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Meta-analysis of empirical research in the investment field with emphasis on corporations operating in the field of financial technologies industry

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Abstract

The present study aims to conduct a meta-analysis of empirical research in the investment field with emphasis on corporations active in the field of financial technologies industry. The type of research is descriptive. The research follows an applied purpose, is considered among basic research, is an interactive post-event survey in terms of data collection method, and has used data available on universities' scientific-research databases. Research populations included all basic research in the financial field that were selected based on the analysis of financial patterns. According to the conditions considered for sample selection, 113 studies conducted throughout 1962-2020 were selected through systematic elimination whose data was collected and tested using meta-analysis. Results of using CAM2 software indicated that given the Cochrane rest, the studies investigated in the present research were heterogeneous and the i squared coefficient also determined the studies to be heterogeneous, confirming the Cochrane test. In the next stage, the results of Begg and Mazumdar's rank correlation confirmed the bias in the publication of studies. At the final stage, the fail-safe N-test yielded the final result that 4484 further studies must be carried out so that an error occurs in the final results of analyses and calculations. This result indicates the high accuracy of results and information obtained from the present research since 4484 cases of distance from error is a favorable and considerable amount.

Keywords

meta-analysis, financial models, CAPM model, Fama and French, Black-Scholes, mean-variance.

1. Introduction

Humans of the current age find themselves dealing with big data daily. Alongside the bytes of data generated every day through sending emails and using social media or downloading pictures from it, a great number of scientific studies have also been conducted that face us with a huge volume of data generated by scientific studies both in terms of input data used for empirical analysis and in terms of output. Results of scholars' research over a variety of periods, specifically during recent years, on adopting big data features resulting from the application of computer sciences (McAfee & Brianfolson, 2012) have extracted three main features for big data regarding empirical research outputs including the abundance of published research (volume), the time it takes to produce new empirical output (velocity), and the diversity of results (variety) (Geyer-Klingeberg et al., 2019).

This also applies to the field of financial research, so that the field of finance has stepped into a new intellectual area over the recent decades (Babajani Mohammadi, 1396), challenging some of current and previous researchers' patterns and assumptions. Meanwhile, many studies have been performed aiming to explore the subject of accounting (financial) knowledge in a variety of fields (Humphrey and Gendron, 2015; Khalifa and Quattrone, 2008). This has resulted in major concerns in this regard including the impact of factors such as journal rankings (Humphrey & Gendron, 2015; Malsch & Tessier, 2015; and Wedlin, 2006), mastering quantitative research methods (Khalifa & Quattrone, 2008), high numbers of university student applications for postgrad education at master's and doctoral levels (Johansson and Yarrabati, 2017), and the simultaneous change of government budget from the number of students to the graduation rate (Bastalich, 2017). According to this and considering the raised concerns, meta-analyses of previous studies is of high priority to detect challenges, weaknesses, strengths, and identification of the potential opportunities for the conduction and steering of future research.

In this regard, some of the recent empirical studies in the financial field indicate a relatively accelerating trend which has resulted in huge differences among empirical results that mainly prevent uninterrupted and continuous conclusions regarding the studied phenomenon. This has resulted in the demand for methods such as meta-analysis that investigates, analyzes, integrates, and evaluates the results of previous research since it encompasses a set of statistical methods for collecting previous studies, discovering and explaining the consistencies and inconsistencies among researchers' reported results, and discovering and summarizing the distorting impacts of journal selection or potential mistakes in an accounting (financial) model. The aforementioned have made meta-analysis a standard tool for research synthesis and evidence-based decision-making in many respective research areas such as economy, marketing, and management, and is rarely used in finance (Geyer-Klingeberg et al., 2019).

In general, the meta-analysis approach falls into the category of systematic reviews and is therefore able to regulate and give meaning to studies conducted in a given field no matter how unsystematic and scattered they are. On the other hand, policy-making is the missing link between the scopes of theory and application (action) and could result in synergy and interaction between theory and action. Both theory and policy achieve higher richness and maturity through this trade-off process. However, the policy-making process requires the accumulation of studies and is not generated spontaneously. Systematic reviews such as meta-analysis regulate and contribute to this accumulation and serve research purposes (Zaker Salehi et al., 2015). Foreign scholars have conducted numerous studies in the field of social sciences using meta-analysis, among which one could mention Philip Davis's meta-analysis of the status of political and sociology sciences (2004), Nick Allum's study on science knowledge and attitudes across cultures (2008), and Daniele Fanelli's meta-analysis on scientific fraud among scientists (2009). Among the Iranian works in the field of "science sociology" with a meta-analytic approach, one could mention the article published by Zaker Salehi (2007) entitled "meta-analysis of the studies conducted in Iran on

attracting experts and preventing their migration" and Qeneiirad (2010) titled "the Iranian attempts to develop alternative sociologies: a critical review". In a qualitative analysis of the application of sociology theories in Iranian studies and using three types of sociology theories, Jalaiipour (2008) considers most of these studies to be entertaining and dependent on the display of statistical tables and suggests that two-thirds of these studies have not accomplished any clear results. Azad Armaki (2010) has also conducted a qualitative analysis of the Iranian sociological studies over 70 years in terms of the theoretical content and methodology and has made connections between these works and broader social contexts such as the country's social and political changes and, specifically, the alternation of sociological generation (Zakersalehi et al., 2015). In the field of accounting, scholars such as Khosa et al. (2019), Geyer-Klingeberg et al. (2019), Humphrey & Gendron (2015), Khalifa & Quattrone (2008), Malsch & Tessier (2015), Wedlin (2006), Johansson & Yerrabati (2017), Bastalich (2017), Sepasi & Ahmadian (2017), and Bababjani Mohammadi (2017) have also conducted a meta-analysis in several fields in their studies.

Hence, the present study conducts a meta-analysis on the empirical research conducted in the field of investment with emphasis on corporations active in the financial technologies industry to respond to the contradictions and inconsistencies in previous research.

2. A review of the research literature and background

A literature review is among the most important parts of research and is a part of the study obtained from previous research conducted by other researchers. John Dewey believes that studying the background of each reference helps the researcher develop a deep understanding of the research subject's various aspects. Resources used in the literature review must be directly or indirectly relevant to the research subject (Delavar, 2003). In this section, we have first explained the literature (meta-analysis theoretical foundations, investment, financial sectors, and financial models) in the forms of concepts, frameworks, theories, and practices, and have proceeded to review materials related to meta-analysis basic research with emphasis on financial pattern analysis, data collection tools, data analysis methods, and studied institutions and markets. At the end of the present section, we have mentioned several domestic and foreign studies relevant to the research subject.

2.1. Meta-analysis

The historical roots of meta-analysis date back to astronomical studies in the 17th century. Karl Pearson's 1904 article published in the British Medical Journal to reconcile data on tuberculosis from various studies marks the first time meta-analysis was used in the history of research. The term "meta-analysis" was introduced by V. Glass –a gene statist- in 1976. He said, "Meta-analysis is a study, it is a little expanded, but is accurate and suitable". Meta-analysis refers to the analysis of analysis. Although it results in V. Glass becoming known as the modern founder of this method, the methodology he introduced as "meta-analysis" was there for a couple of decades before he put a name on it. One could suggest that meta-analysis started in medical research where most studies are confined to small sample sizes since large clinical studies are costly and time-consuming. Given the small sample sizes that reduce clinical studies' statistical power, such studies might fail in discovering statistically significant correlations due to the standard errors in their estimations. Besides, conventional medical programs use meta-analysis to minimize the results of small samples, which increases estimation accuracy.

Thus, meta-analysis is capable of discovering important findings that could not have been found in single studies with multiple goals, so that 50,000 pharmacological meta-analysis studies (Ioannidis, 2016), over 400 management meta-analyses (Buckley et al, 2013), and over 600 cases of economic meta-analyses (Poot, 2012) have been conducted and published so far. Douglas' approach expanded into a considerable diversity of disciplines and research

fields from industrial psychology to social work by their research method experts such as (Hedges and Olkin 2006-1985) (Wolff 1986), (Hunter and Schmidt 2006 - 1990) (Rosenthal 1991) Rosenthal Waralf 1991), (1994 Rosenthal Varabin), (1994 Cooper & Hedges), (2000 Esteghlal and Barry), (2001 Rosenthal and Demetrius) Little et al. (2008) and Bornstein et al. (2009) and is currently considered a conventional method in synthesizing research findings in social and human sciences as well as medical science (Kirka et al., 2012). Although meta-analysis is popular in and embraced by many scientific disciplines, its application is still quite rare in financial studies.

The number of empirical studies conducted on financial presentations is a strong upward tragedy. The huge differences in empirical results that often demonstrate the obstacles for consistent results regarding the studied phenomenon generate the demand for meta-analysis methods and to take advantage of this method for objective consolidation and evaluation of previous empirical findings. Standard tools have been used in meta-analysis to integrate and combine the studies and evidence-based on the decisions in many relevant fields such as marketing, management, or economy; but these tools have rarely been used in finance Jerome Geyer-Klingeberg, Markus Hang, Andreas Rathgeber). Thus, collecting knowledge from an abundance of studies is the basis of science (Hanter and Schmidt 2004), for which meta-analysis is an efficient tool.

According to Glass (1976), meta-analysis is a statistical analysis of a set of analysis results from individual studies to complete the findings. Egger et al. define meta-analysis as the art of integrating pieces of research and analyzing analyses which is a quantitative method for integrating the results of similar, individual studies and combining their findings to assess the efficiency of the operation (Egger, Smith, and Altman, 2001; quoted in Kheyrandish et al. 1998). Meta-analysis methods obtain a weighted mean of results of several individual studies; their distinction is how these weights are allocated and how uncertainty is estimated within the resulting point estimation. In addition to providing an estimation of the shared unknown truth, meta-analysis is capable of examining the contradiction between various studies and discover the patterns of study results, sources of disagreements, and other interesting connections.

We live in the age of data. Alongside the bytes of data generated every day through sending emails and using social media or downloading pictures from it, results of scientific studies are also being generated by the huge volume of data both in terms of input data used for empirical analysis and in terms of output. Adaptation to the great features of computer science (McAfee and Brynjolfsson, 2012) have three main features of the relationship between big data outputs of empirical findings including the abundance of published research (volume), the time it takes to produce new empirical output (velocity), and the diversity of results (variety). This is a quantitative review technique using statistical methods to integrate the empirical results of similar research questions among numerous studies, and determines to what extent the impacts of an empirical event have been received. In other words, meta-analysis is a method for big data analysis that allows the findings of several individual studies to be gradually summarized within a big picture (Gurevitch et al, 2018).

2.2. Basic-experimental research on finance

In its most abstract form, basic research is conducted to generate and refine theories. The problem studied through this type of research originates from the real practical field (Guy, 1992). To categorize financial studies from the basic research point of view, we must first point that many basic pieces of research have been conducted over the past four years in a variety of fields such as risk and return, investment, banking, etc. -each responding to specific needs and sometimes general users of financial markets through the use of financial models- and have somehow helped model providers to explain the needs of investors. Many studies have been conducted in the financial field, each resulting in the expansion of the capital market, and investors have used these pieces of research to their financial advantage using financial

models. Basic research on finance is divided into seven main categories of 1. Corporate finance, 2.investment, 3.financial institutions and markets, 4.qualitative methods and econometrics, 5.risk management, 6.real estate, and 7.financial engineering. We suffice to mention these categories due to the high volume of their content and will finish this section by explaining the subject of the study mentioned in the title. These seven general categories and their subsets constitute basic research on finance. To justify the use of meta-analysis in the present research one must mention that as mentioned earlier, meta-analysis has principles, one of which being that the researchers must illustrate the presence of a specific number of empirical studies on a specific research subject. Besides, these studies must provide evidence that the meta-analysis aims to connect various studies and provide logical results (Ahmed et al., 2013; Darfoss, 2009; Hay et al., 2006). Also, the fact that meta-analysis is could only be performed in quantitative studies that have a series of required statistics -which will be elaborated on in section 4- resulted in the thematic process of this study to shift and concentrate on studies conducted on financial models that play a major part in general finance, specifically in financial investments.

2.3. Basic research on finance and investment

The present research has conducted a comprehensive meta-analysis concentrating on the four main financial management models and has excluded other models due to the lack of the required statistical data. Each of the models will be further explained as follows.

2.3.1. Capital asset pricing model (CAPM)

Capital asset pricing models aim to formulate principles for risk and return. In its simplest form, asset pricing mainly discusses turning asset returns into the price. The two well-known asset pricing models include Arbitrage Pricing Theory and the capital asset pricing model (CAPM) among which this section will concentrate on the latter. Another background research must be mentioned regarding this pricing model and then the model itself will be elaborated on. Cochrane (2001) (quoted by Frank J. Fabius, the encyclopedia of financial models) proposed two conventional methods for pricing capital assets: 1.absolute pricing and 2.relative pricing. The absolute pricing approach seeks to price the asset considering its exposure to the risk of fundamental macroeconomics, an example of which is the capital asset pricing model (CAPM) formulated by Breeden (1979). On the contrary, the relative pricing approach seeks to price the asset exclusively based on the price of other assets and without leaning on the exposure of the asset to macroeconomic factors. The option pricing model formulated by Black and Scholes (1973) is among asset pricing models employing the relative pricing approach. So far, it has been made almost clear where the asset pricing model came from, but one must know that this model was formulated by a couple of academics in 1960 but was first published by William Sharp in his book entitled “the portfolio theory and capital markets" which resulted in him winning the Nobel prize in economics. This model is based on Markowitz's mean-variance model which was developed further by William sharp (1964), John Lintner (1965), and Jean Mossin (1966) and goes by the name of SL-CAMP. This model is based on the idea that an individual investment includes two types of risks including systematic and unsystematic risks. In a more general sense, it could be suggested that the capital asset pricing model was generated according to the capital market theory. General equilibrium theories such as the capital market theory (CMT) and a review on capital asset pricing models including capital market line (CML), stocks market line (SML), and capital asset pricing model (CAPM) help us understand the market's behavior (Raei and Telangi, 2004). There are many formulations for the basic capital asset pricing model many of which have not been mentioned here since they are not the focus of our study (for more information in this regard refer to the Encyclopedia of Financial Models by Frank J. Fabius). However, the main and well-known CAPM model which is currently at the dispose investors is as follows:

$$\overline{R}_i = R_f + \beta_i(\overline{R}_m - R_f) \quad (1)$$

R_i: The expected return (expected equilibrium return) of a capital asset, R_f: no-risk return or the price of the time, β_i: Systematic stock risk index and proxy asset's correlation with market return, and R_m: market return after subtracting no-risk return from it, indicates the risk prize in the form of market risk premium.

According to this function, the difference between the expected returns of two assets could be attributed to their different beta sizes. The equation above confirms the hypothesis that systematic risk is the only important element in the determination of the expected return and unsystematic risk plays no part in this field. This conclusion results in an extremely important economic inference, which is there is no reason for investors to get higher rewards for withstanding higher unsystematic risk (Saeed Fathi et al., 1397).
The beta model in capital asset pricing:

$$\beta_i = \frac{Cov(R_i, R_m)}{Var\,(R_m)} \quad (2)$$

2.3.2. The Black-Scholes model

The Black-Scholes model (1973) selects a relationship between authority and equity using the delta (Δ) parameter aiming to price the trading option for a risk-free portfolio (Hull, Juhn, 1997). For the portfolio to be risk-free, the delta value must be constantly updated so that the Black-Scholes assumption persists. The assumption will be rejected and deviations from the model will occur in case the desirability of a stock goes up; meanwhile, the price of a stock is more accurately calculated if its desirability declines (Irwin, Richard, D, 1994). Hence, the Black-Scholes model measures the options of trading at the money better than trading out of and in the money and are therefore used for stocks with low desirability (Rubinstein, M, 1987). Of course, this model has assumptions as all other models do which might be rejected under certain circumstances, and the model is analyzed based on these assumptions.

Formulating the Black-Scholes model

The Black-Scholes pricing formulation contains 10 parameters of option purchasing price (C), the current stock price (s), a standard normal distribution's collective distribution function (N), the agreed-upon price at expiration (X) and (k), contract expiration (t), exercise price (K), natural anti-logarithm (e = 2.718), fluctuations of the underlying asset price (δ), risk-free return rate (r), and expected returns on base assets (y). The model for pricing a European purchasing option contract is as follows:

$$C = SN(d_1) - ke^{-rT}N(d_2) \quad (3)$$

And the model for pricing European sales option contract is:

$$P = ke^{-rT}N(-d_2) - SN(-d_1) \quad (4)$$

$$d_1 = \frac{\ln\left(\frac{S}{X}\right) + \left(r + \frac{\delta^2}{2}\right)(T)}{\delta\sqrt{T}} \quad (5)$$

$$d_2 = \frac{\ln\left(\frac{S}{X}\right) + \left(r + \frac{\delta^2}{2}\right)(T)}{\delta\sqrt{T}} = d_1 - \delta\sqrt{T} \quad (6)$$

The obtained option price from the Black-Scholes option pricing model is fair since risk-free benefit could be achieved through neutralizing the base stock's position if there is another price in the market, which means if the option purchasing price is higher in the market compared to the price obtained from the Black-Scholes option pricing model, the investor can sell this purchasing option and but a certain number of base stocks. If the opposite circumstance occurs (i.e. the purchasing option price in the market is lower than the "fair price" obtained from the model), the investor can purchase sales options and sell a certain number of underlying shares on credit.

2.3.3. The Mean-variance portfolio analysis model

The mean-variance model formulated by Harry Markowitz in 1952, which also goes by the names of modern portfolio theory and portfolio selection theory, is the main desired model in the allocation of policy assets. This theory is a normative theory describing the investors' real behavior and explaining behavioral standards. It would not an exaggeration to say that the modern portfolio theory has revolutionized investment management since it has made the intellectual art of investment risk into something practical and real through quantifying expected returns and investment risks. Portfolio management used to be concentrated on individual asset risks but has now shifted its focus to total risk (inspired by the book written by Frank J. Fabius). Markowitz's portfolio model is a single-measure optimization model determining a logical equilibrium between risk and return features (Treynor, J.L. 1965). This model is characterized by considering the first two return distribution torques (i.e. mean and variance). Conducted studies have indicated that the portfolio distribution is generally not normal (Campbell, JY and Hentschel, L., 1992).

2.3.4. Fama–French three & five-factor models

Asset pricing models search for the factors of expected returns. Risk factors are identified and multi-factor models are estimated based on returns, so the term "factor" refers to "risk factors". Factor models are widely used by investors to make connections between asset risk exposure and a set of known and unknown factors. The known factors include political and economic factors, industrial factors, or national factors while the unknown factors are the ones that express the dynamics of return on assets in factor models. Factor model evaluation is astonishingly dependent on identified and unidentified factors, sample size, and the number of assets (inspired by the book written by Frank J. Fabius). Various types of factor models are as follows:

- **The single-factor model:** the simplest factor model in which the factor (K) is considered to be observable or known.
- **Multi-factor model:** the number of time-series observations is by far larger than the number of factors. 10 multi-factor models are categorized into two groups:

Table 1: summary of Fama–French models

No	Factor models	stock factor theorists
1	**The first group: single-factor models**	1. Fama & French's three-factor model (1993), 2. Bara's (1993) fundamental factor model MSCI, 3. Bormister-Ibatson-Roll-Ross (BIRR) macroeconomic factor model (1994), 4. Carhart's (1997) four-factor model, 5. Pasteur & Stambach's (2003) four-factor model, 6. Novell & Marx (2013) four-factor mode, 7. Hou, Xue and Zhang (HXZ) (2014) q model, and 8. Fama & French's (2015) five-factor model.
2	**The second group: multi-factor models**	1. Bonds factor model, 2. Barclay Group corporation factor model. In the single factor model, the covariance of stock returns depends on one factor (the market index). In the multi-factor model, the covariance is dependent on two or several factors (Seyed Ahmad Reza Jalili Naeini et al. 2016).

2.3.4.1. Fama & French models

Fama and French used three factors of beta (β), firm size, and book value to market value ratio (BV/MV) to predict stock returns in 1993. According to them, only 70% of the stock return in a diverse portfolio could be justified before, while their model had a 95% explanation power (Eshraghnia and Neshvadian, 1998). After Fama and French's CAPM model, they suggested evidence in favor of this model's empirical failures. In 1993, Fama and French investigated the influence of firm characteristic factors such as stock's book value to market value ratio, size, leverage, etc. on stock returns. They proposed a three-factor model to explain stock returns. These factors

included: 1. the ratio of excess return expected from market portfolio to risk-free interest rate (the market factor), 2. The difference between returns on large firm portfolio stocks and small firm portfolio stocks (SMB size factor), and 3. The difference between returns on the portfolios of high-invested and low-invested firms (the book value to market value factor HML). This model can be formulated as:

$$R_j - R_F = \alpha_j + b_j(R_M - R_F) + s_j SMBB + h_j HML + \varepsilon_j \quad (7)$$

Where b_i, s_i, and H_i indicate the sensitivity of factors in relation to the factors of market, size, and the book value to market value ratio, respectively. The j index in the equation above indicates the model is used to estimate portfolio (Babalouyan & Mehrdokht Zafari, 2016). Fama and French's five-factor model whose formulation is as indicated below will be explained in the following:

$$R_{it} - R_{Ft} = \alpha_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it} \quad (8)$$

(Rm – Rf): the difference between market returns and risk-free returns (market risk premium)

SMB: the difference between small firm stock portfolio returns and large firm stock portfolio returns

HML: the difference between mean stock portfolio returns of firms with high book value to market value ratio and firms with low book value to market value ratio.

RMW: the difference between mean stock portfolio returns of high-profit and low-profit firms

CMA: the difference between mean stock portfolio returns of firms with large and small amounts of investments; Fama and French call the firms with small investments "firms with a conservative strategy". To use either of the Fama & French models, you must obtain market returns and stock returns to use either of the models propose before calculating the indicators above:

2.3.4.1.1. Stock returns:

the returns of investing in stocks are obtained through the subtraction of stock price at the end of the period its price at the beginning of the period plus the profits resulting from ownership divided by stock price at the beginning of the period.

2.3.4.1.2.Market return

market return is the difference between index prices at the beginning and the end of the period divided by the beginning price (Musa Bozorg Asl & Mousavi, 2016).

After the q-factor model of hxz was proposed, Fama and French added other factors –namely, investment and profitability- to the previous three factors and called their new model "the five-factor model". Huoe et al. (2015) quoted Fama & French, reporting that they had conducted tests on the model and concluded that it had a 93% explaining power for stock market changes. In 2015 and after Fama & French's five-factor model was proposed, they reached an interesting finding regarding their three-factor model after 22 years. They discovered that the value factor (HML) does not have a significant impact on the stock market and considered it as an additional explanatory variable. They proceeded to increase their model's explanatory power by adding two new factors of investment and profitability and thus creating the five-factor model.

2.4. Research background

Research literature review and investigation of the respective theories form the foundation of every piece of research. An essential step taken to understand the research subject and carry out the study better is to investigate how the subject of the research had formed, grown, and evolved, and take aid from previously conducted studies in the same field. Attempts have been paid in the previous sections to explain relevant studies. However, a brief review of some of the most prominent and relevant studies is presented in this section (Table 2).

Table 2: summary of research literature

No.	Scholar/ year	Article title
1	Mouctarnie Sarker (2013)	Markowitz portfolio model: evidence from Dhaka Stock Exchange in Bangladesh
2	Me choeichoei et al. (2010)	Consolidated assets mean-variance portfolio selection
3	Sheiuiaoksiea Howang (2012	Mean-variance models for portfolio selection subject to experts' estimations
4	Weigozhong et al. (2007)	potential mean-variance models and efficient boundaries for portfolio selection issues
5	Gourdoon & Alexandre (2001)	Mean-variance models' constrained value-at-risk: The concept of portfolio selection in the Basel Capital Agreement
6	Fresne, cenedal, and stembaeke (1987)	Asset pricing test considering the volatility of market beta and expected risk premium
7	Howang and Houng (2008)	Conditional risk-return relationship in a time-varying beta model
8	Kim et al. (2012)	Evaluation and comparison of various models' asset pricing capabilities in South Korea
9	Da et al (2012)	The efficiency of the CAPM model in firms' capital cost estimation
10	Darrat et al. (2012)	Various C-CAPM models' performance in developing and developed countries
11	Kapeilo & goanie (2005)	The impact of the inflation factors on determining stock price
12	Raei & Khosravi (2007)	Explanation of capital asset pricing model (CAPM) with downside risk in TSE
13	Eslami Bigdeli & Khojasteh (2007)	Improving the explanation of Fama & French's three-factor model expected return using capital productivity
14	Kordestani & Ghasemi (2007)	Evaluating the performance of risk measurement models: Fama & French's three-factor model vs. the q-theory model
15	Eshraghnia & Nashvadian (2008)	Testing Fama & French's three-factor model in TSE
16	Alinezhad & Mehrjerdi (2009)	A new method for stock portfolio performance evaluation using the mean-variance-skewness model and data envelopment analysis technique
17	Tehrani & Siri (2009)	Application of the efficient investment model through the analysis of Markowitz model's mean half-variance
18	Sadeghi, Sorough, and Farhanian (2010)	Investigation of volatility, upside risk, and downside risk in the capital pricing model of TSE
19	Eslami Bigdeli & Khanahmadi (2012)	Feasibility of portfolio risk reduction generalized conditional variance heterogeneity model in TSE
20	Zarrini et al. (2018)	Evaluation of the effect of stochastic fluctuations on the operational risk of hedging European options: Application of Markov Switching and Black Scholes Standard
21	Houshmand Neghabi et al. (2017)	Comparing explanation of behavioral and classic capital asset pricing models in the Iranian capital market
22	Najafi et al. (2018)	Proposing a model for pricing parallel oil forward contracts based on Black-Scholes's option pricing model

2.5. Research hypothesis

Meta-analysis of empirical research on investment emphasizing corporations active in the field of financial technologies industry over 1900-2020 will integrate and steer individual studies in this field.

3. Research methodology

The present study aims to conduct a meta-analysis of empirical research in the investment field with emphasis on corporations active in the field of financial technologies industry. The type of research is descriptive. The research follows an applied purpose, is considered among basic research, is an interactive

post-event survey in terms of data collection method, and the statistical population includes articles available on universities' scientific-research databases. Besides, some of the relevant articles and abstracts were indexed in well-known and reputable domestic (irandoc.ir, magiran.ir, ensani.ir, sid.ir, and civilica.com) and foreign (Science direct, Springer،emerald, and noormags.com), so that data available in universities' databases were used. Research populations included all basic research in the financial field that were selected based on the analysis of financial patterns. According to the conditions considered for sample selection, 113 studies conducted throughout 1962-2020 were selected through systematic elimination whose data was collected and tested using meta-analysis. Results were obtained using CAM2 software.

Studies that met the required methodology –the ones that had used class inclusion- were used to conduct the meta-analysis in this research. All potential studies relevant to the research subject must be considered when decisions are being made as to which studies are included in the research and which are excluded from it. In many cases, the research prepares a protocol as a guideline to determine which studied to include and which to exclude. Protocols usually specify the type of research, the time domain of study results publication, the type of publication, language, and the country of publication. The inclusion or exclusion of each of the previous pieces of research must be made clear. To express the importance of this stage, one could say that the credibility of a meta-analysis depends on the quality of the included studies and quality evaluation is an imperative part of meta-analysis (Ghorbanizadeh, 2014: 33-34). The present research's class inclusion criteria include:

1) Studies with a quantitative method
2) Studies that had investigated basic research (a few numbers of studies (three) has investigated financial model basic research and were thus excluded)
3) Studied that had investigated financial models (CAPM, Black-Scholes, mean-variance, Fama & French, etc.)
4) Studies that had examined correlation coefficient and t value.

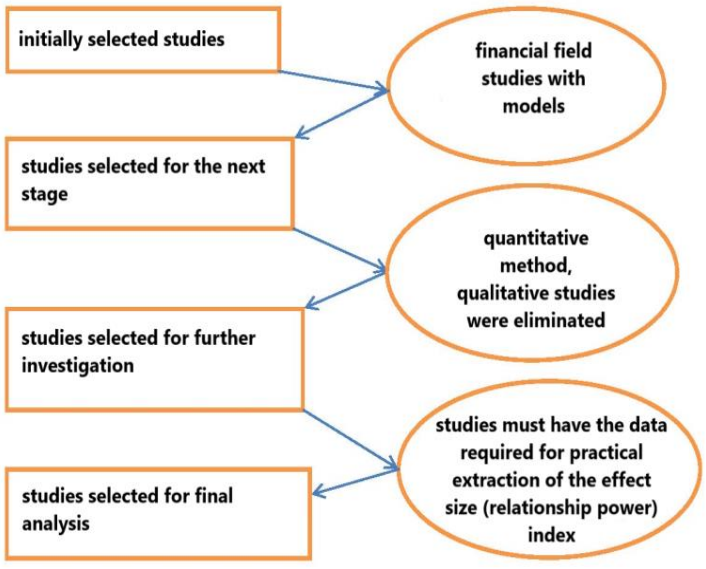

Figure 1: the process of filtering studies

At the data collection stage, data were extracted from each study and specified in the research design stage, a standard form for recording the data mainly extracted from the studies was used to record their research design, description of study groups, experimental practice, diagnostic information, evaluation period, and outcome scales (Chang & Brenzo Kim, 2006:1674). Questions such as: which variables are important? Which variables must be examined? What are research findings and conclusions? Must be asked when extracting data from the literature (Ghorbanizadeh, 1393: p. 36). A coding booklet or spreadsheet is prepared to identify the features of each study responding to the aforementioned questions and record them (Ortega, 2011). In fact, extracted data are categorized into three aspects of publication, methodology, and comprehensiveness. The important point is that we must trust the evidence, not the authors, and record what the authors have reported accurately when extracting data (Ortega, 2011). The issue that generally arises when extracting data is that studies might have used various measuring tools which makes it hard to integrate data. In such cases, data must be unified so that it can be integrated (Chang, Burns, & Kim, 2006: 1674).

Results of the studied pieces of research might be continuous or discrete. When data are continuous, calculation of the overall effect is conducted using the average (standard mean difference). However, scales such as odds ratio, relative risk, and risk difference are used for the same purpose when data are discrete (Whitehead, 2002; Egger, Smith, & Altman, 2001). The mean difference (size of effect) is usually used in continuous data to compare the control and intervention groups. Then, the size of the effect is standardized through the evaluation of the in-class variance. For continuous oblique impacts, values might change and the median might be used instead of the mean (Egger, Smith, & Altman, 2001). The combination of effect sizes could be obtained through the use of either model of "fixed effects" or "random effects" in meta-analysis. The fixed effect model is based on mathematics and its assumption is the similarity and difference of the correct experimental operation across all experiments. In short, the fixed-effect model is used when there is no difference between the studied pieces of research in terms of quality (Lee, 2010). The random-effect model, on the other hand, has the assumption that the real effect of the experiments might vary across the studies. Individuals are inclined to interpret the random effects and fixed effects models similarly (Ghorbanizadeh, 2014:48). Attention to challenging and controversial issues such as the quality, biases, and heterogeneity in the studies is imperative to meta-analysis. Bias, inclination, or partiality (tendency to one side) refer to the estimation of higher or lower amounts than the actual value. All studies are prone to bias. Bias might be due to factors such as various methods of data collection, unfavorable selection of the control group, or not having corrected the intervening variables (Egger, Altman, and Smith, 2010).

4. Data analysis

In his section that seeks to analyze the results of the study, all the studied pieces of research are first reviewed and the studies that have the class-inclusion criterion are selected first. Then, data collected through the coding form are extracted and classified into various tables aiming to answer the research questions and provide beneficial reports and classifications. Study of these tables that have been prepared in quantitative formats as far as possible yields useful and concise information on the studies' authors, year of the study, sample, and conducted studies divided by the type of research, subject of research, time, and place. It must be mentioned that the variables required for calculating the size of the effect were obtained using the 2MCA software to answer the research questions.

4.1. Descriptive statistics of the study

A total of 1200 Persian and English articles conducted in the field of basic financial research were extracted through the present study. However, this

number was reduced to 238 articles including 123 Persian and 115 English articles that have a relatively high thematic similarity and were suitable for meta-analysis given the emphasis of the present research on financial patterns (models). No dissertations were included in the study due to the lack of accessibility (because of the ban on downloading dissertations from the IranDoc website and lack of access to the updated password for the ProQuest website). Afterward, the inclusion and exclusion filters of the study were used to filter said articles into 113 Persian and English articles, among which 23 Persian and 8 English articles that were determined to be completely suitable for this research were selected according to the class-inclusion criteria and entered the process of variables and hypotheses categorization and, eventually, the process of calculating the effect size.

4.2. Effect size

In statistics, the effect size is a scale used to demonstrate the relationship between two variables under similar statistical circumstances. The effect size of these variables is evaluated using the qualitative measures of low, moderate, and high as indicated in Table 3. This indicator that is a turning point in meta-analysis studies was introduced by the American statistician, Jacob Cohen.

Table 3: effect size frequency distribution

Change domain/ effect intensity	Frequency	Frequency percentage
Effect intensities smaller than 0.3 (small)	14	0.33
Effect intensities of 0.3-0.5 (moderate)	6	0.14
0.5 and higher (large)	22	0.52
Total	42	100

Table 4: effect size of basic research on financial models meta-analysis

Scholar	Effect size	Significance level	Result
Salehi et al.	-0.22	0.02	Confirmed
	0.23	0.02	Confirmed
	0.24	0.01	Confirmed
Baharestan et al.	0.21	0.03	Confirmed
Pourzamani & Shiri	0.65	0.000	Confirmed
	0.72	0.000	Confirmed
Osta et al.	-0.90	0.000	Confirmed
Soleimanian et al.	0.96	0.000	Confirmed
	0.67	0.000	Confirmed
	0.41	0.000	Confirmed
	Excluded	t value smaller than 1.96	-
	Excluded	t value smaller than 1.96	-
	Excluded	t value smaller than 1.96	-
Ranjbar et al.	0.46	0.000	Confirmed
	0.54	0.000	Confirmed
	0.53	0.000	Confirmed
	0.53	0.000	Confirmed
Mojtahedzadeh et al.	Excluded	t value smaller than 1.96	
Ashtab et al.	0.96	0.000	Confirmed
Sabali et al.	0.99	0.000	Confirmed
Raei & Chavosh	0.96	0.000	Confirmed

Scholar	Effect size	Significance level	Result
Fallah et al.	-0.30	0.010	Confirmed
	Excluded	t value smaller than 1.96	-
	Excluded	t value smaller than 1.96	-
	Excluded	t value smaller than 1.96	-
Amirhosseini & Ghobadi	0.98	0.000	Confirmed
	0.99	0.000	Confirmed
	0.90	0.000	Confirmed
Rezaii et al.	0.45	0.003	Confirmed
	Excluded	t value smaller than 1.96	-
	Excluded	t value smaller than 1.96	-
Ramezani & Kamyabi	0.08	0.000	Confirmed
	Excluded	t value smaller than 1.96	-
	Excluded	t value smaller than 1.96	-
Babalouian & Mozaffari	0.28	0.004	Confirmed
	0.26	0.070	Rejected
	0.19	0.040	Confirmed
	Excluded	t value smaller than 1.96	-
	-	t < 1.96/ duplicate variable	-
	Excluded	t < 1.96/ duplicate variable	-
	Excluded	t < 1.96/ duplicate variable	-
	-	Duplicate	-
	Excluded	t < 1.96/ duplicate variable	-
	Excluded	t < 1.96/ duplicate variable	-
	Excluded	t < 1.96/ duplicate variable	-
	Excluded	t < 1.96/ duplicate variable	-
	Excluded	t < 1.96/ duplicate variable	-
	Excluded	t < 1.96/ duplicate variable	-
Babalouian & Mozaffari	0.280	0.005	Rejected
	0.24	0.010	Confirmed
	Excluded	-	-
	Excluded	-	-
Mallik et al.	0.59	0.000	Confirmed
	0.77	0.000	Confirmed
	0.63	0.000	Confirmed
	0.65	0.000	Confirmed
Masution et al.	0.98	0.000	Confirmed
	0.97	0.000	Confirmed
Kisman et al.	0.84	0.000	Confirmed
Eslami & Honardoust	0.37	0.000	Confirmed
	Excluded	-	-
Hajiha & Bakhshi	-0.24	0.004	Confirmed
	-0.35	0.000	Confirmed
	0.24	0.003	Confirmed

Scholar	Effect size	Significance level	Result
Abbasi et al.	0.87	0.000	Confirmed
	Excluded	-	-
Rahmani & Mohammadi	0.23	0.000	Confirmed
	0.23	0.000	Confirmed
	0.13	0.010	Confirmed
Ebrahimi et al.	Excluded	-	-

As indicated in table 3, the risk-size interaction size and the value interaction on the momentum model are low (according to Cohen's spectrum, which specifies values between 0.1 and 0.3 to be low). Besides, significance levels lower than 0.05 indicate the confirmation of relationships which means the interaction between risk, size, and effect have impacts on the momentum model. Fama & French model's transparency and predictability are confirmed with a small effect size. According to the study of Pourzamani and Shirazi, the impact of the Carhart model on growth and value firms is confirmed with a large effect size (over 0.5). According to the study of Osta et al., the impact of economic and financial models on performance evaluation is confirmed with a large effect size (-0.90) (negative values indicate the inverse and significant relationship between variables). According to the study of Soleimanian et al., the relationship between momentum value, Fama & French's model, and the CAPM model are confirmed with a large effect size while the relationship between Fama & French's model and accrual items has a moderate effect size (00.3-0.5). Besides, the impact of the crisis prediction model on profit management is confirmed with a large effect size (over 0.5) according to the study of Ashtab et al. According to the study of Sabali et al., the impact of the multifactor model on stock returns is confirmed with a large effect size. Besides, the impact of artificial and multifactor neural networks on the returns of stock shares is confirmed with a large effect size according to the study of Raei & Chavosh. According to the study of Fallah et al., the negative impact of the corporate governance disclosure variable on the default risk is confirmed with a small effect size (0.1-0.3). As the study of Amirhosseini and Ghobadi indicates, the difference between CAPM and CD-CAPM models on positive and negative risks is confirmed with a large effect size. Besides, the difference between CAPM and CD-CAPM models is also confirmed with a large effect size (over 0.5). According to the study or Rezaii et al., the impact of the single-factor model on capital asset pricing is confirmed with a moderate effect size (0.3-0.5). As the study of Ramezani & Kamyabi indicates, the impact of Fama & French's five-factor model on the expected returns was confirmed with an extremely small effect size (smaller than 0.1). According to the results of Babalouian & Mozaffari, the impact of Fama & French's five-factor model on premium risk is confirmed with a small effect size while it has no impact on the size (significance level higher than 0.05). The impact of Fama & French's five-factor model on value is also confirmed with a small effect size. It must be mentioned that the rows with the word "excluded" in Table 4 indicate that although the respective studies have calculated the t statistic, they were excluded from the present research due to the small value of t or duplicity of the studied variable since they would result in biased meta-analysis results. Besides, the impact of risk premium and size on HXZ were confirmed with a small effect size (0.1-0.3). According to the study of Mallik et al., the relationships between CAPM-DSEX and CAPM-DS20 models as well as the relationship between FAMA-DSEX and FAMA-DS30 are confirmed with a large effect size. As indicated in the study on Nasution et al., the impact of the CAPM and Fama & French's model on the market risk is confirmed with a large effect size. Also, the stock return rate was confirmed with a large effect size as indicated in the study of Kisma et al. According to the study of Eslami & Honadoust, the impact of Fama & French's three-factor model on the

liquidity risk is confirmed with a moderate effect size. As indicated in the study of Hajiha & Bakhshi, the impact of efficiency on credit expansion fluctuations of stock companies was confirmed with a small effect size. As indicated in the study of Abbasi et al., the influence of the idealistic style on managers' investment performance was confirmed with a small effect size. Correlations and effect size values were recorded in the table. To interpret, it must be borne in mind that each effect size has its corresponding significance level (the P-value column). Therefore, if the p-value in the desired cell is smaller than 0.05, the study will be confirmed and studies with significance levels higher than 0.05 are rejected. The effect size indicates the intensity of the relationship.

Table 5: the antecedents and consequences of basic financial model studies

Consequence	Antecedent
Return on stocks	Performance
Default risk	Firm size
Positive risk	Financial leverage
Negative risk	Management style
Performance assessment	Financial turnover
Exchange rate	Financial behavior
Import	The bias of access to information
Inflation	Discovering the point of reliance
Liquidity	Over-confidence
Profit management	Interaction
Liquidity risk	Momentum value
Corporate credit expansion fluctuations	Accrual items
Investment performance	Financial-size limitation
Investors' decisions	Corporate governance

4.3. The Funnel plot

Using a two-dimensional diagram called the Funnel plot is the most conventional and simplest way of detecting bias, through which the intervention impact estimated for each study is drawn in front of its sample size. If the study is unbiased, we expect the diagram to be symmetrical and the scatter value to be distributed around the axis of composite effect size symmetrically. In other words, the size of the intervention effect increases with the decrease in the sample size if the study is unbiased (Light and pilmiere, 1984). On the contrary, the scatter of studies will be more concentrated on one side of the average axis at the bottom of the diagram if the study is biased. This indicates that studies with smaller sample sizes (illustrated at the bottom of the diagram) are more likely to be published if they have an above-average impact size and will be statistically significant in that case (Ghorbanizadeh, 2013). In this method, the null hypothesis (H0) indicates the symmetry of the diagram and lack of bias in the published article while the alternative hypothesis indicates the asymmetry of the diagram and the presence of bias in the article.

As illustrated in Figure 1, the five studies demonstrated as solid circles indicate that their significance has been confirmed due to their large sample size. Besides, two effects were insignificant as demonstrated at the bottom of the funnel diagram.

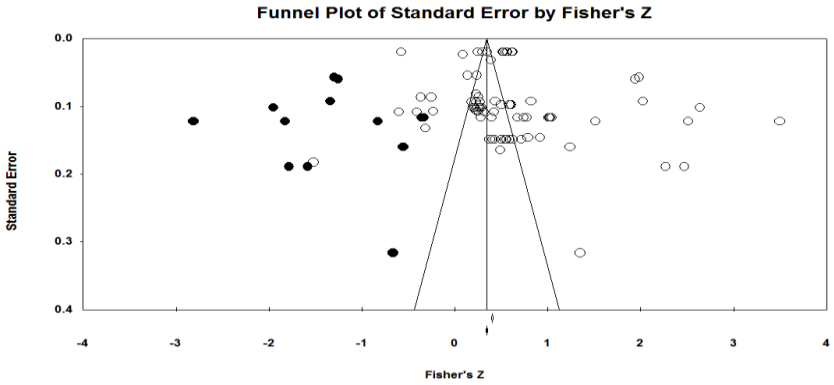

Figure 1: the Funnel plot of the study

4.4. Examining the publication bias (error)

Data obtained in this section is a part of the meta-analysis of publication bias evaluation. Publication bias refers to cases where the result of some studies are kept away for some reason. Publication bias is among the issues harming the credibility of meta-analysis. Publication bias in a meta-analysis does not encompass total studies conducted in the desired field since many studies are conducted in the research world whose results are not published for some reason, or rather gets published in low-ranking journals. The case is that sometimes, the researcher does not send his article for publication since he has not achieved the desired or significant results, or the journal refrains from publishing such an article. Thus, the presence of statistically significant results in a study has become a factor for its acceptance for publication (Macaskill P., Water SD., L. Rwig 2000). So publication bias must be detected and corrected in the beginning stages of a meta-analysis for the results to be valid. The funnel diagram, Egger's linear regression method, Begg and Mazumdar rank correlation, and fail-safe N have been used to evaluate this assumption. The results of evaluations are illustrated using a variety of methods as follows.

Table 6: results of publication bias

Model	**Effect size with a 95% confidence interval**				**Zero test (two sequences)**		**Heterogeneity**				**squared Tau**			
Model	Number	Point estimation	Lower limit	Upper limit	Z	P	Q	DF	P	I	squared UϬT	Standard error	var	uϬT
fixed number	79	3.83	0.374	0.392	76.508	0	7581.544	78	0	98.971	0.222	0.078	0.006	0.741
Random number	79	5.34	0.454	0.606	10.951	0								

4.5. The Q test for heterogeneity

The Q test examines heterogeneity or homogeneity of effect size in the form of introducing a sub-hypothesis (heterogeneity refers to the difference between the results of studies. Result heterogeneity indicates the presence of a moderating variable that has influenced the study results on the obtained variables. In such a case, meta-analysts must examine the moderating variable(s) that might have caused the heterogeneity (Kheyrandish et al., 2018)). The null hypothesis (H0) indicates the insignificance of the obtained effects while the alternative hypothesis (H1) indicates the presence of significant differences between the obtained effect sizes. The null hypothesis was rejected and the alternative hypothesis was accepted considering the 95% confidence level which means the probability of error is smaller than 5%. Therefore, no significant difference was observed between the obtained effect sizes.

Table 7 indicates the amount of homogeneity. I^2 and Q tests are used to investigate homogeneity. According to the results ($p < 0.01$ and $Q = 7581.54444$), one could say that the null hypothesis indicating the homogeneity of the studies was rejected with a 99% confidence interval which indicates the use of diverse studies and confirms the hypothesis of the studies' heterogeneity. In other words, the significance of the Q index shows that the early research's effect sizes are heterogeneous. However, squared I is another index used for determining the same thing and has been used since the Q index is sensitive to the increase in effect size, and its power to reject homogeneity decreases with the increase in the number of effect sizes. The I^2 index can have values up to 100% and indicates the level of homogeneity as a percentage. The closer this index is to 100%, the more homogenous the initial studies. Therefore, results of the I^2 test indicate that 98% of the total changes in the studies are due to their heterogeneity. This test tells us that basic research in the financial field with an emphasis on financial model analysis is quite diverse, so mediating variables must be used to determine the location of differences as well as the variance. Of course, attempts were paid to identify these indicators; data collected in the checklists were referred to several times and the variables and hypotheses were revisited. However, no clear results were obtained in this regard.

4.6. Results of Begg and Mazumdar rank correlation

Begg and Mazumdar rank correlation indicates the rank correlation between effect sizes and the variance (TAU Kendall rank correlation coefficient) of these effects. The interpretation of the coefficient is that a value of zero indicates no relationship between the effect size and accuracy while deviations from zero indicate such a relationship. According to the table above, the value of the TAU Kendall rank correlation coefficient is 0.222 which indicates a significant correlation between the effect size and accuracy (significance level lower than 0.05) and the alternative hypothesis (H1) indicating the asymmetry of the funnel plot is confirmed.

4.7. The fail-safe N test

Rosenthal's fail-safe N test calculated the number of missing studies (with a mean effect size of zero) and must be added to the analyses so that the statistical insignificance on the overall effect is obtained (Ghorbanizadeh, 1392: 141). In other words, this index indicates the number of similar studies that would change the currently obtained results if they were added to the current scope of research (studies under review). The main idea behind the fail-safe N is to specify the number of studies with zero effect size to reduce the probability of type I error in the predetermined significance level. To be clear, if several quantitative insignificant studies are required for a result to reach a specific significance level, the obtained results are probably invalid (Vegas, 2005:55). As can be seen, the value observed in this inequality has been illustrated as a solid circle in the funnel diagram. Table 7 illustrates the results of the fail-safe N test for the present study.

According to the table above, 4484 other studies must be added to and examined in the research so that the two-tailed P does not exceed 0.05. This means that

4484 other studies must be conducted so that error occurs in the calculation and analyses which indicates the high accuracy and validity of the results obtained in the present study. 4484 studies distance from error is a considerable and acceptable amount.

Table 7: classic fail-safe N test

The z value for the observed studies	67.80997
The P-value for the observed studies	0.000
Alpha	0.0500
Residual (sequence)	2
Z for alpha	1.95996
The number of observed studies	79
The number of missing studies that get P to alpha	4484

4.8. Duval and Tweedie trim and fill method

Duval and Tweedie is a method for publication bias evaluation and adjustment. This method uses a repetitive process in which the inconsistent observations are eliminated from the funnel plot (elimination of the redundancies from the distribution). The values allocated to missing studies are then added (the act of filling the estimation of the standard error and effect size of studies that have probably been missed). The emergence of many missing studies at one side of the mean line indicates small sample bias or publication bias (Little, Corcoran, Pillani, 2008). In other words, this method is based on the key idea behind the funnel plot which indicates that the diagram becomes symmetrical relative to the effect mean effect size axis in case of no bias. The trim and fill process considers missing studies, enters them in the analysis, and recalculated the summary of effect size (Ghorbanizadeh, 2013). The "five studies" demonstrated in Table 8 are the same five studies mentioned in the forest plot that had passed the vertical line and were confirmed due to their large sample size.

Eventually, the strength of the relationship between dependent and independent variables was evaluated. Then, the effect size heterogeneity test for the type of the conducted meta-analysis was performed to test the desired hypothesis. The fixed effect model would be used in case of data homogeneity and the random effect model would be used in case of data heterogeneity. Examination of the sample group variable's mediating role obtained from the Q test indicated the increase of Q from 7581.54 to 11583.19. Thus, results indicate that mediating variables could play no role in basic research in the field of finance with an emphasis on financial models.

Table 8: Duval and Tweedie trim and fill method

Explanation	Fixed effect			Random effect			Value Q
	Point estimation	Lower limit	Upper limit	Point estimation	Lower limit	Upper limit	The number of required studies: 5
Value of observations	0.38296	0.37410	0.39175	0.53434	0.45381	0.45383	7581.54398
Adjusted value	0.33032	0.32126	0.33932	0.31284	0.20310	0.20310	1158.1924

5. Conclusion

The statistical population considered for the present research includes studies published on universities' databases for the 58 years of 1962-2020. The sample contains 133 studies the list of which has been presented in Appendix 1. The present study aims to conduct a meta-analysis on empirical studies in the field of finance on corporations operating in the financial technologies industry. Accordingly, the first section of the study introduced the research, section two discussed research literature and background, and section three explained the methods of conducting the study and testing the hypotheses. Results obtained from data analysis and research hypotheses' level of confirmation were discussed in section four. The present section provides the required suggestions after a review of the results obtained from testing research

hypotheses. As mentioned earlier, the main purpose of this study was to conduct a meta-analysis on empirical studies in the field of finance on corporations operating in the financial technologies industry. The present study faced many challenges in the beginning. Besides, the meta-analysis of basic research in the field of finance can highlight the role of these models in the field of finance and provide scholars with a deeper insight into investment decision-making through the definition and interpretation of consequences and antecedents of the main financial models by calculating their effect size using the CAM2 software. Hence, the main results of meta-analysis studies are aimed at obtaining a statistic called "the effect size" and the author strives to obtain its value so that meta-analysis studies have emerged seeking to help researchers find general results regarding specific subjects. In the present study, 113 domestic and foreign research articles were reviewed based on the total number of articles available on websites and the filters that articles had to go through before being included in the meta-analysis process. The general results of the study are mentioned in the following.

The present study was based on the four main models in the field of financial investments whose variables were significant as a result of their influence on one another. Results indicated that the dependent variables of the study included exchange rate, performance evaluation, inflation, profit management, liquidity, stock share return, default risk, fluctuations of firms' credit expansion, positive and negative risks, liquidity risk, market risk, stock return, investors' performance, and decisions, etc. which are two-dimensional variables. Results indicate that 113 studies have focused on these variables to investigate financial models in the field of investment, many of which were excluded from the meta-analysis through the filtration of the software. Eventually, the frequency percentage of these variables was obtained with effect sizes of 0.33% (10w), 0.14 (moderate), and 0.52% (high). Besides, the study of the independent variables of all financial models (in this study, Fama & French's three-factor and five-factor models and the capital asset pricing model (CAPM) and its variations were investigated) including risk interaction, size, and value, accrual items, corporate governance, premium risk, efficiency, financial leverage, idealistic style, financial circulation, financial behavior, accounting decisions, etc. that are dummy and two-dimensional variables indicated that 113 quantitative studies in the field financial model investment had been conducted on these variables, and the frequency percentage of the variables were obtained as 0.33%, 0.52%, and 0.33%.

So these variables have been able to influence and change the other variables. No controlling or moderating variables were used in this study and the study was conducted used a set of dependent and independent variables. In the first stage, the results of the forest plot indicate the scatter of effect sizes based on the confidence interval were explained to illustrate the results of the study visually as discussed in section four. However, only seven studies out of the total reviewed studies passed through the middle line of the plot, five of which were confirmed due to their large sample size, and two were rejected (since their significance level was higher than 0.05). The second stage included the use of the funnel plot to identify publication bias which is of great use in meta-analysis studies. The results were the illustration of study results in another format which indicated that five studies were significant due to their large sample size and the other two were rejected. At the next stage, interesting results were obtained by investigating publication bias through other methods. Hence, at the third stage, the Q test was used in the form of a sub-hypothesis to examine the homogeneity of the obtained effect sizes while the alternative hypothesis indicated a significant difference between the obtained effect sizes. According to the result of this test ($p < 0.01$ and $Q = 7581.54444$), one could say that the null hypothesis indicating the homogeneity of the studies was rejected with a 99% confidence interval which indicates the use of diverse studies and confirms the hypothesis of the studies' heterogeneity. In other words, the significance of the Q index shows that the early research's effect sizes are heterogeneous. However, squared I is another index used for determining the same thing and has been used since

the Q index is sensitive to the increase in effect size, and its power to reject homogeneity decreases with the increase in the number of effect sizes. The I^2 index can have values up to 100% and indicates the level of homogeneity as a percentage. The closer this index is to 100%, the more homogenous the initial studies. Therefore, results of the I^2 test indicate that 98% of the total changes in the studies are due to their heterogeneity. At the next stage, Begg and Mazumdar rank correlation was examined, which indicated a TAU Kendall rank correlation coefficient of 0.471; and the significance level indicates a significant relationship between effect size and accuracy (significance level is lower than 0.05%). Also, the alternative hypothesis (H1) indicating the asymmetry of the funnel plot and publication bias was confirmed. At the first stage, results of the fail-safe N test were examined which indicated that 4484 other studies must be conducted so that error occurs in the calculation and analyses which indicates the high accuracy and validity of the results obtained in the present study. 4484 studies distance from error is a considerable and acceptable amount. At the sixth and final stage, the studies were investigated using Duval and Tweedie trim and fill method that seeks to discover the relationship between the dependent and independent variables of the study. Examination of the sample group variable's mediating role obtained from the Q test indicated the increase of Q from 7581.54 to 11583.19. Thus, results indicate that mediating variables could play no role in basic research in the field of finance with an emphasis on financial models.

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