Lakonishok et al. (1994), the preeminence of the CF/P effect is documented in China by Cakici et al. (2017), where the largest differences in both risk-adjusted raw and returns between the highest and lowest

quintiles are observed when stocks are ranked by their CF/P ratio, followed by the B/M ratio and then the E/P ratio. In their study, Nudrat et al. (2017) confirmed the presence of a positive relation between the CF/P ratio and stock returns in Pakistan, India, and China stock markets. A similar pattern is observed by Kakinuma (2020) in the Thai market. Furthermore, the author concluded that portfolios sorted on the CF/P ratio consistently exhibit the strongest performance in outperforming the market. On the other hand, Akhtar (2021) documented a positive relationship between the P/CF ratio and stock returns in Indonesia, Malaysia, Philippines, Singapore, and Thailand stock markets.

The only study about African markets known to us is the one conducted by Hanauer and Lauterbach (2019). They tried to investigate anomalous returns in 28 emerging markets, including three African markets: Egypt, Morocco, and South Africa. The authors conclude that the CF/P effect is pervasive in equal-weighted and value-weighted portfolio classifications and cross-sectional regressions.

2.5. The P/S effect

The P/S effect was initially documented by Fisher (1984), who suggested that firms with low (high) P/S ratios are more favored (less favored) by investors, creating opportunities for buying (selling). In other words, stocks with the lowest P/S ratio generate increased returns. Those findings found their support by Barbee et al.'s (1996) research. The authors concluded that the inverse of the P/S ratio (S/P) has a positively significant relation with stock returns. Furthermore, the indicator exhibits more robust associations with stock returns than the B/M and size. Mukherji et al. (1997) validated this positive association in the Korean stock exchange and found that stocks with a higher S/P indicator have higher returns. For their part, Nathan et al. (2001) highlighted the dominance of the P/S effect in the American market. They noted that the excess returns from investment strategies based on this ratio are largely higher than those using the P/E ratio. In their study, Barbee et al. (2008) analyzed the relationship between four market ratios (P/E, P/CF, P/B, and P/S) and American stock returns. The authors found that the P/S ratio has the most consistently significant negative relationship with returns compared to other indicators.

In terms of emerging markets, there is a scarcity of studies dedicated to them. The positive relation between the S/P ratio and stock returns is earlier reported by Sheu et al. (1998) in the Taiwan stock market. The same results were observed by Rahmani et al. (2006) in Iran's stock market but just in one year. While the authors separately examined the S/P effect over the years, they found, on the contrary, a negative relationship, hence an inverse effect, for four consecutive years. On the other hand, Öztürk and Karabulut (2020) confirmed the P/S effect in the Istanbul stock market as stocks with a lower P/S ratio led to higher returns for the study's period. Consistently with Rahmani et al.'s (2006) conclusions, Akhtar (2021) found an inverse P/S effect in both ASEAN and European markets. The author noted a positively significant relationship between stock returns and the P/S ratio.

2.6. The D/E effect

Bhandari (1988) studied, for the first time, the relationship between the leverage ratio and the average stock returns in the American market. The findings showed the presence of a significant positive relation between stock returns and the D/E ratio. Companies with high D/E ratios are overperforming. However, Harris and Raviv (1991) found that average returns are negatively associated with the D/E ratio. In line with Bhandari's (1988) conclusions, Barbee et al. (1996) and Mukherji et al. (1997) found that stocks with a higher leverage have higher returns in the American and the Korean stock markets, respectively. Nevertheless, Penman et al. (2007) and George and Hwang (2010) agree with Harris and Raviv's (1991) conclusions about the American market. Furthermore, George and Hwang (2010) rejected the hypothesis that this negative relation is due to mispricing (Penman et

al., 2007). The same results are documented by Muradoğlu and Sivaprasad (2012) in the London stock market.

When discussing emerging markets, several research papers focus primarily on the Asian continent. In line with Bhandari (1988), many researchers in different developing markets document the positive relationship between the D/E ratio and stock returns. Ramlah (2021) indicated in their studies conducted in the Indonesian stock market that leverage positively influenced stock returns. However, other studies aligned with Penman et al. 's (2007) findings and indicated the negative association between D/E and stock returns. In the Istanbul stock market, Koseoglu (2014), Öztürk and Yılmaz (2015), and Öztürk and Karabulut (2020) found that companies having lower leverage ratios tend to achieve stronger performance in comparison to those with higher leverage levels.

In addition to the previously documented contradictory results in developed and emerging markets, some studies indicate the absence of any leverage effect in certain emerging markets. Samarakoon (1998) found that there is no significant relationship between D/E and average returns in the Sri Lankan stock market. Similarly, the findings of Rahmani et al. (2006) affirmed the lack of a significant leverage effect in the Tehran market. Corroborating those results, Shabib-ul-Hasan et al. (2015) and Mustafa et al. (2017) found no statistically significant relationship between financial leverage and returns in the Karachi Stock Exchange. In Malaysia, Jakpar et al. (2019) revealed that the D/E ratio did not have any impact on stock returns. Regarding their research, Maiti and Balakrishnan (2020) concluded that, in the Indian context, an intricate relationship exists between the D/E ratio and stock returns.

Although the leverage effect occupies an important place in the financial literature and is linked to numerous economic and financial areas, very few studies explore this anomaly in the African market. As far as we know, the only study conducted in the Ghana stock market is by Acheampong et al. (2014). The authors align with the prevailing research that identifies an inverse leverage effect.

3. Data and Methods

Our study uses unbalanced panel data for non-financial Moroccan companies from July 2001 to June 2020. We compiled data sourced from both the Refinitiv database and the Moroccan stock exchange website. After excluding firms with missing information, the remaining sample totals 50 companies—the number of firms considered in the sample increases yearly. Once a company is included in the sample, all its available data from the inclusion date up to the end of the study period are considered. Notably, there are no gaps in the data for a company once it is part of the sample. We opted for an unbalanced panel data sample on account of the small number of stocks traded in the Moroccan stock exchange as well as the availability of data.

According to Fama and French (2008), except for size, we respect the lag of 6 months for variables. The fundamental anomalies which are used in the present paper for July t to June of t+1, are: size effect, measured by the natural log of market capitalization in June t; B/M effect, measured by the natural log of the ratio of book equity for December t-1 divided by market equity in December of t-1; P/E effect, measured by the ratio of price/earnings for December t-1; P/CF effect, measured by the ratio of price/Cash flows for December t-1; P/S effect, measured by the ratio of price/sales for December t-1; D/E effect, measured by the ratio of Debt-to-equity for December t-1. We consider the stock holding period return (HPR, hereafter) as the return rate investors achieve through long-term stock ownership. In our study, consistent with Akhtar (2021), we choose twelve months as a holding period.[2] Table 1 represents the descriptive statistics of all studied variables.

[2] Many are studies prioritizing to use a long-short strategy (Lakonishok et al., 1994; Bird & Casavecchia, 2007; Akhtar, 2021). However, the period of holding is not specified.

Table 1. Descriptive statistics of dependent and independent variables

Variables	Mean	Standard deviation
HPR	0.063	0.440
Size (millions MAD)	5 980	17 500
B/M	0.636	0.477
P/E	18.673	29.754
P/CF	11.052	25.257
P/S	2.506	8.840
D/E	0.469	0.604

Note: The table presents the average values and standard deviations for both dependent and independent variables. The dependent variable is the stock holding period return (HPR), defined as the return rate investors achieve through long-term stock ownership with a holding period of twelve months. For all anomaly variables, which serve as the independent variables, a six-month lag is applied, except for size. The fundamental anomalies considered for the period from July of year t to June of year t+1 are as follows: size effect, measured by the natural log of market capitalization in June t; B/M effect, measured by the natural log of the ratio of book equity for December t-1 divided by market equity in December of t-1; P/E effect, measured by the ratio of price/earnings for December t-1; P/CF effect, measured by the ratio of price/Cash flows for December t-1; P/S effect, measured by the ratio of price/sales for December t-1; D/E effect, measured by the ratio of Debt-to-equity for December t-1.

As noted by Jaffe et al. (1989), studies applying the ANOVA approach, do not provide point estimates of statistical relations, more in-depth analyses are needed. Regression analysis is commonly employed to validate findings achieved through the portfolio approach and to capture an intricate relation that cannot be revealed using this approach (Cakici et al., 2017). Additionally, Fama and French (2008) reported that the regression analysis has the power to identify the return effects of anomalies. Therefore, we carry out, in addition to the univariate analysis returns, a regression analysis to measure the intercept and coefficients of fundamental indicators for Moroccan stock returns by using a fixed-effect model as a preliminary analysis. In accordance with Akhtar (2021), we measure the relationship between fundamental variables and stock HPR with the upcoming formula:

$$\mathrm{HPR} = \alpha + \beta_1 * Size + \beta_2 * B/M + \beta_3 * P/E + \beta_4 * P/CF + \beta_5 * P/S + \beta_6 * D/E + \varepsilon \quad (1)$$

with,

α: is the equation's constant.

β_1, β_2, β_3, β_4, β_5, β_6: are the coefficients of the six fundamental variables (Size, B/M, P/E, P/CF, P/S and D/E., respectively)

ε: is the equation's error term.

Then, we adopt Blundell and Bond's (1998) SGMM methodology[3] for dynamic panels, as it is well-established in the literature that substantial challenges can emerge when applying the ordinary least square (OLS) to estimate equations in this context. Furthermore, this methodology can easily deal with unbalanced panel data. To address issues arising from the proliferation of instruments, we employed the "xtabond2" Stata command, as introduced by Roodman (2009).

[3] SGMM methodology is based on Arellano and Bond (1991) which is an efficient approach to handle endogeneity and heterogeneity issues.

4. Results and Discussion

4.1. The univariate analysis returns

Table 2 presents the average monthly returns for the four groups of stocks sorted by the six fundamental variables. At the end of June each year, firms are independently assessed using the six ratios in the portfolio construction process. Subsequently, they are categorized into one of the four groups. Group 1 includes stocks with the lowest indicator values, whereas Group 4 consists of those with the highest indicator values.

From panel A, small stocks achieve higher returns than large stocks, with a negative difference of 14.25 percent per month between the top and the bottom quartiles. This result confirms the negative association between stock returns and size. However, the value is not statistically significant. Our findings are consistent with those reported by Kyriazis and Diacogiannis (2007), Abrokwa and Nkansah (2015), and Abd-Alla and Sobh (2020).

Table 2. Average returns for portfolios sorted by fundamental anomalies from July 2001 to June 2020.

Panel A: sorted on Size					
Portfolios	1	2	3	4	4-1
Return	0.224	0.168	0.178	0.082	-0.143
t-statistic	2.213	2.274	3.108	1.750	-1.720
Panel B: sorted on B/M					
Portfolios	1	2	3	4	4-1
Return	0.068	0.094	0.179	0.195	0.126*
t-statistic	1.531	1.488	2.342	2.831	2.156
Panel C: sorted on P/E					
Portfolios	1	2	3	4	4-1
Return	0.223	0.103	0.103	-0.009	-0.231*
t-statistic	2.884	1.636	1.886	-0.151	-3.155
Panel D: sorted on P/CF					
Portfolios	1	2	3	4	4-1
Return	0.196	0.161	0.151	0.012	-0.183*
t-statistic	3.826	2.508	2.211	0.199	-2.714
Panel E: sorted on P/S					
Portfolios	1	2	3	4	4-1
Return	0.264	0.147	0.014	0.091	-0.173*
t-statistic	4.151	2.211	0.221	1.857	-3.687
Panel F: sorted on D/E					
Portfolios	1	2	3	4	4-1
Return	0.094	0.115	0.126	0.026	-0.067
t-statistic	2.074	2.238	2.450	0.402	-1.295

Note: The table shows average monthly returns and t-statistics for portfolios of all stocks sorted into quartiles based on six indicators: Size, B/M, P/E, P/CF, P/S, and D/E (Panels A to F). The difference in returns between the highest (Quartile 4) and lowest (Quartile 1) quartiles is also reported. * More than two standard errors.

From portfolios sorted on B/M, results show that high B/M stocks outperform substantially low B/M stocks with a difference of 12,63 percent per month between the two extreme groups. The positive relationship between returns and the B/M ratio is confirmed as the return difference is statistically significant. Persistently, Aguenaou et al. (2011) and Alaoui Taïb and Benfeddoul (2023) reported that the B/M effect is the most pronounced in the Moroccan stock market.

In panel C, low P/E firms earn a premium of 23.14 percent over firms with high P/E ratios, emphasizing the negative association between this indicator and stock return. In

addition, the difference between the two extreme portfolio returns is statistically significant. Related to the portfolios ranked on P/CF in panel D, the negative relationship between stock returns and this ratio is validated as low P/CF companies surpass those with high ratios, registering a statistically significant difference of 18.33 percent per month. Inconsistent with Cakici et al. (2017), the P/E effect holds the top position since the largest differences in returns between the highest and lowest quartiles are observed when stocks are ranked by their P/E ratio, followed by the P/CF ratio and then the B/M ratio.

The results in panel E reveal the significantly negative relation between the P/S indicator and the stock returns. According to Öztürk and Karabulut (2020), firms with a low P/S ratio have greater returns than those with a high ratio. In addition, the spread in returns between the top and the bottom quartiles presents a statistically significant value of 17.28 percent per month.

Lastly, in panel F, the difference in abnormal returns between the two extreme groups for the D/E variable is surprising. Its value shows a negative unexpected sign, implying an inverse association between the leverage ratio and stock returns. Furthermore, this value is statistically insignificant. Those findings are in harmony with those reported on the Karachi stock market (Shabib-ul-Hasan et al., 2015; Mustafa et al., 2017).

5. Regression results

5.1. Fixed-effect panel regression

The results in Table 3 are based on a fixed-effect panel regression analysis of stocks HPR as the dependent variable with robust standard errors.[4] According to Akhtar (2021), we consider the business cycle issues by including year-fixed effects in the model. The interpretation of the results primarily relies on the F-statistic and the regression coefficients. Specifically, the F-statistic assesses the overall significance of the model, while the regression coefficients indicate the presence or absence of fundamental effects on the market. The findings show that the F-statistic is significant, confirming the model's stability and reliability.

Table 3. Results of the fixed-effects model

	Coefficient	*t*-statistic	Number of Groups	50
Size	-0.0631	-1.25	Observations	675
B/M	0.1397*	2.93	F-statistics	10.84*
P/E	-0.0016*	-3.38	Significance F	0
P/CF	-0.0005***	-1.86	R-square	0.2875
P/S	0.0051*	3.62	Year Fixed Effect	yes
D/E	-0.0011	-0.02	Number of Groups	50
α	1.2453	1.25		

Note: Coefficient values are estimated using fixed-effects panel regression analysis of stock holding period returns (HPR) as the dependent variable, based on equation (1), with robust standard errors. The model is adjusted for heteroskedasticity using White's variance estimator. (*), (**), and (***) represent significance levels of 1%, 5%, and 10%, respectively.

Regarding the regression coefficients, we observe that the slope of the size variable exhibits the expected negative sign, indicating that small stocks outperform large ones. However, the value is statistically insignificant. The absence of small-effect is also documented in different emerging markets such as Athens (Kyriazis & Diacogiannis, 2007), Ghana (Acheampong et al., 2014; Abrokwa & Nkansah, 2015), and Egyptian

[4] We use the White estimate of variance errors to adjust the model for heteroskedasticity.

markets (Abd-Alla & Sobh, 2020). Similarly, the coefficient of the debt variable shows an unexpected negative sign, which contradicts the D/E effect, as Bhandari (1988) presented. Our results are in harmony with Harris and Raviv's (1991) and Penman et al.'s (2007) conclusions. However, in our case, the value of the coefficient is still statistically insignificant.

As expected, the B/M ratio shows a significantly positive relationship to stock returns, implying that stocks with high B/M have greater returns than those with low B/M ratios. As several researchers point out, the dominance of the B/M effect over the size effect is evident in emerging markets (Fama & French, 2012; Barry et al., 2002; Eraslan, 2013). Our findings align with those reported in Alaoui Taïb and Benfeddoul's (2023) study in the Moroccan market. Related to the P/E ratio, its coefficient indicates a significantly negative relationship to stock returns—firms with low P/E over-perform firms with high P/E, which is consistent with the literature. Liu et al. (2019) concluded that the E/P effect is economically and statistically significant and is the best indicator for capturing the value effect in China. The P/CF variable has the expected negative sign, which is significant at 10 percent. These findings suggest that firms with low P/CF ratios typically show greater returns. Parallel results have been reported by Akhtar and Rashid (2015), who documented a negatively significant relation between the P/CF ratio and stock returns in the Pakistan stock market.

Regarding the P/S ratio, the results are surprising. The coefficient of the P/S ratio is significant, with an unexpected positive sign assuming that stocks with a high P/S ratio outperform those with low ratios. This finding conforms with the Akhtar's (2021) study. In Iran's stock market, while Rahmani et al. (2006) separately examined the S/P effect over the years, they also found a negative relationship, hence an inverse effect, for four consecutive years. As Konijn et al. (2011) noted in their study, dissimilarities in the relation between stock returns and fundamentals through different markets may be influenced by those stock markets' institutional and regional features.

5.2. Results of the dynamic panel model

Table 4 shows the findings of the SGMM estimation model of Moroccan stock returns. The SGMM estimation equation considers the lagged HPR as an endogenous variable. Our basic model is estimated using equation 1, where the lagged HPR is an additional term. According to the literature, the general findings are deemed robust because no second-order autocorrelation is detected in the residuals, and the employed instruments are valid.

Table 4. Results of the dynamic panel model

	Coefficient	*t*-statistic	Number of Groups	50
HPR_{t-1}	0.0445	1.15	Observations	625
Size	-0.0080	-0.44	Hansen test	0.179
B/M	0.1113*	2.65	AR (2)	0.112
P/E	-0.0010*	-2.66	F-statistics	8.75*
P/CF	-0.0009*	-3.09	Significance F	0
P/S	0.0015***	1.94		
D/E	0.0242	0.4		
α	0.3041	0.82		

Note: The coefficient values are estimated using the Blundell and Bond (1998) system generalized method of moments (SGMM) for dynamic panels. The SGMM methodology builds upon the approach of Arellano and Bond (1991), which is an efficient method for addressing endogeneity and heterogeneity issues. Our basic model is estimated using Equation 1, where the lagged HPR is an additional term. (*), (**), and (***) represent significance levels of 1%, 5%, and 10%, respectively.

Table 4 indicates a notable absence of second-order autocorrelation as the p-value of AR (2) is high, 0,112. In addition, the Hansen test of over-identifying restriction has a high p-value (0,179), indicating that the null hypothesis of "the validity of the instruments" cannot be rejected. In addition, regarding the significance of the F-statistics, our dynamic panel model is reliable and stable.

Overall, the results of Table 2 confirm those presented in the previous section concerning fixed-effect regression. The slope of the size variable is still insignificant. The dynamic model's findings also support the B/M effect with a significantly positive coefficient. The P/E is still pronounced as the coefficient still shows the significantly negative expected sign. The P/CF variable still has the expected negative sign, which is significant at 5 percent. As argued earlier in the fixed-effect regression, the inverse P/S effect is still marked with the significantly positive sign of the slope. According to the D/E effect, the sign of the coefficient becomes positive. However, its value is still statistically insignificant.

As Cakici et al. (2017) argued, regression analysis is frequently used to corroborate the portfolio analysis. However, the results of our study are conflicting when it comes to the P/S effect. As previously shown in sorts within the P/S ratio, the statistically significant negative relationship between the top and bottom quartiles is evident. Inversely, when considering the outcomes of both the fixed-effect panel regression and the SGMM estimation model, the coefficient of the P/S variable shows a statistically significant positive sign. In light of this, those findings are inconclusive regarding the existence of the P/S effect in the Moroccan market.

6. Conclusion

This research brings forth new substantiation regarding fundamental anomalies in stock markets, especially in an emerging market. Little, if any, is interested in this question in the Moroccan context. To fill this gap, in our study, we examine and explore fundamental anomalies in the Moroccan stock exchange from July 2001 to June 2020 using the univariate sorts analysis, followed by a regression analysis through fixed-effect and SGMM estimation models. Our sample includes 50 non-financial Moroccan companies.

In the robustness testing, we found a significantly positive relationship between Moroccan stock returns and the B/M ratio, which confirmed the Alaoui Taïb and Benfeddoul (2023) conclusions. In addition, our results revealed a negatively significant relationship between stock market returns and both the P/CF and P/E ratios, consistent with findings from prior studies such as Chakici et al. (2017), who examined both effects, and Akhtar and Rashid (2015) for the P/CF effect, as well as Liu et al. (2019) for the P/E effect. This finding confirms the preeminence of the value effect in emerging markets (Fama & French, 2012; Barry et al., 2002; Eraslan, 2013).

Regarding the size effect, the findings highlighted their absence in the Moroccan stock market as their coefficients were insignificant. This is consistent with observations in other emerging markets, such as Athens (Kyriazis & Diacogiannis, 2007), Ghana (Acheampong et al., 2014; Abrokwa & Nkansah, 2015), and Egypt (Abd-Alla & Sobh, 2020). One possible explanation for the absence of the size effect in these markets is the economic structure, often dominated by small and medium-sized enterprises (SMEs). In Morocco, 99% of the economic fabric comprises SMEs, leaving slight variation in firm size, which could explain the insignificance of this effect. Similarly, the leverage effect, represented by the D/E ratio, was insignificant in the Moroccan market. This aligns with studies from other emerging markets, such as the Karachi stock market (Shabib-ul-Hasan et al., 2015; Mustafa et al., 2017).

Nevertheless, whether there was a positive or negative P/S effect over the studied period remains inconclusive, as the univariate and regression analyses yielded contradictory results. Based on the findings, it can be inferred that in the Moroccan market, where two methodologies (Fixed effects model and SGMM methodology) align against a single one (portfolio approach), the P/S effect might be inverse. This inverse P/S

effect could be explained by several factors, with two key drivers being the sectoral composition of the stock market and investor behavior. Beyond the financial sector, telecommunications, consumer goods, and services dominate the market. Companies in these sectors often exhibit higher P/S ratios, benefiting from stable revenue streams supported by robust business models and favorable regulations that minimize operational risk. As a result, these companies tend to attract risk-averse investors who value their stability and predictability, fostering expectations of consistent performance. This dynamic, in turn, drives higher valuations and potentially leads to greater future returns.

In sum, our results confirm the existence of significant differences in how fundamental characteristics impact stock returns between developed and emerging markets. In line with Akhtar's (2021) argument, divergences in accounting standards and economic environments play a critical role in shaping the understanding and prevalence of fundamental anomalies in stock markets. Developed markets are typically well-functioning and more efficient than emerging markets, which often deviate from these characteristics. To address these discrepancies, regulators and policymakers must prioritize market transparency through measures aimed at improving the flow and reliability of information. Enhancing transparency can contribute to greater market efficiency and better alignment with international standards. For instance, regulatory authorities could implement stricter financial disclosure requirements, promote the adoption of uniform accounting standards, and enforce timely reporting practices. These measures will enhance investor confidence and reduce information asymmetry, contributing to market inefficiencies.

In Morocco, progress has already begun with initiatives such as mandating extra-financial reporting for issuers going public. These measures could be further complemented by increasing digitalization in reporting processes and conducting regular audits to ensure compliance. Fostering financial literacy among investors and enhancing corporate governance standards could contribute to a more transparent and efficient market.

Our findings have two implications. Firstly, from a managerial perspective, investors and portfolio managers may consider the significant fundamentals identified in this study to shape their investment strategies or asset allocation within the Moroccan stock market. By incorporating these findings into their decision-making processes, portfolio managers can better exploit market inefficiencies and improve portfolio performance.

Secondly, from an academic perspective, these results provide further directions for future research aimed at understanding and modeling the return-risk relationship in the Moroccan stock market. For instance, researchers could explore advanced modeling techniques, such as multifactor models like the Fama and French framework, while integrating the most pertinent indicators revealed in this study. Future studies might also examine the robustness of these findings across different economic and market conditions, including periods of volatility or economic shocks, such as the COVID-19 pandemic. Moreover, further analysis could focus on sectoral variations within the Moroccan stock market to identify how fundamental anomalies manifest differently across firms. Investigating calendar effects is another promising avenue, as certain anomalies may be unique to specific markets, such as Islamic stock markets (Hasan et al., 2022). Furthermore, exploring the role of psychological factors in shaping market anomalies offers a compelling direction for future research (Bhanu, 2023). Additionally, adopting more sophisticated methodologies to reassess the predictability of market risk premiums through equity anomalies presents significant potential (Arvanitis et al., 2024; Cakici, 2024). Comparative studies across emerging markets with similar characteristics could provide valuable insights through an out-of-sample investigation, enabling a deeper understanding of market behavior.

Conflicting Interests: The Authors declare no conflict of interest.

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Author Contributions: Conceptualization, S.B., and A.A.T.; methodology, S.B., and A.A.T; software, S.B.; validation, A.A.T; formal analysis, S.B., and A.A.T; resources, S.B.; writing—original draft preparation, S.B., and A.A.T; writing—review and editing, S.B., and A.A.T; supervision, A.A.T. All authors have read and agreed to the published version of the manuscript.

Bibliography

Abd-Alla M. H. & Sobh M. (2020). Empirical test of Fama and French three-factor model in the Egyptian stock exchange. *Financial Assets and Investing,* 11(2), 5-18. https://doi.org/10.5817/FAI2020-2-1

Abrokwa J. and Nkansah P. (2015). Predictors of stock returns: Some evidence from an emerging market. *Academy of Accounting and Financial Studies Journal,* 19(3), 1-8

Acheampong P., Agalega E. and Shibu A.K. (2014). The effect of financial leverage and market size on stock returns on the Ghana Stock Exchange: Evidence from selected stocks in the manufacturing sector. *International Journal of Financial Research,* 5(1), 125-134. https://doi.org/ 10.5430/ijfr.v5n1p125

Aguenaou, S., Abrache, J., El Kadiri, B. (2011). Testing the Fama French three factor model in the Moroccan stock market. *International Journal of Business, Accounting and Finance*, 5 (2), 57-66. https://go.gale.com/ps/i.do?id=GALE%7CA335188948&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=1936699X&p=AONE&sw=w&userGroupName=anon%7E4ab51f1b (accessed 12 March 2022).

Akhtar S., Ansari S. A. and Ansari V.A. (2017). Size, value, momentum, and liquidity effects in Indian stock returns. *Wealth: International Journal of Money, Banking & Finance,* 6(1), 34-39.

Akhtar T. (2021). Market multiples and stock returns among emerging and developed financial markets. *Borsa Istanbul Review,* 21(1), 44-56. https://doi.org/10.1016/j.bir.2020.07.001

Akhtar T. and Rashid K. (2015). The relationship between portfolio returns and market multiples: A case study of Pakistan. *Oeconomics of Knowledge,* 7(3), 2-28.

Alaoui Taïb. A. and Benfeddoul S. (2023). The empirical explanatory power of CAPM and the Fama and French three-five factor models in the Moroccan stock exchange. *International Journal of Financial Studies,* 11(1), 1-19. https://doi.org/10.3390/ijfs11010047

Alhashel B. S. (2021). Cross-section of returns in frontier markets: Evidence from the GCC markets. *Emerging Markets Finance and Trade,* 57(3), 798-823. https://doi.org/10.1080/1540496X.2019.1590195

Al-Mwalla M. (2012). Can book-to-market, size and momentum be extra risk factors that explain the stocks rate of return?:Evidence from emerging Market. *Journal of Finance, Accounting & Management,* 3(2), 42-57. https://doi.org/ 10.1108/MF-07-2014-0202

Arellano M. and Bond S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies,* 58(2), 277-297. https://doi.org/10.2307/2297968

Arvanitis, S., Scaillet, O., & Topaloglou, N. (2024). Spanning analysis of stock market anomalies under Prospect Stochastic Dominance. *Management Science,* 70(9), 6002-6025. https://doi.org/10.1287/mnsc.2023.4953

Ball R. (1978). Anomalies in relationships between securities yields and yield-surrogates. *Journal of Financial Economics,* 6(2-3), 103-126. https://doi.org/10.1016/0304-405X(78)90026-0

Banz, R. W. (1981). The relationship between return and market value of common stocks. *Journal of Financial Economics,* 9(1), 3-18. https://doi.org/10.1016/0304-405X(81)90018-0

Barbee Jr. W.C, Mukherji S. and Raines G.A. (1996). Do sales–price and debt–equity explain stock returns better than book–market and firm size? *Financial Analysts Journal*, 52(2), 56-60. https://doi.org/10.2469/faj.v52.n2.1980

Barbee Jr W.C., Jeong J-G. and Mukherji S. (2008). Relations between portfolio returns and market multiples. *Global Finance Journal,* 19(1), 1-10. https://doi.org/10.1016/j.gfj.2008.02.001

Barry C.B., Goldreyer E., Lockwood L., and Rodriguez M. (2002). Robustness of size and value effects in emerging equity markets, 1985–2000. *Emerging Markets Review,* 3(1), 1-30. https://doi.org/10.1016/S1566-0141(01)00028-0

Basu S. (1977). Investment performance of common stocks in relation to their price-earnings ratios: a test of the efficient market hypothesis. *Journal of Finance,* 32(3), 663-682. https://doi.org/10.1111/j.1540-6261.1977.tb01979.x

Basu S. (1983). The Relationship between earnings yield, market value and return for NYSE common stocks. *Journal of Financial Economics,* 12(1), 129-156. https://doi.org/10.1016/0304-405X(83)90031-4

Benfeddoul S. and Alaoui Taïb A. (2024). Cross-sectional patterns in Moroccan sock returns: A Fama-French perspective. *International Journal of Economics and Financial Issues*, 14(6), 182-194. https://doi.org/10.32479/ijefi.17032

Bhandari L.C. (1988). Debt/equity ratio and expected common stock returns: Empirical evidence. *The Journal of Finance,* 43(2), 507–528. https://doi.org/10.1111/j.1540-6261.1988.tb03952.x

Bhanu, B. K. (2023). Behavioral finance and stock market anomalies: Exploring psychological factors influencing investment decisions. *Commerce, Economics & Management*, 23.DOI: 10.25215/9392917783.04

Boamah N.A., Watts E. and Loudon G. (2017). Regionally integrated asset pricing on the African stock markets: Evidence from the Fama French and Carhart models. *Journal of Economics and Business,* 92, 29-44. https://doi.org/10.1016/j.jeconbus.2017.04.002

Bird R. and Casavecchia L. (2007). Sentiment and Financial Health Indicators for Value and Growth Stocks: The European Experience. *The European Journal of Finance,* 13(8), 769-793. https://doi.org/10.1080/13518470701705777

Blundell R. and Bond S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics,* 87(1), 115-143. https://doi.org/10.1016/S0304-4076(98)00009-8

Cakici N., Chan K. and Topyan K. (2017). Cross-sectional stock return predictability in China. *The European Journal of Finance*, 23(7-9), 581-605. https://doi.org/10.1080/1351847X.2014.997369

Cakici N., Fabozzi F.J. and Tan S. (2013). Size, value, and momentum in emerging market stock returns. *Emerging Markets Review,*16, 46-65. https://doi.org/10.1016/j.ememar.2013.03.001

Cakici, N., Fieberg, C., Metko, D., & Zaremba, A. (2024). Do anomalies really predict market returns? New data and new evidence. *Review of Finance,* 28(1), 1-44. https://doi.org/10.1093/rof/rfad025

Chan L.K.C., Hamao Y. and Lakonishok J. (1991). Fundamentals and stock returns in Japan. *The Journal of Finance,* 46(5), 1739-1764. https://doi.org/10.1111/j.1540-6261.1991.tb04642.x

Eraslan V. (2013). Fama and french three-factor model: Evidence from Istanbul Stock exchange. *Business and Economics Research Journal,* 4(2), 11–22.

Fama, E.F. and French, K.R. (1992). The cross-section of expected stock returns. *Journal of Finance*, 47(2), 427-465. https://doi.org/10.2307/2329112.

Fama, E.F. and French, K.R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics,* 33(1), 3-5. https://doi.org/10.1016/0304-405X(93)90023-5

Fama, E.F. and French, K.R. (1998). Value versus growth: The international evidence. *The Journal of Finance,* 53(6), 1975-1999. https://doi.org/10.1111/0022-1082.00080

Fama, E.F. and French, K.R. (2008). Dissecting anomalies. *The Journal of Finance,* 6(4), 1653-1678. https://doi.org/10.1111/j.1540-6261.2008.01371.x

Fama E. F. and French K. R. (2012). Size, value, and momentum in international stock returns. *Journal of Financial Economics,* 105(3), 457–472. https://doi.org/ 10.1016/j.jfineco.2012.05.011

Fama, E. F. and French, K. R. (2017). International tests of a five-factor asset pricing model. *Journal of Financial Economics,* 123(3), 441-463. http://dx.doi.org/10. 1016/j.jfineco.2016.11.004

Fisher K. L. (1948). *Super stocks*. Homewood, III: Dow Jones-Irwin.

George T.J. and Hwang C.Y. (2010). A resolution of the distress risk and leverage puzzles in the cross section of stock returns. *Journal of Financial Economics*, 96(1), 56–79. https://doi.org/10.1016/j.jfineco.2009.11.003

Hanauer M. X. and Lauterbach J. (2019). The cross-section of emerging market stock returns. *Emerging Markets Review*, 38, 265-286. https://doi.org/10.1016/j.ememar.2018.11.009

Harris M. and Raviv A. (1991). The theory of capital structure. *The Journal of Finance,* 46(1), 297-355. https://doi.org/10.1111/j.1540-6261.1991.tb03753.x

Harvey C.R. (1995). Predictable risk and returns in emerging markets. *The Review of Financial Studies*, 18(3), 773-816. https://doi.org/10.1093/rfs/8.3.773

Hasan, M. B., Hassan, M. K., Rashid, M. M., Ali, M. S., & Hossain, M. N. (2022). Calendar anomalies in the stock markets: conventional vs Islamic stock indices. *Managerial Finance*, 48(2), 258-276. https://doi.org/10.1108/MF-12-2020-0601

Hearn B. (2011). Modelling size and liquidity in North African industrial sectors. *Emerging Markets Review,* 12(1), 21-46. https://doi.org/10.1016/j.ememar.2010.08.004

Hsu C.H, Lee K.C., Chang Y.P. and Fung H.G. (2015). Value versus growth: Taiwan evidence. *Managerial Finance*, 41(8), 845 – 856. https://doi.org/10.1108/MF-07-2014-0202

Jaffe J., Keim D.B. and Westerfield R. (1989). Earnings yields, market values, and stock returns. *The Journal of Finance,* 44(1), 135-148. https://doi.org/10.1111/j.1540-6261.1989.tb02408.x

Jakpar S., Tinggi M., Yu Qi W. and Samsudin N. (2019). The impact of firm leverage on stock return in manufacturing industry. *UNIMAS Review of Accounting and Finance*, 3(1), 39-48. https://doi.org/10.33736/uraf.1978.2019

Kakinuma Y. (2020). Empirical evidence of profitability anomaly in the Thai stock market. *Journal of International Studies*, 13(4), 89-100. https://doi.org/10.14254/2071-8330.2020/13-4/6

Kheradyar S, Ibrahim I. and Mat Nor F. (2011). Stock return predictability with financial ratios. *International Journal of Trade, Economics and Finance,* 2(5), 391-396. https://doi.org/10.7763/IJTEF.2011.V2.137

Konijn S.J.J., Kräussl R. and Lucas A. (2011). Blockholder dispersion and firm value. *Journal of Corporate Finance,* 17(5), 1330-1339. https://doi.org/ 10.1016/j.jcorpfin.2011.06.005

Koseoglu B. (2014). Cross-sectional variation in stock returns due to leverage in exchange Istanbul. *International Business Research*, 7(1), 34-41. http://dx.doi.org/10.5539/ibr.v7n1p34

Kyriazis D. and Diacogiannis G. (2007). Testing the performance of value strategies in the Athens Stock Exchange. *Applied Financial Economics*, 17(18), 1511-1528. https://doi.org/10.1080/09603100600949226

Lakonishok J., Shleifer A. and Vishny R.W. (1994). Contrarian investment, extrapolation, and risk. *Journal of Finance,* 49(5), 1541-1578. https://doi.org/10.1111/j.1540-6261.1994.tb04772.x

Lau S.T., Lee C.T. and McInish T.H. (2002). Stock returns and beta, firms size, E/P, CF/P, book-to-market, and sales growth: Evidence from Singapore and Malaysia. *Journal of Multinational Financial Management,* 12(3), 207-222. https://doi.org/10.1016/S1042-444X(01)00051-2

Leite A. L., Klotzle M. C., Pinto A. C. F. and Da Silva A. F. (2018). Size, value, profitability, and investment: Evidence from emerging markets. *Emerging Markets Review*, 36, 45-59. https://doi.org/10.1016/j.ememar.2018.04.006

Liu J., Stambaugh R.F. and Yuan Y. (2019). Size and value in China. *Journal of Financial Economics,* 134(1), 48-69. https://doi.org/10.1016/j.jfineco.2019.03.008

Maiti M. and Balakrishnan A. (2020). Can leverage effect coexist with value effect?. *IIMB Management Review*, 32(1), 7-23. https://doi.org/10.1016/j.iimb.2019.07.011

Mukherji S., Dhatt M. S. and Kim Y.H. (1997). A fundamental analysis of Korean stock returns. *Financial Analysts Journal,* 53(3), 75-80.

Muradoğlu Y.G. and Sivaprasad S. (2012). Using firm-level leverage as an investment strategy. *Journal of Forecasting*, 31(3), 260–279. https://doi.org/ 10.1002/for.1221

Mustafa S., Saeed A. and Zafar A. (2017). The effect of financial leverage and market size on stock returns on the Karachi Stock Exchange: Evidence from selected stocks in the non-financial sector of Pakistan. *The International Journal Of Business & Management*, 5(10), 246-252. Available at SSRN: https://ssrn.com/abstract=3063965 (Accessed 22 May 2022).

Nartea, G. V., Ward, B. D., and Djajadikerta, H. G. (2009). Size, BM, and momentum effects and the robustness of the Fama-French three-factor model: Evidence from New Zealand. *International Journal of Managerial Finance,* 5(2), 179-200. https://doi.org/10.1108/17439130910947895

Nathan S., Sivakumar K. and Vijayakumar J. (2001). Returns to trading strategies based on price-to-earnings and price-to-sales ratios. *The Journal of Investing,* 10(2), 17-28. https://doi.org/10.3905/joi.2001.319458

Nivoix S. and Guo Y. (2018). The PER and PBR in China: Where do we stand? *China's Global Political Economy: Managerial Perspectives.* https://doi.org/10.4324/9781315102566-14

Nudrat F., Waqas M., Rameez H., Fraz A. and Arif M. (2017). Cash to price ratio & stock returns: evidence from emerging markets. *International Journal of Economics and Finance,* 9(11), 153-162. https://doi.org/10.5539/ijef.v9n11p153

Öztürk H. and Karabulut T.A. (2020). Impact of financial ratios on technology and telecommunication stock returns: Evidence from an emerging market. *Investment Management and Financial Innovations,* 17(2), 76-87. https://doi.org/ 10.21511/imfi.17(2).2020.07

Öztürk H. and Yılmaz A.A. (2015). Leverage and stock returns: Evidence from Istanbul Stock Exchange. *Accounting and Finance Research*, 4(4), 140-146. http://dx.doi.org/10.5430/afr.v4n4p140

Page M. and Palmer F. (1991). The relationship between excess returns, firm size and earnings on the Johannesburg Stock Exchange. *South African Journal of Business Management,* 22(3), 63-73. https://doi.org/10.4102/sajbm.v22i3.900

Penman S. H., Richardson S.A. and Tuna I. (2007). The Book-to-Price Effect in Stock Returns: Accounting for Leverage. *Journal of accounting research,* 45(2), 427-468. https://doi.org/10.1111/j.1475-679X.2007.00240.x

Rahmani A., Sheri S. and Tajvidi E. (2006). Accounting Variables, Market Variables and Stock Return in Emerging Markets: Case of Iran. Available at SSSRN: https://doi.org/10.2139/ssrn.947288.

Ramlah R. (2021). The effect of profitability and leverage on stock return of food and beverage companies. *Point of View Research Management,* 2(2), 139-150. Retrieved from https://journal.accountingpointofview.id/index.php/POVREMA/article/view/145

Reinganum M.R. (1981). Misspecification of capital asset pricing: Empirical anomalies based on earnings yields and market values. *Journal of Financial Economics,* 9(1), 19-46. https://doi.org/10.1016/0304-405X(81)90019-2

Roodman D. (2009). How to do Xtabond2: An Introduction to Difference and System GMM in Stata. *The Stata Journal*, 9(1), 86-136. https://doi.org/10.1177/1536867X0900900106

Rosenberg B., Reid K. and Lanstein R. (1985). Persuasive evidence of market inefficiency. *The Journal of Portfolio Management,* 11(3), 9-16. https://doi.org/10.3905/jpm.1985.409007

Samarakoon L. P. (1998). An Empirical Analysis of the Relationship between Fundamentals and Stock Returns in Sri Lanka. Research Monograph, University of Sri Jayewardenepura, Sri Lanka. Available at SSRN: https://ssrn.com/abstract=1509788 (Accessed 12 April 2022).

Shabib-ul-Hasan S., Farooq S. and Muddassir M. (2015). Stock returns indicators: debt to equity, book to market, firm size and sales to price. *Journal of Poverty, Investment and Development,* 16, 25-32.

Sheu H.J., Wu S. and Ku K.P. (1998). Cross-sectional relationships between stock returns and market beta, trading volume, and sales-to-price in Taiwan. *International Review of Financial Analysis,* 7(1), 1-18. https://doi.org/10.1016/S1057-5219(99)80035-0

Stattman, D. (1980). Book value and stock returns. *The Chicago MBA: A Journal of Selected Papers,* 4, 25-45.

Suyanto and Sibarani F.N.H. (2018). Stock investment analysis, idiosyncratic risk and abnormal return. *Advances in Social Science, Education and Humanities Research -15th International Symposium on Management*, 186, 88-91. https://doi.org/10.2991/insyma-18.2018.22