Journal of Social Sciences and Management Studies

Vol.1, No.4
December 2022

CONTENTS

RESEARCH ARTICLE

An empirical investigation of Tobin's-Q augmented various Asset Pricing Models: Evidence from Pakistan

Mohammad Azam

Department of Management Sciences, National University of Modern Languages (NUML), Peshawar Campus, KPK, Pakistan

Corresponding Author: Mohammad Azam, azam.ims@hotmail.com; mazam@numl.edu.pk

Abstract
Despite the strong growing popularity of Asset Pricing Models, it is difficult to estimate which factor contributes significantly in explaining average excess portfolio returns particularly in emerging equity market. Using an extensive sample over Jan-1994-Dec-2020 period, this paper aims to extend the literature by augmenting Tobin-Q adjusted risk premium with various unconditional standard asset pricing models which seeks to postulate the nexus between expected portfolios stock returns and risk-factors using monthly data of 521 enlisted financial and non-financial firms from Pakistan Stock Exchange. The multiple time-series OLS regression analysis models are employed to analyze Tobin-q risk-factor augmented with various factors models. Fama and French (2015) five-factor model excessively explains average equity returns however, our results reveal that size, value, profitability and particularly Tobin-q factor are significant while market and investment factor are redundant in Pakistan Stock Exchange. The momentum factor shows weak results in describing average equity returns in the market. Based on Gibbons, Ross and Shanken (1989) test, our findings support Tobin-Q augmented Fama and French (2015) five-factor model as appropriate for pricing stocks returns in emerging market of Pakistan. The investors, portfolio managers and policy-makers should assume the Tobin-q factor while constructing diversified portfolios for investments in Pakistan Stock Exchange.

Keywords: Tobin-q factor; momentum; profitability; investment; PSX

Introduction and Motivation

In the contemporary era of information, all over the globe, individual investors are eager to invest in stock markets due to sophisticated technology and stringent corporate governance rules concerning transparency of public sector reporting (Lee, Cheng & Chong, 2016). Due to progressive complexity of financial markets, investors must assume numerous factors to increase their earnings (Galankashi, et al., 2020). Consequently, investors are hyperconscious to ascertain and evaluate numerous investments proactively seeking to invest generally into capital markets and particularly into stocks due to easily transferability (liquidity) and excess returns characteristics but conversely high volatility (risks) makes them risk-averse and extremely diligent in stocks and portfolio allocation. Likewise, Škrinjarić (2020) critically outlined the portfolio managers and practitioners' eagerness towards acquiring theoretical knowledge regarding innovative finance and economics theories and sophisticated quantitative techniques in response to investors' quarries in solving their intricate problems to determine the intrinsic value of

their investment while investing in stock markets. Although, they assume various theories to determine the stock returns (Ameer & Jamil, 2013) in the quest for secured investment and excess stock returns.

Moreover, as the relative performance in terms of excess average returns, stocks compare to corporate bonds over-perform progressively since one and half century (Madsen, 2003). Therefore, individual investors and financial market practitioners enthusiastically exhibit asymmetric response to determine the intrinsic value of stock (Akhtar, 2021), before constructing diversified portfolios in which the nonsystematic risk could be reduced by accumulating inversely correlated securities. Hence, the portfolio construction and selection of asset is a significant domain in investment management (Wu, et al., 2019; Li et al., 2017). Their eagerness to ascertain the validation of theoretically justified factors which are considered as influential determinants in decision-making process made them realized to empirically examine various asset pricing models (APMs) in real-life decision-making process. Dewandaru et al., (2014); Mengoli (2004) argued that the ultimate determination of investors and portfolio managers

is to outperform than market in a systematic way which might be possible over implementation of empirical research results into the real-life investment strategy.

Penman (1992) argued that accounting fundamental ratios are predominantly used earlier to ascertain the intrinsic value of assets. These sustainability accounting ratios are still using by investors, portfolio managers and particularly policy-makers for decision-making process. Similarly, substantial market ratios such as B|M ratio, price-to-earnings ratio, price-to-dividend ratio were also utilized for evaluation of stocks (Stowe et al., 2007; Bodie et al., 2013) which decreased information asymmetry charges for investors (Alroaia et al., 2012) but subject to economic and environmental differences among multinational firms, accounting information interpretation homogeneously may produce spurious results for investors (Choi et al., 1983). However, investors need to understand the mechanism of multi-markets thoroughly (Akhtar, 2021). However, the investors decisions are also influenced by the characteristics of equity market such as transparency, functionality, efficiency, quick and easy-access to information in the developed equity markets that emerging markets typically lacks (Arikan et al., 2019; Leal et al., 2018).

Besides, investors consider the trade-off between desirable and undesirable thing as endeavor to optimize returns and diminish risk rationally which is possible through portfolio diversification strategy (Markowitz, 1952). As Grobys et al. (2018) comment that inversely correlation between two-factor yields probably higher returns. This doctrine is pioneered by Markowitz as the rule of investor behavior known as portfolio theory which contributed grass-roots to the APMs that triggered unprecedented area of research in financial economics, spurred by a plethora of research studies. However, the notion of investment can be traced back from the contribution of Graham et al. (1934) who postulated the under and over-valuation of assets in the realm of asset returns.

Although, in academic literature of financial economics, the theory of APMs is the most debated prominent discipline, Zada, Rehman, and Khwaja (2018) but still remains inconclusive to determine the standard or empirically appropriate benchmark model among a wide diversity of models. By augmenting various proposed empirically motivated factors, researchers evaluate the pricing abilities of APMs which was independently initiated by the trio (Lintner, 1965); Mossin (1966); (Sharpe, 1964) in the collateral name as Capital Asset Pricing Model (CAPM). It explains the risk and returns trade-off of financial asset which is solely measured by beta (Mukherji et al., 1997) which is assumed as a measure of systematic risk (non-diversifiable risk) in financial economics literature. According to this model, the valuation of asset is possible only through the determinant of market returns and beta is the sole coefficient which measures the risk of an asset, also familiar as single-factor

model (SFM) which is widely used for empirically predicting the expected returns and cost of equity, (Situm, 2021; Frank & Shen, 2016; Boyle, 2005).

Furthermore, Sehrawat et al. (2020) comment that risk-diversification is possible by augmenting foreign-securities into portfolios. Feng et al. (2017); Harvey et al. (2016); augmented macro-economic and financial factors to discover the nexus with portfolio returns constructing 25 two-sorted Size-B|M ratio portfolios. Similarly, Rendón (2020) examined foreign exchange risk as additional factor using eight OECD high-income countries daily data. The time span consists of 16 years from Jan-2000 through Feb-2016. Using time-series regression models, the augmented C4FM with regional currency premium (RCP) concluded that global model outperformed than standard C4FM. In the case of Japan and Asian-Pacific markets, the domestic version model demonstrated better results than global version model.

The remainder of the study is organized as section two consists of literature review, section three data and methodology, section four time-series OLS regression, section five results and conclusion of the study.

Literature Review

Over the past five decades, APMs was empirically examined and was used as facilitator for investors, portfolio and fund managers Ali et al. (2018) but later on, a plethora of alternative models were introduced such as intertemporal APMs by Merton (1973), Arbitrage pricing theory (APT) by Ross (1976), liquidity augmented two-factor model by (Liu, 2006). Since 1970s, a plethora of anomalies or factors are empirically investigated by academic researchers and portfolio practitioners that determine the stock returns. The motivation behind the theoretical and empirical examination of various patterns is to improve the explanatory power of the model and focusing on model specification (Davidson et al., 2002). Despite long theoretically and empirically investigation, the preceding literature evidenced dissimilar and unpredictable results regarding the asset pricing models especially in emerging equity markets where investors are hyperconscious to make rational investment decision.

Moreover, various patterns such as earning-to-price ratio (Basu, 1977; Jaffe, Keim & Westerfield, 1989); leverage (Bhandari, 1988); size (Benz, 1981; Basu, 1983); value (Stattman, 1980; Rosenberg et al., 1985) divert the single-factor model into multi-factor model. Among them, the most popular one introduced by (Fama & French, 1992, 1993) who augmented two additional factors named size and value factor that became more popular in the academic literature of finance known as Fama-French three-factor model (henceforth FF3FM). It gained more popularity, assumed as a benchmark in the domains of APMs in finance, and therefore, mostly tested in academic research. They criticized and argued that SFM is not empirically

valid in explaining variations in cross-sectional expected returns, therefore, the extended version model with addition to size and value factors appropriately explains the cross-sectional average equity returns.

Moreover, Carhart (1997) hypothesizes the momentum-pattern as additional explanatory variable augmented with FF3FM for enhancing description of average returns which is empirically tested correspondingly and observed improving explanatory power of the model called Carhart (1997) four-factor model (C4FM). Merton (1987); Peng and Xiong (2006) focused on investor behaviour pattern. Subsequently, Fama and French (2015) proposed alternative extended and revised model by further augmenting profitability and investment patterns with the FF3FM which is also empirically examined in a variety of developed and emerging equity markets and supported highly statistically significant results in developed stock markets such as USA, Europe and Asia Pacific (Fama & French, 2015, 2016, 2017). Moreover, Liu et al. (2019) offered alternative value pattern measured by Earnings-Price (E/P) ratio. Huang (2019) using individual stock returns data from 1994 through 2016, argued that these patterns delivered better explanatory power for average stock returns in China. Lin (2017) argues that FF5FM outperform FF3FM consistently in China and particularly value and profitability patters perform better results but investment is redundant in China equity market. Likewise, Nichol and Dowling (2014) argued that profitability pattern exhibited the most potential for UK equity market. Conversely, Kubota and Tekehara (2018) revealed unfavourable results from Japan equity market. Ahlatcıoğlu and Okay (2021) investigated post-earnings announcement drift and comment that FF3FM and FF5FM are unable to explain monthly portfolios returns in Turkey equity market. Similarly, the emerging equity markets also pinpointed poor explanatory findings particularly investment factor such as (Guo et al., 2017) in China equity market and (Zaremba & Czapkiewicz, 2017) in Eastern Europe. Ali et al. (2019) examined four standard asset pricing models like FF3FM, C4FM, FF5FM and momentum augmented FF5FM in PSX.

A general question in asset pricing models area is whether the additional factor improves the explaining ability of the model which can be determined by behaviour of stock returns. With a view to understand the behaviour of stock returns, a plethora of accounting-based and firm-specific measure factors have been proposed and empirically investigated around the globe which exclusively enriched the literature but not yet justified to be conclusive concerning appropriate standard APM which fully capture the stock returns. However, there are various firm-level determinants which explain the variation of portfolio returns which portfolio investors and managers seeking to exploit the forecasting capabilities of APMs by augmenting risk-factors into their opportunistic

investments in diversified portfolios (Mosoeu & Kodongo, 2020).

Academically, the APMs are ubiquitously empirical examined research area of finance which is pioneered independently by (Lintner, 1965; Mossin, 1966; Sharpe, 1964) called Single-factor model (SFM). It presumes that beta solely captures the risk of a stock which is thoroughly investigated model shows a broad spectrum of diversified findings and conclusions. It postulates linear nexus between expected returns and risk (beta). This linear relationship is empirically investigated and critically argued by numerous research studies such as Douglas (1969) argued that this nexus is too-flat as a consequence of measurement error in bet, (Miller & Scholes, 1972). To decrease the measurement errors, Black et al. (1972); Fama and MacBeth (1973) interlinked this nexus with portfolio instead of individual firms returns and support the argument that this association is near linear while slope is still under estimated (Fama & French, 1992) also reveal too-flat and statistically insignificant nexus between risk and returns. Moreover, a considerable quantity of research studies has made substantial contributions in the discipline of APM by postulating the determinants of expected stock returns and capturing capability of associated risk premiums. Davidson et al. (2002); Fama and French (1993) argued that firm-specific fundamental variables such as firm size, B|M ratio, dividend yield, momentum capture implicit risk measures which investors demand to be compensated as reward of bearing risks that explain the variation in stock returns, (Pojanavatee, 2020; Shaharuddin et al., 2018; Acheampong & Swanzy, 2016; Lau et al., 2002). Based on beta analysis, there are two versions of CAPM findings such as static OLS where beta coefficient is considered to be constant over time and alternative is time varying beta coefficient. Based on time-varying beta, Kassimatis (2008) reveals that value and momentum patterns react as disappear and conversely, size-factor returns diminishes using Australian equity market data. His findings reveal that momentum pattern is performing poor in the market. Furthermore, the study advocates that as the business cycle (macroeconomic situation) of country to country differs accordingly the return-generating process differs country to country. Therefore, the estimation of beta as constant may cause spurious regression results.

More specifically, there are substantial empirical evidences advocating that FF3FM outperformed single-factor model using developed and emerging equity markets data around the globe. The standard FF3FM has extensively been investigated around the globe using the data of developed stock markets (as Dirkx & Peter, 2020; Kubota & Takehara, 2018; Huynh, 2017) and emerging stock markets (as Mosoeu & Kodongo, 2020; Xie & Qu, 2016). As a matter of fact, empirical results were comparatively improved but FF3FM was generally witnessed incapable in explaining fully cross-sectional stock returns (Novy-Marx,

2013; Mosoeu & Kodongo, 2020). Furthermore, Novy-Marx (2013) and Watanabe et al. (2013) identified an additional pattern to be considered when explaining fluctuations in cross-sectional average stock returns (CSSR) as a profitability factor.

Alternatively, Titman, Wei & Xie (2004) highlighted the significant contribution of investment pattern to explain the variation in CSSR. Furthermore, these two additional patterns were augmented with market, size and value patterns familiar as FF3FM and proposed Fama & French (2015) five-factor model (FF5FM). Similarly, various additional patterns such as liquidity (Racicot & Rentz, 2016, 2017), labour growth rate (Roy & Shijin, 2018), momentum (Dirkx & Peter, 2020; Zheng, Chiang & Nelling, 2020), nominal interest rates (Jareño et al., 2018), growth in macroeconomic (Vassalou, 2003; Li, Vassalou & Xing, 2006), price-to-earnings ratio, dividend yield (Zheng, Chiang & Nelling, 2020) factors were augmented with FF5FM to further improve the explanation of variation in CSSR. These empirical studies still not reached to the conclusion regarding perfectness and the empirical augmentation process is still vigorous in the literature. In the line of zoo-factors, this study seeking to explore the Tobin-q risk premium to price the returns and investigate whether additional factor has explanatory power in emerging equity market of Pakistan. Furthermore, to find out which Tobin-q augmented model do the best job in capturing the average excess portfolio returns. It is pioneered by Kaldor (1966) but later on popularized by (Tobin, 1970). It is used to measure the firm performance, (Wernerfelt & Montgomery, 1988), to operationally evaluate the comparative performance of firms, (Wolfe & Sauaia, 2003) which is used as a proxy for investment opportunities, (Fu, Singhal & Parkash, 2016) to investigate whether stock is overvalued or undervalued. It deals with two variables: the present price of stock measured by statisticians and spot-market price of stock which assumes overvalue outperform undervalue stocks.

The contemporary literature, supported by a diverse range of empirical studies, evidence the robustness of FF5FM estimates explaining expected variation in CSSR (Fama & French, 2015, 2017; Racicot & Rentz, 2016; Zada, et al., 2018; Munir et al., 2020) and capturing risk-premium more vigorously than the preceding APMs in developed and emerging equity markets across the globe. The nexus between multiple factors and portfolio returns has been extensively explored in frontier and emerging equity markets and Pakistan Stock Exchange (PSX) is not exempted [1] . Furthermore, various studies augmented alternative factor to investigate the accelerated

performance of the model such as default risk by Khan and Iqbal (2021); liquidity by Racicot, Rentz, and Théoret (2018), momentum by Dirkx and Peter (2020). However, these baseline empirical models evidenced diversified and mix results which cannot be generalized to every equity market simultaneously therefore, this study demonstrates novelty by using Tobin-q augmented CAPM, FF3FM, C4FM and FF5FM for in-depth understanding the new pattern whether TQ is a significant proxy of pricing stocks returns empirically in emerging market of Pakistan.

The progress towards improvement and assessment of appropriate relevant risk-factor or determinant for rationally allocating and empirically testing portfolios made the researchers ultra-cautious which although enhanced the literature of APMs but alternatively severe the problem of specification and identification in the discipline of financial economics. Gospodinov, Kan and Robotti (2019) focus on severe identification problems concerning the nexus between coefficients and risk factors by augmenting irrelevant pattern in the model indicating that spurious results may cause biased conclusion consequently, however, factor allocation must be theoretically adjusted and motivated as well as empirically correlated accordingly. Therefore, in line with APMs, this study postulates a theoretically justified risk-factor known as Tobin-q factor.

Cochrane (2011); Racicot and Rentz (2016) pinpointed that the Q-theory interlinks with stock prices and investment. Furthermore, Hou et al. (2015) stated that by adjusting it can be intertwined the nexus between expected returns and investment. Moreover, this study constructs portfolios and categorizes the firms having higher Tobin-q value outperforms than firms having low Tobin-q value and similarly, we construct factor as firms having higher Tobin-q are overvalued firms and firms having lower Tobin-q are undervalued firms. The Tobin-q is used as measure of firm-value (Zhang et al., 2018). Moreover, based on this mechanism, overvalued portfolio firms outperform undervalued portfolio firms which are symbolized as (OMU) to see the relationship between Tobin-q factor and excess average portfolio returns in PSX.

Nevertheless, practitioners and portfolio managers consistently use Tobin-Q technique to determine the value of an asset while investing in valuable long-terms assets (see Wang & Xiong, 2021; Qin, Luo, & Wang, 2021; He, Shi, Chang, & Wu, 2021; Tsai, Mai & Bui, 2021; Balfoussia & Gibson, 2019). It estimates whether firm is overvalued or undervalued in terms of operational efficiency. This emphasizes the inclination to use Tobin-Q as factor premium where firms having lower Tobin-Q outperform firms having higher Tobin-Q to contribute the "zoo of new factors" argued by (Cochrane, 2011). In this study, we introduced Tobin-Q anomaly as additional factor in association with standard single-factor model and multi-factor standard models like FF3FM, C4FM, FF5FM to

---

[1] See Khan & Iqbal, 2021; Shah, Shah, Khan, & Ullah, 2021; Munir, Sajjad, Humayon, & Chani, 2020; Chhapra, Rehan, Mirza, & Sohail, 2020; Chhapra, Zehra, Kashif, & Rehan, 2020; Arsalan & Iqbal, 2020; Haqqani, & Rahman, 2020; Zhang, Saqib, Saqib, Mahmood, & Cao, 2019; Haque, & Nasir, 2018; Lohano & Kashif, 2018; Zada et al. (2018); Sadhwani, Bhayo & Bhutto, 2019; Mirza & Reddy, 2017; Hanif, Choudhary & Ismail, 2017; Wu, Imran, Feng, Zhang, & Abbas, 2017; Azam & Ilyas, 2011; Azam (2021); Azam (2022a); Azam (2022b).

keep APMs parsimonious using the financial and non-financial (industrial and non-industrial) sectors firms enlisted on PSX by following (Mirza & Shahid, 2008).

Racicot & Rentz (2016; 2017) examined Paster & Stambaugh (2003) (henceforth PS-2003) liquidity adjusted FF-2015 using improved GMM–based robust instrumental variables technique proposed by Hansen (1982). They used PS-2003 liquidity factor as additional factor using 564 months' time span data from January 1968 to December 2014. They analyzed these APMs using OLS and GMM techniques to investigate the capturing ability of the models. Their findings in both studies reveal that including liquidity factor, all (FF-1993; 2015) factors are unable to explain expected returns except market factor for 12 sectors using sophisticated GMM approach. Conversely, the study also revealed effective results using OLS procedure.

Ali (2022) investigated Hirshleifer and Jiang (2010) zero-investment portfolio as undervalue minus overvalued (UMO) factor as augmented anomaly with base-line models using PSX data from 2013 to 2018. Furthermore, for testing models, maximum squared Sharpe ratio test and GRS are utilized to examine the performance of the augmented base-line models in PSX. The results revealed that UMO performed better and statistically significant in the market. In combination of market, UMO, SMB and RMW patterns, the study observed better models performance as compare to base-line models in the market.

Azimli, (2020) compared various APMs in emerging Borsa Istanbul equity market using monthly stock returns from Jul-2006 through Dec-2015 and Govt. Treasury debt rates are risk-free rate to calculate excess market returns. The annually rebalanced value-weighted six excess portfolios as LHS dependent variables were constructed and regressed against CAPM, FF3FM, Q-factor and FF5FM in this study for investigation. To test the robustness of the model based on joint hypothesis for alpha, GRS and GMM techniques are used.

Khan and Iqbal (2021) investigated FF5FM using non-financial firms' data by employing hybrid version of dynamic panel probit and artificial neural network (ANN) and Fama and MacBeth (1973) two-steps approach to determine the default risk factor in PSX. Using the time span over 2006-2015, they investigated default risk adjusted FF5FM in PSX. Interestingly, the findings reveal that mean stock momentum is highly absorbed by investment factor.

Jan et al. (2021) comparatively examined single and multiple-factor models using 50 firms' data enlisted on PSX for the time-span over Jan-2014-Dec-2018. Surprisingly, their findings reveal contradictory results with theory as big market-cap firms outperform small market-cap. Similarly, low B|M ratio firms outperform high B|M ratio firms. Conclusively, FF3FM performed better results in explaining stock returns than CAPM-single-factor model in PSX.

Davidson, Leledakis and Okunev (2002) examined the impact of Tobin-q ratio on cross-sectional momentum on mean equity returns using individual stock returns data from UK stock market. They used TQ, beta, market value equity (MVE) and B|M equity as (RHS) independent variables. Their findings revealed that MVE and TQ performed highly statistically significant results. Furthermore, firms having smaller TQ outperformed firms having higher TQ. However, Pietrovito (2016) investigated the comparative study of price-to-earnings (P|E) ratios and Tobin's-Q (1969) in investment decision-making process using German equity market firm-level data.

Zada et al. (2019) examined FF5FM in PSX using 16 dynamic portfolios based on size, value, profitability and investment from 120 firms sample monthly data from Jun-2000 through Jun-2014. They observed statistically significant results for five-factors using time-series regression technique except value-factor which show weak significant results. In line with theory, such as small firms outperform big firms, their study revealed all similar as small, value, robust and conservative stocks outperformed big, growth, weak and aggressive stocks respectively. Their findings reveal portfolio constructed on the basis of Big-Low-Robust and Aggressive (BLRA) firms produced efficient results for CAPM, FF3FM and FF5FM with the highest adjusted R-square.

Chhapra et al. (2020) examined the nexus between default risk and CSSR using all enlisted and delisted Pakistani firms' monthly data from 2001-2016. To measure default risk, Ohlson's 0-score is used. For further investigation, CAPM, FF3FM and FF5FM are regressed with equal and value-weighted decile portfolios. Moreover, using GMM for estimation, the findings revealed non-existence of distress anomaly in PSX. Conclusively, the results of B|M ratio revealed statistically insignificant explaining returns of distressed firms.

Shoaib et al. (2020) investigated FF3FM in South Asian three-countries such as China, India and Pakistan using 1,148 firms' panel data for the time-span 2001-2017. They investigated alternative measures of size and revealed that size-effect measures matter for markets as total-assets (TA) is appropriate for emerging (India-Pak) while market-equity based measure for matured markets (China). Furthermore, TA (market-cap-MC) portfolios postulate significant statistical results using FF3FM in all markets. Conversely, market-equity based portfolios postulate weak findings for size-pattern in emerging markets.

Hou et al. (2019) examined various factors models in their work and investigated q-factor includes FF-5 factors and six-factors using spanning factors regression. They further critically argued that mispricing may be due to construction procedure followed.

Hanauer and Linhart (2015) investigated CAPM, FF3FM and C4FM using monthly data from 21 emerging and 24 developed economies. The sample of the study consists of 63,775 unique stocks from developed and 21,612 unique

stocks from emerging equity markets. The time-span assumed consists of 16 years from Jul-1996 through Jun-2012. The stocks prices are measured with US$. Based on 16 value-weighted portfolios, multiple OLS regression technique is used for analysis. Furthermore, mean adjusted R-square, mean absolute intercept, mean standard error of intercepts and F-value of GRS test with p-value are used for model evaluation. Their findings revealed statistically strongly significant value-patterns while weakly but significant momentum-patterns. In comparison with developed markets, the capturing ability of value patterns is observed more influential in emerging markets while poor size-effect is observed in both.

This study contributes novelty to the growing literature of base-line APMs by shedding scholarly new light on the nexus between Tobin-q factor and equity portfolio returns in emerging stock market of Pakistan using augmenting Tobin-q factor as sixth factor to the FF5FM with highly significant findings.

Model Specification

Tobin-Q augmented CAPM (TQ-CAPM)

$$R_i - R_f = R_f + \beta_m(R_m - R_f) + +\beta_q(OmU) + \varepsilon_i \quad (1)$$

Where,
R_i is expected excess return from portfolio
R_f, is Risk-less rate (T-bills rates as proxy)
R_m is the expected return from market
OmU is Overvalued minus Undervalued firms returns called Tobin-Q factor.
β_m and β_q are the sensitivities of market and Tobin-Q factors respectively

Tobin-Q augmented FF3FM (henceforth TQ-FF3FM)

$$R_i - R_f = R_f + \beta_m(R_m - R_f) + \beta_s(SmB) + \beta_v(HmL) + \beta_q(OmU) + \varepsilon_i \quad (2)$$

Where,
R_i is expected excess return from portfolio
R_f, is Risk-less rate (T-bills rates as proxy)
R_m is the expected return from market
R_m-R_f is the excess market returns called Market factor
SmB is the Small Minus Big firms returns called Size factor
HmL is the High minus Low firms returns called Value factor
OmU is Overvalued minus Undervalued firms returns called Tobin-Q factor.
$\beta_m, \beta_s, \beta_v$ and β_q is the coefficients of market, size, value and Tobin-q factors respectively

Tobin-Q augmented Carhart (1997) four-factor model (henceforth TQ-C4FM)

$$R_i - R_f = R_f + \beta_m(R_m - R_f) + \beta_s(SmB) + \beta_v(HmL) + \beta_p(WmL) + \beta_i(OmU) + \varepsilon_i \quad (3)$$

Where,
R_i is expected return from portfolio
R_f, is Risk-less rate (T-bills rates as proxy)
R_m is the expected return from market
R_m-R_f is the excess market returns called Market factor
SmB is the Small minus Big firms returns called Size factor
HmL is the High minus Low firms returns called Value factor
WmL is the Winner minus Loser firms returns called Momentum factor
OMU is Overvalued Minus Undervalued firms returns called Tobin-Q factor.
$\beta_m, \beta_s, \beta_v, \beta_p$ and β_i are the coefficients of market, size, value, profitability and investment factors respectively

Tobin-Q augmented Fama & French (2015) five-factor model (henceforth TQ-FF5FM)

$$R_i - R_f = R_f + \beta_m(R_m - R_f) + \beta_s(SmB) + \beta_v(HmL) + \beta_p(RmW) + \beta_i(CmA) + \beta_q(OmU) + \varepsilon_i \quad (4)$$

Where,
R_i is expected return from portfolio
R_f, is Risk-less rate (T-bills rates as proxy)
R_m is the expected return from market
R_m-R_f is the excess market returns called Market factor
SMB is the Small Minus Big firms returns called Size factor
HML is the High Minus Low firms returns called Value factor
RMW is the Robust Minus Weak firms returns called Profitability factor
CMA is the Conservative Minus Aggressive firms returns called Investment factor
OMU is Overvalued Minus Undervalued firms returns called Tobin-Q factor.
$\beta_m, \beta_s, \beta_v, \beta_p$ and β_i are the coefficients of market, size, value, profitability, investment and Tobin-q factors respectively

Data and Methodology

Data and Descriptive Statistics

With a view to conduct empirical analysis, this study uses an extensive historical sample of secondary data, consequently follows the area of quantitative approach, which were extracted from numerous sources of official websites. The data such as closing prices information were collected from Thomson Router DataStream for the time span of 27 years from January 1994 through December

2020. The 3-months Government Treasury Bills rates were used as risk-free rate and financial statements information such as outstanding shares, book-value of equity of individual firms were extracted from State Bank of Pakistan (SBP) official website. Moreover, the monthly data of PSX-100 index (previously called KSE-100 index) were extracted from Pakistan Stock Exchange (PSX) official website.

The population of the study consists of all financial and non-financial firms registered on PSX from 1994 to 2020 which were documented as 564 firms. By following Ali et al. (2018), this study observed 630 firms and based on data availability for consecutive four years, choose 521 firms as a sample for the study while dropped firms having negative book-to-market ratios. The sample of the study covers 521 enlisted individual financial and non-financial firms from all sectors except closed-ended mutual funds. The simple random sampling technique is used for selecting the sample of the study and the firms' data available for consecutive four years were selected for the study while delisted firms were dropped accordingly.

Table 1: Independent variables (factors) description and sources:

Variable	Description and Sources
Market excess Returns (RmRf)	PSX-100 index Close prices. Market returns (Rm) is measured as Price(today) minus Price(yesterday) divided by Price (yesterday) multiply with 100. Excess market returns measured by deducting risk-free rate.
Risk free rate (Rf)	Government 3 months Treasury Bills rate is measured as Risk-free rate.
Size factor (SMB)	Size factor is measure based on market capitalization (market-cap) which is calculated as (market close price multiply with outstanding shares). Small firms having small market-cap are assumed as small market-cap portfolios while big firms having big market-cap are assumed as big market-cap portfolios. Based on market-cap all firms are classified into 5 equal-quantile portfolios. Size factor is measured as small market-cap portfolios minus big market-cap portfolio by following Fama & French (1993, 2015).
Value factor (HML)	Value factor is measured based on Book-value (BV) of equity and Market Close Price of stock which is assumed as Book-to-Market (B|M) ratio. Sorted all the firms' B|M ratio and classified into 5 equal-quantile portfolios similar as size factor and assumed as high B|M ratio firms (value) portfolios minus low B|M ratio firms (growth) portfolios by

Variable	Description and Sources
	following Fama & French (1993, 2015).
Profitability factor (RMW)	RMW is calculated using data of operating profitability (OP). OP is the result of subtracting operating profit with interest expense and divided by total shareholder's equity by following (Fama & French, 2015).
Investment factor (CMA)	CMA is calculated using data of investment (Inv). For the portfolio formed in December period t, Inv measured as growth in total assets with equation; $((TA_n - TA_{n-1}) / TA_{n-1}))$ by following (Fama & French, 2015).
Momentum (WML)	Momentum factor is measured by calculating average returns of sample firms for 6 months and then sorted into 5 equal-quantile portfolios as higher average returns (winners) portfolios and lower average returns (losers) portfolios and consequently constructed winners minus losers factors by following (Azimli, 2020).
Tobin's Q (TQ) ratio	TQ is measured as Market value of Common equity plus Total Assets (TA) minus Book-Value (BV) of common equity divided by TA by following (Pietrovito, 2016).

Source: Author's Compilation

Portfolio Construction

To investigate the impact of various factors such as market, size, value, profitability, investment, momentum, liquidity on portfolio stock returns, a substantial quantity of empirically research work has been conducted constructing value-weighted dual-sorted 25 (5x5 sorted) portfolios based on size and B|M ratio. All the firms were equally divided into 5 quintiles equal portfolios based on market capitalization (size) and classified as big, 4, 3, 2 & small firms. After sorting based on highest to lowest market capitalization, these 5 quintiles were further subdivided into 5 equal portfolios based on book-to-market ratios as high B|M ratio firms to low B|M ratio firms as shown in the table-1. Based on size and B|M ratio, 25 value-weighted mimicking portfolios were formed as suggested by FF (1993, 2015) as mentioned in Table 2.

Empirical Analysis

Our model provides an alternative Tobin-q factor as additional augmented factor in the domain of APMs to analyze the impact on average value-weighted excess portfolio returns in PSX. Furthermore, our study differentiates from other studies conducted on PSX using APMs based on construction of value-weighted 25 portfolios which includes financial as well as non-financial enlisted firms excluding Closed-ended Mutual Funds

industry. To demonstrate the influence of market, size, value, profitability, investment and Tobin-q factors on

average equity portfolio returns, this study observed the following findings:

Table 2: 25 Portfolio Construction based on Size-Book-to-Market (B|M) Ratio

PF-25	H_B|M	4	3	2	L_B|M	PF-25	H_B|M	4	3	2	L_B|M
Big	BH	B4	B3	B2	BL	**Big**	SBM01	SBM02	SBM03	SBM04	SBM05
4	4H	44	43	42	4L	**4**	SBM06	SBM07	SBM08	SBM09	SBM10
3	3H	34	33	32	3L	**3**	SBM11	SBM12	SBM13	SBM14	SBM15
2	2H	24	23	22	2L	**2**	SBM16	SBM17	SBM18	SBM19	SBM20
Small	SH	S4	S3	S2	SL	**Small**	SBM21	SBM22	SBM23	SBM24	SBM25

Table 2 depicts the VW 25 excess portfolios constructed based on Size-B|M ratio. BH represents portfolio consists of firms having big market-cap and high B|M ratios. Similarly, BL represents portfolio consists of firms having big market-cap and low B|M ratios. In the same way, SH indicates the portfolio of small market-cap and high B|M ratios firms and SL shows small market-cap and low B|M ratios financial and non-financial firms. Alternatively, these portfolios are named as SBM1 (Size-B|M ratio) portfolio represents BH and so on.

Descriptive Statistics & Matrix of Correlations between Independent Variables

Table 3: Descriptive Statistics and Correlation for RHS Factors

Factor	RmRf	SMB	HML	WML	RMW	CMA	OMU
Mean	0.00332	-0.00361	-0.00136	0.010484	0.002186	0.00152	-0.00175
Std. Dev.	0.084543	0.033125	0.019417	0.028903	0.016322	0.015593	0.018954
Min	-0.45966	-0.15361	-0.09442	-0.14042	-0.05821	-0.04426	-0.07736
Max	0.235408	0.129705	0.12753	0.195921	0.05481	0.060834	0.064787
Obs.	324	324	324	324	324	324	324
Factor	**RmRf**	**SMB**	**HML**	**WML**	**RMW**	**CMA**	**OMU**
RmRf	1						
SMB	-0.0777	1					
HML	0.011	0.0536	1				
WML	-0.0818	0.231	-0.2476	1			
RMW	0.0172	-0.0307	-0.2464	0.0908	1		
CMA	-0.0018	0.0792	0.2556	0.2684	0.1168	1	
OMU	0.0185	0.3135	-0.0985	-0.1378	-0.0272	0.0248	1

Notes: the table shows the descriptive statistics and correlation matrix for independent (right-hand side) variables. The data observations consist of 324 months' data for market, size, value, profitability, investment and Tobin-Q risk-premiums. The third-sixth rows show average returns, standard deviation, minimum and maximum values of the observations respectively. Similarly, the correlation matrix shows the correlation between independent variables (RmRf, SMB, HML, WML, RMW, CMA and OMU)

Table 3 presents the preliminary descriptive statistics which provide an insight into the independent variables (factors) including market premium (RmRf), size premium (SMB), value premium (HML), momentum premium (WML), profitability premium (RMW), investment premium (CMA) and Tobin-q premium (OMU). On average, market premium exhibits (0.00332) 0.332% monthly average returns with standard deviation of 0.084543 and ranges from -0.459660 to 0.23541.

The correlation matrix results demonstrate that there is inverse nexus between market and size patterns, market and investment; size and profitability; value and profitability, value and Tobin-q, and between profitability and Tobin-q premiums. The results show similarity with

Zada et al. (2018) except between SMB & HML, HML & RMW, HML & CMA, and RMW & CMA. In contrast, the remaining premiums show a positive relationship with one another. To the best of our knowledge, Tobin-q has not been used as additional risk-premium factor with FF5FM in the emerging market of Pakistan. Therefore, it will contribute additional factor to the body of knowledge for further investigation of APMs in future.

Table 4 summarizes the descriptive statistics of dependent variables including average 25 excess portfolios returns extracted based on Size-B|M ratio, standard deviation, minimum and maximum values of each value-weighted portfolio.

Table 4: Descriptive Statistics of Dependent Variables (25 Portfolios)

Mean	H_B|M	4	3	2	L_B|M	Std. Dev.	H_B|M	4	3	2	L_B|M
Big	-0.0138	-0.0123	-0.0095	-0.0082	-0.0082	Big	0.0711	0.0559	0.0489	0.0603	0.0537
4	-0.0145	-0.0121	-0.0121	-0.0098	-0.0097	4	0.0544	0.0522	0.0521	0.0604	0.0568
3	-0.0154	-0.0097	-0.0099	-0.0119	-0.0091	3	0.0617	0.0611	0.0503	0.0549	0.0549
2	-0.0135	-0.0129	-0.0088	-0.0131	-0.0179	2	0.0681	0.0569	0.0597	0.0648	0.0628
Small	-0.0165	-0.0150	-0.0143	-0.0150	-0.0198	Small	0.0536	0.0672	0.0586	0.0742	0.0595

Min	H_B|M	4	3	2	L_B|M	Max	H_B|M	4	3	2	L_B|M
Big	-0.3436	-0.2891	-0.3145	-0.3372	-0.1713	Big	0.1762	0.1426	0.1365	0.3501	0.1688
4	-0.3011	-0.2703	-0.2019	-0.3183	-0.2460	4	0.1957	0.1756	0.1374	0.2476	0.1554
3	-0.2549	-0.2728	-0.2851	-0.2114	-0.1892	3	0.2591	0.3606	0.1621	0.2600	0.2557
2	-0.3530	-0.2110	-0.1991	-0.2638	-0.2882	2	0.3870	0.2053	0.2199	0.2614	0.2415
Small	-0.1748	-0.3308	-0.2150	-0.2999	-0.2873	Small	0.2205	0.2600	0.2985	0.2435	0.3085

PF-25	H_B|M	4	3	2	L_B|M	PF-25	H_B|M	4	3	2	L_B|M
Big	BH	B4	B3	B2	BL	Big	SBM01	SBM02	SBM03	SBM04	SBM05
4	4H	44	43	42	4L	4	SBM06	SBM07	SBM08	SBM09	SBM10
3	3H	34	33	32	3L	3	SBM11	SBM12	SBM13	SBM14	SBM15
2	2H	24	23	22	2L	2	SBM16	SBM17	SBM18	SBM19	SBM20
Small	SH	S4	S3	S2	SL	Small	SBM21	SBM22	SBM23	SBM24	SBM25

Note: the table 4 shows the descriptive statistics for dependent (left-hand side) variables. The data observations consist of 324 months excess 25 portfolios constructed based on size (market capitalization) and value (book-to-market ratio) using 521 financial and non-financial firms' monthly data. The first group shows average returns, second shows standard deviation, third and fourth minimum and maximum values of the observations respectively for 25 portfolios which are ranked such as BH, B4, B3, B2, BL, 4H, 44, 43, 42, 4L, 3H, 34, 33, 32, 3L, 2H, 24, 23, 22, 2L, SH, S4, S3, S2 and SL. Here, B represents big-firms and S represents small-firms while on the other hand high-book-to-market ratio and low-book-to-market ratio sequence from high to low respectively

In table 4, the portfolio BH (SBM01) represents excess portfolio consists of firms having big market-cap and high B|M ratios minus risk-free rates. It ranges from -0.343553 to 0.1761707 with average returns of -0.01382 and standard deviation of 0.07105. Similarly, portfolio SL (SBM25) denotes excess portfolio having small market-cap and low B|M ratio. It ranges from -0.2872866 to 0.3084587 with average returns of -0.01982 and standard deviation of 0.0595351. Moreover, there is no monotonically movement in the 25 portfolios excess returns when moving from small firms to big firms.

As size theory suggest, the small market-cap firms have greater returns as compare to big market-cap firms but this study presents diversified results. The average returns of all the 25 portfolios show negative returns but on average, 2 small stock quantiles (SBM16-25) shows -0.01467 higher returns with 0.062538 standard deviation in comparison with 2 big stock quantiles (SBM01-10) shows -0.01101 with standard deviation of 0.056565 which supports the theory that small stock produce higher returns as well as higher standard deviation (risk) shows similarity with (Kassimatis, 2011; Gaunt, 2004; Halliwell, Heaney & Sawicki, 1999). However, on average, 2 high B|M ratio stock quantiles (column High-B|M plus 4) exhibits -0.01356 returns with standard deviation of 0.060211 shows lower returns in comparison with 2 Low-B|M ratio stock quantile -0.01226 with standard deviation of 0.060218 which show almost contradictory results.

Factor Redundancy (Spanning) Tests

The spanning test helps to thoroughly identify which factor is redundant (Azimli, 2020) and not supporting in terms of mean-variance efficiency (MVE) to the model. A factor is not robust if its variation is captured by other affiliated factors (Huberman & Kandel, 1987). Alternatively, it identifies that which factor possesses unique information ratio (Ardila-Alvarez et al., 2021) which determines the statistically significant value of intercept of the regression. Fama and French (2017) documented that in factor spanning test in case the intercept value is closed to zero, it implies that dependent variable is redundant to explain average portfolio stocks returns. Table 3 illustrates the results for factor spanning regression tests of six factors of the study. According to our results, OMU exhibits intercept of 0.000809 (t = 0.779) with adjusted R-square of 0.183 shows that OMU cannot be replicated by other pattern. It demonstrates that it is significant to explain average excess portfolio returns in PSX. Similarly, RmRf, HML, RMW and CMA also show insignificant intercept values (0.00457%, 0.00137%, 0.00171%, -0.000558% with t-value = 0.89, 1.369, 1.811, -0.667) respectively. The intercept in RmRf (market premium) regression is positive insignificant (0.00457% with t-value = 0.89). However, market, value, profitability and Tobin-q factor show positive intercepts while investment shows negative statistically insignificant intercept. The SMB (size) and WML (momentum) factors demonstrate significant alpha

(α = -0.00587 with t-value = -3.312 with p < 0.05) and (α = 0.00913 with t-value = 6.589 with p < 0.01) respectively which shows inconsistent results with Guo et al. (2017)

and with Europe and Japan of Fama & French (2017). The result shows similarity with North America and Asia Pacific results of Fama & French (2017).

Table 5: Spanning Regression results

Factor	RmRf	SMB	HML	WML	RMW	CMA	OMU
SMB	-0.1876		0.1047***	0.2681***	0.003982	-0.03467	0.2231***
	(-1.173)		(3.422)	(6.162)	(0.135)	(-1.333)	(7.474)
HML	0.009037	0.3402***		-0.5861***	-0.2726***	0.3349***	-0.2499***
	(0.031)	(3.422)		(-7.695)	(-5.354)	(7.778)	(-4.413)
WML	-0.1945	0.3990***	-0.2686***		-0.03299	0.2122***	-0.2127***
	(-0.996)	(6.162)	(-7.695)		(-0.918)	(7.196)	(-5.650)
RMW	0.1047	0.01443	-0.3042***	-0.08031		0.1771***	-0.07819
	(0.343)	(0.135)	(-5.354)	(-0.918)		(3.642)	(-1.272)
CMA	0.09827	-0.1609	0.4785***	0.6617***	0.2268***		0.1876**
	(0.285)	(-1.333)	(7.778)	(7.196)	(3.642)		(2.721)
OMU	0.146	0.6715***	-0.2316***	-0.4301***	-0.06494	0.1217**	
	(0.525)	(7.474)	(-4.413)	(-5.650)	(-1.272)	(2.721)	
RmRf		-0.02303	0.0003416	-0.01604	0.003547	0.0026	0.005955
		(-1.173)	(0.031)	(-0.996)	(0.343)	(0.285)	(0.525)
_cons	0.00457	-0.00587**	0.00137	0.00913***	0.00171	-0.000558	0.000809
	(0.89)	(-3.312)	(1.369)	(6.589)	(1.811)	(-0.667)	(0.779)
N	324	324	324	324	324	324	324
adj. R-sq	-0.007	0.195	0.279	0.29	0.085	0.217	0.183
F	0.6468	14.038	21.799	22.949	6.0045	15.931	13.066

t-stat. are in parenthesis
*** *p<0.01, ** p<0.05, * p<0.1*

Using Tobin-q and momentum augmented five-factors to regress the seven factor using data from Jan-1994 to Dec-2020 which consists of 324 months.

Figure 1: Average annual PSX-100 Index Data and Average annual Market returns (1994-2020)

Source: Author's Compilation
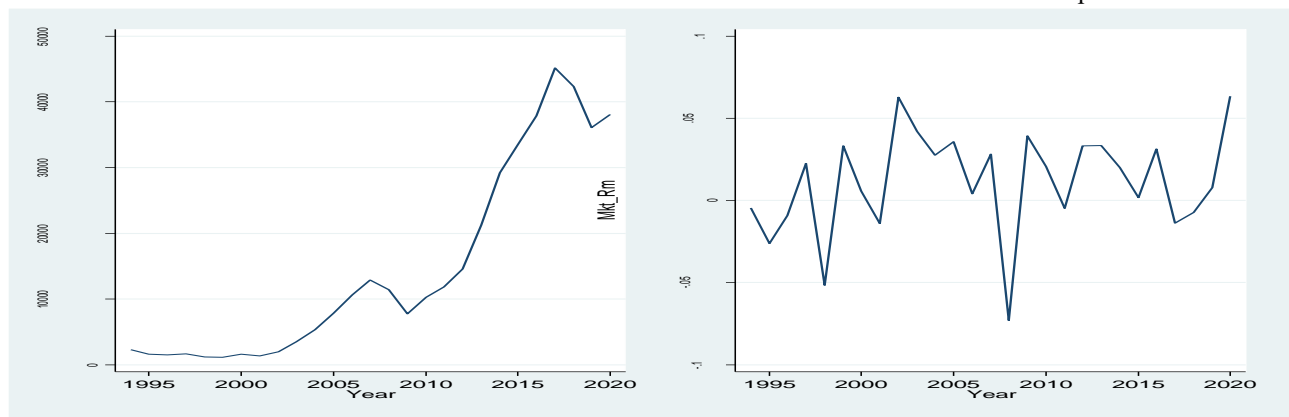
As the figure 1 depicts that PSX-index shows steadily inclines in value from 2003-2008 and suddenly declines during financial crises 2008-2009. After 2009, again inclines towards growth while reached to peak of 45,135.94 in 2017 but again slight decline is shown due to political uncertainity in the country. It shows the overall journey from 1994-2020 at a glance to understand the market situation of the country. However, annual market-

returns show variation and particularly in 2008-09 era, a big volatility is reflected but at the end 2019-2020 positive growth is shown in the graph.

Figure 1 illustrates the graphical presentation of the PSX-100 index from 1994 through 2020. It shows slowly and consistently growth till 2008 but due to global economic crisis of 2008-2009 influence adversely while after that again a growing increase till Aug-2017 which showed recorded decline abruptly due to bulk-selling of blue-chips

stocks by financial institutions and foreign investors and particularly the verdict on 'Avenfield' case of Mr. Nawaz Sharif (X-Prime Minister of Pakistan). Hence, government need to perform their role in the economy as it is a significant agent in the economy (Vasilev, 2021). Moreover, due to current government bold decisions, the investors' confidence level in investing stocks market again increased which ultimately reflect in the shape of bullish trend in the market in 2019 onwards. The similar portray is presented by average returns graph which reflect the same mechanism in the Pakistan equity market.

OLS Regression Results

The additional information content of Tobin-Q as factor, alternative estimator is used to augment the base-line asset pricing models, results demonstrate as follows:

Table 6: Tobin Q augmented CAPM: (Based on Size and B|M Ratio-Double sorted)

Alpha	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	-0.0131***	-0.0118***	-0.0094***	-0.0068*	-0.0085**	Big	-0.001	0.000	-0.001	-0.036	-0.005
4	-0.0137***	-0.0112***	-0.0116***	-0.0094**	-0.0090**	4	0.000	0.000	0.000	-0.006	-0.005
3	-0.0135***	-0.0086*	-0.0099***	-0.0116***	-0.0083**	3	0.000	-0.010	-0.001	0.000	-0.006
2	-0.0117**	-0.0127***	-0.0075*	-0.0114**	-0.0160***	2	-0.002	0.000	-0.022	-0.001	0.000
Small	-0.0158***	-0.0135***	-0.0125***	-0.0118**	-0.0178***	Small	0.000	0.000	0.000	-0.001	0.000

RmRf	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	0.0818	0.0402	0.0612	0.053	0.0493	Big	-0.077	-0.272	-0.056	-0.166	-0.164
4	0.0433	0.029	0.027	0.018	-0.0068	4	-0.219	-0.391	-0.431	-0.651	-0.854
3	0.0151	0.0425	0.014	0.0199	0.0359	3	-0.693	-0.280	-0.675	-0.582	-0.314
2	-0.0162	0.0309	-0.0764*	0.0182	0.0419	2	-0.707	-0.409	-0.048	-0.656	-0.283
Small	0.0331	0.0031	-0.0037	0.0261	0.016	Small	-0.344	-0.943	-0.920	-0.541	-0.659

OMU	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	0.5396**	0.3294*	0.1877	0.8661***	-0.1203	Big	-0.009	-0.044	-0.189	0.000	-0.446
4	0.5487***	0.5684***	0.2941	0.2734	0.3408*	4	-0.001	0.000	-0.055	-0.124	-0.041
3	1.1395***	0.6891***	0.005	0.1983	0.5120**	3	0.000	0.000	-0.973	-0.220	-0.001
2	1.0343***	0.1851	0.5775***	1.0306***	1.1150***	2	0.000	-0.269	-0.001	0.000	0.000
Small	0.4520**	0.8189***	1.0155***	1.9082***	1.1988***	Small	-0.004	0.000	0.000	0.000	0.000

Adj. R^2	H_B|M	4	3	2	L_B|M	F-value	H_B|M	4	3	2	L_B|M
Big	0.025	0.01	0.011	0.075	0.002	Big	5.09	2.68	2.75	14.04	1.24
4	0.036	0.039	0.007	0.002	0.007	4	6.96	7.58	2.20	1.31	2.11
3	0.118	0.044	-0.006	0	0.029	3	22.52	8.39	0.09	0.92	5.77
2	0.077	0	0.039	0.086	0.112	2	14.55	0.97	7.50	16.22	21.28
Small	0.023	0.047	0.102	0.234	0.141	Small	4.72	9.05	19.37	50.46	27.55

Note: Table 6 reports the time-series OLS regression results for Tobin-Q augmented CAPM. The LHS variables are excess 25 value-weighted portfolios constructed based on size and B|M ratio. The RHS variables are market excess returns and Tobin-Q factor premium. The results reports coefficients with probability values and F-values for all 25 regression results.

First, this study conducts OLS time-series regression using TQ-CAPM Equation-1. According to the methodology elaborated above, Table 6 shows Tobin-Q (TQ) factor augmented CAPM (henceforth TQ-CAPM) time-series OLS regression results, the market premium shows statistically positive but insignificant nexus with portfolio (PF) excess returns except one portfolio (23, β = -0.0764 with p-value = 0.0481), show similarity with (Shah et al., 2021; Rizwan et al., 2013; Hanif & Bhatti, 2010; Javid, & Ahmad, 2008) while dissimilar with Azam and Ilyas (2011) who observed significant and positive nexus.

Furthermore, results reveal positive relationship between market premium and excess portfolio returns except portfolios (4L, 2H, 23 and S3) with β = -0.0068, -0.0162, -0.0764 and -0.0037 respectively). Conclusively, the market-risk premium shows economically insignificant nexus with portfolio stocks returns in PSX using Tobin-Q adjusted CAPM. Conversely, the Tobin-Q pattern demonstrates almost statistically significant nexus with average excess portfolio stock returns except seven portfolios (B3, BL, 43, 42, 33, 32 and 24 with p-value > 0.05). All the portfolios show positive nexus except portfolio BL (β = -0.1203). However, considering TQ as additional independent RHS factor, the results change drastically.

Monotonically, the small market-cap firms' portfolios demonstrate statistically strong significant nexus with portfolio returns except portfolio 24, (β = 0.185 with p-

value = 0.2685) which confirms the theory that small firms outperform big firms based on Tobin-Q anomaly. Similarly, portfolio having H_B|M ratio show statistically significant relationship for all portfolios except PF-24 which also supports the theory that value stocks portfolios outperform growth stocks portfolios.

The TQ-CAPM all alpha coefficients demonstrate statistical highly significant results which designate over-valued portfolios which also determine the non-validity of TQ-CAPM. Interestingly, the F-value of 9 portfolios shows statistically insignificant results while 16/25 portfolios show significant overall models results. The adjusted R-square (ARS) ranges from -0.00 to 23.4%. The average ARS of all 25 portfolios is 5.04% based on measuring goodness of fit.

Table 7: OMU (Tobin-Q) adjusted FF3FM (TQ-FF3FM)

Alpha	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	-0.0146***	-0.0125***	-0.0104***	-0.0089**	-0.0104***	Big	0.000	0.000	0.000	-0.003	0.000
4	-0.0137***	-0.0110***	-0.0130***	-0.0110***	-0.0108***	4	0.000	0.000	0.000	-0.001	0.000
3	-0.0127***	-0.0080*	-0.0098***	-0.0127***	-0.0086**	3	0.000	-0.017	-0.001	0.000	-0.005
2	-0.0088**	-0.0113***	-0.0063	-0.0113**	-0.0161***	2	-0.009	0.000	-0.051	-0.001	0.000
Small	-0.0140***	-0.0101**	-0.0118***	-0.0102**	-0.0171***	Small	0.000	-0.002	0.000	-0.004	0.000

RmRf	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	0.0366	0.0104	0.0352	0.0276	0.0256	Big	-0.313	-0.736	-0.204	-0.428	-0.427
4	0.0247	0.0092	0.0059	0.006	-0.0276	4	-0.449	-0.760	-0.852	-0.878	-0.431
3	-0.0003	0.0384	0.0117	0.0102	0.0351	3	-0.994	-0.325	-0.725	-0.776	-0.328
2	-0.0063	0.0387	-0.0646	0.0193	0.0416	2	-0.873	-0.292	-0.089	-0.638	-0.290
Small	0.0419	0.0157	0.0026	0.0436	0.0251	Small	-0.211	-0.677	-0.944	-0.294	-0.487

SMB	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	-1.2805***	-0.8271***	-0.7444***	-0.7830***	-0.7244***	Big	0.000	0.000	0.000	0.000	0.000
4	-0.4954***	-0.5179***	-0.6287***	-0.4011***	-0.6437***	4	0.000	0.000	0.000	0.000	0.000
3	-0.3706***	-0.077	-0.0566	-0.3134**	-0.0385	3	0.000	-0.464	-0.531	-0.001	-0.690
2	0.4096***	0.2799**	0.3783***	0.0324	-0.0129	2	0.000	-0.005	0.000	-0.770	-0.903
Small	0.3252***	0.5129***	0.2021*	0.5437***	0.2751**	Small	0.000	0.000	-0.041	0.000	-0.005

HML	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	1.1308***	0.9218***	0.5690***	-0.085	-0.015	Big	0.000	0.000	0.000	-0.576	-0.915
4	0.7856***	0.9367***	0.1613	-0.3742*	-0.1003	4	0.000	0.000	-0.248	-0.028	-0.513
3	1.0975***	0.5454**	0.1239	-0.173	-0.1485	3	0.000	-0.002	-0.398	-0.269	-0.344
2	1.1857***	0.4569**	0.1829	-0.0326	-0.0398	2	0.000	-0.005	-0.271	-0.856	-0.817
Small	0.6166***	1.3929***	0.1332	0.1077	-0.0406	Small	0.000	0.000	-0.405	-0.553	-0.798

OMU	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	1.3590***	0.8780***	0.6551***	1.2886***	0.277	Big	0.000	0.000	0.000	0.000	-0.069
4	0.9009***	0.9483***	0.6566***	0.4564*	0.6851***	4	0.000	0.000	0.000	-0.013	0.000
3	1.4545***	0.7866***	0.0486	0.3533*	0.5182**	3	0.000	0.000	-0.758	-0.037	-0.002
2	0.9287***	0.0772	0.3877*	1.0095***	1.1180***	2	0.000	-0.656	-0.031	0.000	0.000
Small	0.3353*	0.6773***	0.9177***	1.6198***	1.0432***	Small	-0.034	0.000	0.000	0.000	0.000

Adj. R²	H_B|M	4	3	2	L_B|M	F-value	H_B|M	4	3	2	L_B|M
Big	0.405	0.298	0.267	0.24	0.177	Big	56.02	35.22	30.37	26.43	18.31
4	0.176	0.233	0.145	0.059	0.132	4	18.28	25.48	14.72	6.03	13.25
3	0.255	0.068	-0.009	0.031	0.026	3	28.70	6.92	0.30	3.62	3.16
2	0.234	0.046	0.078	0.081	0.106	2	25.65	4.93	7.86	8.09	10.60
Small	0.111	0.279	0.111	0.285	0.157	Small	11.05	32.30	11.09	33.19	16.02

Note: Table 7 reports the time-series OLS regression results for Tobin-Q augmented FF3FM. The LHS variables are excess 25 value-weighted portfolios constructed based on size and B|M ratio. The RHS variables are market excess returns and Tobin-Q factor premium. The results reports coefficients with probability values and F-values for all 25 regression results.

Table 8: OMU (Tobin Q) adjusted Carhart (1997) four-factor model (TQ-C4FM)

Alpha	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	-0.0109***	-0.0099***	-0.0075**	-0.0097**	-0.0095**	Big	-0.001	-0.001	-0.003	-0.002	-0.001
4	-0.0125***	-0.0120***	-0.0143***	-0.0128***	-0.0124***	4	0.000	0.000	0.000	0.000	0.000
3	-0.0106**	-0.0110**	-0.0125***	-0.0139***	-0.0068*	3	-0.001	-0.002	0.000	0.000	-0.039
2	-0.0098**	-0.0120***	-0.0072*	-0.0111**	-0.0114**	2	-0.007	0.000	-0.038	-0.003	-0.001
Small	-0.0116***	-0.0094**	-0.0168***	-0.0079*	-0.0144***	Small	0.000	-0.007	0.000	-0.036	0.000

RmRf	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	0.0305	0.0062	0.0306	0.0288	0.0242	Big	-0.394	-0.839	-0.263	-0.408	-0.454
4	0.0227	0.0107	0.008	0.0089	-0.0251	4	-0.487	-0.724	-0.803	-0.818	-0.474
3	-0.0037	0.0432	0.0161	0.0122	0.0321	3	-0.915	-0.266	-0.628	-0.734	-0.371
2	-0.0046	0.0399	-0.0631	0.019	0.034	2	-0.906	-0.279	-0.097	-0.645	-0.378
Small	0.038	0.0147	0.0106	0.0399	0.0207	Small	-0.254	-0.697	-0.767	-0.336	-0.565

SMB	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	-1.1756***	-0.7548***	-0.6649***	-0.8046***	-0.7003***	Big	0.000	0.000	0.000	0.000	0.000
4	-0.4608***	-0.5431***	-0.6641***	-0.4518***	-0.6877***	4	0.000	0.000	0.000	0.000	0.000
3	-0.3105**	-0.1602	-0.1316	-0.3478***	0.0137	3	-0.002	-0.147	-0.165	-0.001	-0.893
2	0.3807***	0.2605*	0.3530**	0.038	0.1174	2	-0.001	-0.013	-0.001	-0.746	-0.286
Small	0.3929***	0.5306***	0.0634	0.6070***	0.3524***	Small	0.000	0.000	-0.533	0.000	-0.001

HML	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	0.9714***	0.8119***	0.4484***	-0.0522	-0.0516	Big	0.000	0.000	0.000	-0.744	-0.728
4	0.7331***	0.9749***	0.215	-0.2973	-0.0334	4	0.000	0.000	-0.142	-0.095	-0.835
3	1.0063***	0.6717***	0.2378	-0.1207	-0.2278	3	0.000	0.000	-0.119	-0.463	-0.166
2	1.2295***	0.4864**	0.2213	-0.041	-0.2376	2	0.000	-0.004	-0.204	-0.828	-0.180
Small	0.5137***	1.3660***	0.3438*	0.0115	-0.1579	Small	-0.001	0.000	-0.036	-0.952	-0.339

WML	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	-0.3681**	-0.2538*	-0.2786**	0.0757	-0.0845	Big	-0.002	-0.011	-0.002	-0.501	-0.418
4	-0.1213	0.0882	0.124	0.1776	0.1545	4	-0.251	-0.368	-0.229	-0.156	-0.172
3	-0.2105	0.2916*	0.2631*	0.1208	-0.1833	3	-0.064	-0.020	-0.015	-0.296	-0.113
2	0.1012	0.0682	0.0888	-0.0196	-0.4569***	2	-0.428	-0.567	-0.469	-0.883	0.000
Small	-0.2375*	-0.062	0.4862***	-0.2223	-0.2709*	Small	-0.028	-0.612	0.000	-0.097	-0.020

OMU	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	1.2085***	0.7743***	0.5412***	1.3195***	0.2424	Big	0.000	0.000	0.000	0.000	-0.126
4	0.8514***	0.9844***	0.7073***	0.5290**	0.7482***	4	0.000	0.000	0.000	-0.006	0.000
3	1.3684***	0.9058***	0.1561	0.4027*	0.4433*	3	0.000	0.000	-0.337	-0.022	-0.012
2	0.9701***	0.105	0.4240*	1.0014***	0.9313***	2	0.000	-0.560	-0.023	0.000	0.000
Small	0.2383	0.6520***	1.1164***	1.5290***	0.9325***	Small	-0.144	-0.001	0.000	0.000	0.000

Adj. R^2	H_B|M	4	3	2	L_B|M	F-value	H_B|M	4	3	2	L_B|M
Big	0.422	0.31	0.287	0.238	0.176	Big	48.14	29.98	26.98	21.20	14.76
4	0.177	0.232	0.146	0.062	0.134	4	14.90	20.54	12.08	5.25	11.00
3	0.261	0.081	0.007	0.032	0.031	3	23.82	6.70	1.45	3.11	3.05
2	0.233	0.044	0.077	0.078	0.14	2	20.62	4.00	6.39	6.46	11.50
Small	0.121	0.278	0.156	0.289	0.168	Small	9.93	25.83	12.91	27.25	14.09

Note: Table 8 reports the time-series OLS regression results for Tobin-Q augmented C4FM. The LHS variables are excess 25 value-weighted portfolios constructed based on size and B|M ratio. The RHS variables are market excess returns and Tobin-Q factor premium. The results reports coefficients with probability values and F-values for all 25 regression results.

Second, this study conducts OLS time-series regression using TQ-FF3FM Equation-2. Table 7 summarizes the results of Tobin-Q adjusted FF3FM (TQ-FF3FM). The results demonstrate that market premium depicts statistically insignificant for all 25 portfolios consistent with TQ-CAPM. This relationship shows positive nexus except portfolios (4L, 3H, 2H and 23 having β = -0.0276, -0.0003, -0.0063 and -0.0646 respectively) which show inverse nexus with portfolio excess returns. The results show the size-pattern statistically insignificant impact on portfolio returns for 5/25 portfolios.

The results demonstrate almost similar findings as TQ-FF3FM show 20/25 portfolios statistically highly significant estimates of slope coefficients concerning size-pattern. Shoaib, Siddiqui & Ayub (2020) argued that positive and significant size infers that small market-cap (MC) firms outperform big MC firms. The findings also establish positive significant for small MC firms except (PF 22 and 2L, β = 0.0324 and -0.0129 respectively). The positive statistically significant value-effect assures the existence of value-effect which infers that value firms outperform growth firms having negative coefficient values except PF-42 (β = -0.3742). Similarly, TQ-pattern shows highly statistically significant nexus with portfolio excess stock returns (PESR) as 22/25 portfolios coefficients exhibit significant coefficients. Comparatively, TQ-FF3FM perform better than TQ-CAPM in the line of TQ-pattern. Conversely, the market risk premium shows similarly statistically insignificant results as TQ-CAPM. The average adjusted R-square (AAR2) shows 0.0504 and 0.15964 for TQ-CAPM and TQ-FF3FM respectively which shows better improvement. The F-state also confirms that 22/25 portfolios exhibit highly significant results with p-value less than threshold value.

Third, this study conducts OLS time-series regression using TQ-C4FM Equation-3. Table 8 summarizes the findings of the Tobin-q augmented Carhart (1997) four-factor model (TQ-C4FM). The market risk premium shows statistically positive insignificant results as TQ-CAPM and TQ-FF3MF. Similarly, the size, value and TQ results exhibit statistically significant as 19/25, 12/25 and 21/25 portfolios respectively while momentum-pattern shows weakly significant findings as 9/25 portfolios. The F-value shows significant findings except 3 portfolios, almost similar to TQ-FF3FM which shows trivial improvement in the TQ-C4FM. Conclusively, the AAR2 for TQ-FF3FM and TQ-C4FM show 0.15964 and 0.1672 respectively which also demonstrates trivial improvement. Interestingly, all the intercept values show statistically significant results.

Table 9: OMU (Tobin Q) adjusted Fama & French (2015) five-factor model (TQ-FF5FM)

Alpha	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	-0.0132***	-0.0115***	-0.0097***	-0.0098**	-0.0097***	**Big**	0.000	0.000	0.000	-0.001	-0.001
4	-0.0133***	-0.0106***	-0.0130***	-0.0110***	-0.0102***	**4**	0.000	0.000	0.000	-0.001	-0.001
3	-0.0121***	-0.0084*	-0.0104***	-0.0134***	-0.0078*	**3**	0.000	-0.012	0.000	0.000	-0.012
2	-0.0078*	-0.0120***	-0.0065*	-0.0106**	-0.0151***	**2**	-0.022	0.000	-0.046	-0.003	0.000
Small	-0.0148***	-0.0092**	-0.0107***	-0.0102**	-0.0156***	**Small**	0.000	-0.004	-0.001	-0.004	0.000

RmRf	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	0.0384	0.0121	0.0364	0.0267	0.0274	**Big**	-0.284	-0.693	-0.187	-0.442	-0.392
4	0.0257	0.0115	0.0073	0.0078	-0.0247	**4**	-0.433	-0.701	-0.819	-0.839	-0.471
3	0.0018	0.0397	0.0136	0.0098	0.036	**3**	-0.958	-0.306	-0.678	-0.783	-0.315
2	-0.0039	0.0387	-0.0657	0.0214	0.0421	**2**	-0.920	-0.292	-0.084	-0.601	-0.282
Small	0.0415	0.0185	0.0055	0.0453	0.0292	**Small**	-0.214	-0.619	-0.879	-0.273	-0.401

SMB	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	-1.2719***	-0.8238***	-0.7422***	-0.7886***	-0.7256***	**Big**	0.000	0.000	0.000	0.000	0.000
4	-0.4949***	-0.5247***	-0.6369***	-0.4119***	-0.6520***	**4**	0.000	0.000	0.000	0.000	0.000
3	-0.3741***	-0.0897	-0.0739	-0.3208***	-0.0323	**3**	0.000	-0.392	-0.404	-0.001	-0.738
2	0.4094***	0.2708**	0.3821***	0.0297	-0.003	**2**	0.000	-0.007	0.000	-0.788	-0.977
Small	0.3168***	0.5083***	0.1998*	0.5341***	0.2718**	**Small**	-0.001	0.000	-0.040	0.000	-0.004

HML	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	1.0979***	0.8569***	0.5201***	-0.0789	-0.1218	**Big**	0.000	0.000	0.000	-0.631	-0.421
4	0.7406***	0.7671***	0.029	-0.5527**	-0.3162	**4**	0.000	0.000	-0.847	-0.003	-0.052
3	0.9591***	0.3787*	-0.1044	-0.2108	-0.148	**3**	0.000	-0.039	-0.500	-0.213	-0.382
2	1.0585***	0.3891*	0.2739	-0.1616	0.0046	**2**	0.000	-0.026	-0.127	-0.403	-0.980
Small	0.5762***	1.2112***	-0.0395	-0.057	-0.2814	**Small**	0.000	0.000	-0.816	-0.771	-0.088

RMW	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	-0.4714*	-0.4235*	-0.3084*	0.2349	-0.4495*	**Big**	-0.016	-0.012	-0.040	-0.214	-0.010
4	-0.2277	-0.5369**	-0.3137	-0.4337*	-0.6949***	**4**	-0.200	-0.001	-0.070	-0.039	0.000
3	-0.5109**	-0.3072	-0.4237*	0.0984	-0.229	**3**	-0.008	-0.145	-0.018	-0.612	-0.239
2	-0.5838**	0.0221	0.2833	-0.4976*	-0.1576	**2**	-0.006	-0.912	-0.170	-0.026	-0.459
Small	0.1232	-0.6743***	-0.7194***	-0.4135	-0.9962***	**Small**	-0.497	-0.001	0.000	-0.066	0.000

CMA	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M

Big	-0.3253	-0.1207	-0.0799	0.2125	0.0566	**Big**	-0.112	-0.491	-0.611	-0.284	-0.757
4	-0.0156	0.2716	0.3205	0.4218	0.3348	**4**	-0.933	-0.111	-0.077	-0.056	-0.088
3	0.1471	0.4946*	0.6742***	0.285	-0.2383	**3**	-0.461	-0.026	0.000	-0.163	-0.243
2	0.0174	0.3526	-0.1512	0.1155	-0.378	**2**	-0.938	-0.093	-0.485	-0.621	-0.092
Small	0.3234	0.1893	0.0994	0.3755	0.1456	**Small**	-0.090	-0.373	-0.628	-0.112	-0.464

OMU	H_B|M	4	3	2	L_B|M	P-value	H_B|M	4	3	2	L_B|M
Big	1.3463***	0.8621***	0.6433***	1.2935***	0.2551	**Big**	0.000	0.000	0.000	0.000	-0.093
4	0.8910***	0.9166***	0.6338***	0.4254*	0.6445***	**4**	0.000	0.000	0.000	-0.020	0.000
3	1.4273***	0.7594***	0.0113	0.3501*	0.5142**	**3**	0.000	0.000	-0.942	-0.039	-0.003
2	0.9018***	0.0687	0.4047*	0.9838***	1.1211***	**2**	0.000	-0.692	-0.025	0.000	0.000
Small	0.3322*	0.6417***	0.8824***	1.5909***	0.9941***	**Small**	-0.036	0.000	0.000	0.000	0.000

Adj. R^2	H_B|M	4	3	2	L_B|M	F-value	H_B|M	4	3	2	L_B|M
Big	0.42	0.31	0.274	0.243	0.189	**Big**	40.04	25.24	21.30	18.26	13.51
4	0.176	0.256	0.154	0.072	0.165	**4**	12.47	19.51	10.82	5.20	11.67
3	0.268	0.08	0.034	0.033	0.03	**3**	20.67	5.69	2.87	2.85	2.69
2	0.248	0.05	0.079	0.089	0.112	**2**	18.71	3.81	5.59	6.28	7.79
Small	0.116	0.299	0.142	0.292	0.22	**Small**	8.07	24.02	9.94	23.17	16.20

Note: Table 9 reports the time-series OLS regression results for Tobin-Q augmented FF5FM. The LHS variables are excess 25 value-weighted portfolios constructed based on size and B|M ratio. The RHS variables are market excess returns and Tobin-Q factor premium. The results reports coefficients with probability values and F-values for all 25 regression results.

Fourth, this study conducts OLS time-series regression using TQ-FF5FM Equation-4. Table 9 summarizes the TQ-FF5FM findings received from time-series regression analysis. The results show similarity as TQ-CAPM, TQ-FF3FM, TQ-C4FM and TQ-FF5FM, as far as the market risk premium is concerned which shows 25/25 portfolios statistically insignificant and mostly positive nexus except three portfolios (4H, 2L & 23, β = -0.0247, -0.0039 & -0.0657 respectively) with excess portfolio stocks returns (EPSR). Conversely, size-pattern presents 20/25 portfolios economically significant nexus with EPSR. The theory suggests small firms PF outperform big firms PF and findings of small firms demonstrate positive statistically significant returns while big firms PF exhibit negative statistically returns which supports the theory and size-pattern existence in the market. Similarly, HML-pattern shows almost similar results as TQ-FF3FM and QT-C4FM and all three models displays 12/25 statistically significant nexus with EPSR. The high book-to-market portfolios (H-BMPF) exhibits economically positive significant nexus while low book-to-market portfolios (L-BMPF) show insignificant which confirms the existence of value-effect. Moreover, similar to Ekaputra, & Sutrisno, 2020, the result of HML (value) pattern is not redundant for PSX. The profitability-pattern displays 14/25 statistically significant impact on EPSR which indicates significant contribution in the emerging market. Conversely, the investment-pattern coefficient values display highly insignificant and mix results as 23/25 show insignificant. Only 2 PF (34 and 33 having β = 0.4946 and 0.6742 respectively) present significant results. TQ-pattern maintains the significance in the model as 22/25 portfolios show statistically significant and positive nexus with EPSR.

Benchmark Factor

Table 10: Significant or Insignificant Factor Results

Model	RmRf	OMU	SMB	HML	WML	RMW	CMA
TQ-CAPM	1/25	18/25					
TQ-FF3FM	0/25	22/25	20/25	12/25			
TQ-C4FM	0/25	21/25	19/25	12/25	9/25		
TQ-FF5FM	0/25	22/25	20/25	12/25		14/25	2/25
Results	Insig.	Sig.	Sig.	Sig.	Insig.	Sig.	Insig.

Note: Table 10 reports the time-series OLS regression results for Tobin-Q augmented APMs. It shows conclusive results for all employed factors including Tobin-Q factor. The table shows number of significant and insignificant portfolio results out of 25 portfolios

Overwhelmingly, the overall findings of TQ-pattern are highly significant and influential in the market as 18/25, 22/25, 21/25 and 22/25 PFs demonstrate highly statistically significant relationship with EPSR using TQ-CAPM, TQ-FF3FM, TQ-C4FM and TQ-FF5FM respectively in the emerging market of Pakistan. The findings of the study not fully endorse the applicability of TQ-FF5FM in PSX as market and profitability patterns show inefficient outputs. The overall average adjusted R-square shows trivial improvement as compare to all models such as 0.0504, 0.15964, 0.1672 and 0.17404 for TQ-adjusted CAPM, FF3FM, C4FM and FF5FM respectively. Consistent with early contributions and recent studies such as Foye (2018) who argued that investment and profitability patterns failed to give justification in Asian equity markets, our findings demonstrate similar results testing TQ-FF5FM in PSX. Similarly, Hanauer and Lauterbach (2019) observed weak

results for two-augmented factors of FF5FM using 28 emerging equity markets including PSX.

Table 10 demonstrates the number of significant or insignificant factor results out of total 25 portfolios using time-series OLS regression technique. According to table, market factor determines that CAPM is failed to explain the average excess portfolio returns (AEPR). Similarly, investment factor shows insignificant impact on AEPR as 2 out of 25 portfolios show redundancy in the market. Similar to Lin (2017), the investment factor shows redundancy in the market. The third weaker results represent by momentum factor as 9 out of 25 portfolios exhibit significance results. Conversely, the size pattern represents significant results for approximately 20 out of 25 portfolios. Correspondingly, HML pattern also shows 12 out of 25 significant nexuses with AEPR in the market. More interestingly, the portfolios having high B|M ratio stocks outperform low B|M ratio stocks. Comparative to size pattern, value pattern performance shows weak impact

which shows contradictory results as Minović and Živković (2014) referred that as compare to size effect, value effect has more impact on mean stock returns. Moreover, the contributed factor, Tobin-q pattern demonstrates more significant impact as TQ-CAPM, TQ-FF3FM, TQ-C4FM and TQ-FF5FM exhibit 18, 22, 21 and 22 out of 25 portfolios statistically significant relationship with AEPR in PSX.

Model Diagnostics for Model Validation using Gibbons, Ross, and Shanken (1989) Test:

To unveil the suitable and benchmark model for the market, Gibbons, Ross and Shanken (1989) (GRS-1989) test is employed by following Nichol & Dowling (2014); Fama & French (2015, 2016, 2018); Hou, Xue & Zhang (2015); Hou, Mo, Xue, & Zhang, 2021; Fletcher (2019); The performance of the Tobin-q adjusted models in emerging equity market of Pakistan is hypothesized using Gibbons, Ross and Shanken (1989) test.

Table 11: The GRS test findings

Model	Mean alpha	Test stat.	P-value	Mean adj. R2	Mean SE	Mean abs alpha
TQ-CAPM	-0.01148788	2.5837442	0.00008486	0.05032373	0.00320015	0.01148788
TQ-FF3FM	-0.01141321	2.4405731	0.00022404	1.60E-01	0.00302114	0.01141321
TQ-C4FM	-0.01111375	1.9213909	0.00608791	0.16717324	0.00322854	0.01111375
TQ-FF5FM	-0.01106487	2.2601241	0.00073735	0.17404298	0.00303128	0.01106487

Note: Table 11 shows GRS test findings based on average absolute alpha (AAA); average standard error; average adjusted R-square and GRS F-test with p-value.

This study empirically investigates to establish how efficiently Tobin-q augmented standard models such as CAPM, FF3FM, C4FM and FF5FM explain the excess 25 value-weighted portfolio returns in PSX. There are various empirical evaluation techniques followed by many studies regarding model performance to be selected as benchmark model. In this regards, Gibbons, Ross and Shanken (1989) postulated a test based on Wald test which hypothesizes that the absolute alphas produced should be equal or closed to zero in case the model explains the expected excess portfolio returns, Mosoeu, & Kodongo (2020). Correspondingly, if intercept is equal to zero infers model is valid, (Lohano & Kashif, 2018). For overall time period, based on average absolute intercepts (AAA) value, dissimilar with Mosoeu, & Kodongo, 2020; Ekaputra, & Sutrisno, 2020; Kubota & Takehara, 2018; Huyuh, 2017; Chiah et at. 2016, GRS test accepts the TQ-FF5FM for PSX which is comparatively closer to zero. In particular, our findings support TQ-FF5FM as appropriate for pricing stocks returns in emerging market of Pakistan. Moreover, the GRS test findings also support the TQ-C4FM as compare to TQ-FF3FM and TQ-CAPM based on AAA value. The results of TQ-FF5FM reveal that as compare to TQ-FF3FM it outperforms in explaining the portfolio excess returns in emerging market. Similarly, the study of

Foye, Mramor, and Pahor (2013) observed failure of the FF3FM in emerging markets.

Conclusion

Empirically, the FF5FM has widely been investigated in developed and emerging equity markets around the globe. The findings of FF5FM, similar to FF3FM, are determining the significant risk premium and providing empirical validation of APM by explaining the cross-section of potential stock returns, around the world. Although, the results evidence mix findings in explaining the average stock returns to justify FF5FM validation. Therefore, the prior studies augmented various additional factors such as momentum and liquidity with FF5FM boost the predictability power of the model. Correspondingly, this study proposes Tobin-q augmented various standard APMs in emerging equity market such as PSX to investigate whether the marginal-factor contributes to measure risk-premium in the domain of asset pricing framework. The study examines the nexus between various factors including market, size (SMB), value (VMG), profitability (RMW), investment (CMA) and particularly Tobin-q (OMU) with excess 25 (value-weighted) portfolio returns in PSX. The prior empirical research studies investigated various asset pricing models with significant augmented anomalies which substantiate FF5FM dominance over FF3FM explaining the variation in CSSR

in developed and emerging equity markets around the globe. Although, our results indicate that FF5FM seems relatively effective in PSX except market and investment factors which report statistically insignificant nexus with portfolio excess returns. The results of the study are consistent with previous studies findings using FF5FM in PSX. The contributed TQ factor is priced in the emerging market of Pakistan as overall results comparatively perform better than rest of all market, size, value, momentum, profitability and investment patterns. There are various factors which need to be investigated as additional sixth factor in the PSX to conduct future research in emerging market. The investors and particularly portfolio managers should assume the TQ evaluation pattern while constructing diversified portfolio in emerging equity market of Pakistan.

The future study may include human capital as an additional factor instead of, like (Azam, 2022b). Structural equation modeling is a different approach that might be used in future research to test robustness further such as (Azam, 2022a). Future research may investigate structural breaks before and after Covid-19 utilising the ARCH family techniques as suggested by Azam & Azeem, 2021). The Tobin-q augmented various asset pricing models can be tested such as Fama & French (2018) six-factor model.

Funding

Conflicts of Interest

The author has no conflict of interest to disclose.

Acknowledgement

References

Acaravci, S. K., & Karaomer, Y. (2017). Fama-French five factor model: evidence from Turkey. *International Journal of Economics and Financial Issues*, *7*(6), 130-137.

Acheampong, P., & Swanzy, S. K. (2016). Empirical test of single Factor and multi-factor asset pricing models: Evidence from non-financial firms on the Ghana stock exchange (GSE). *International Journal of Economics and Finance*, *8*(1), 99-110.

Ahlatcıoğlu, A., & Okay, N. (2021). Post-earnings announcement drift: Evidence from Turkey. *Borsa Istanbul Review*.*21*(1), 92-103.

Akhtar, T. (2021). Market multiples and stock returns among emerging and developed financial markets. *Borsa Istanbul Review*, *21*(1), 44-56.

Ali, F. (2022). Testing mispricing-augmented factor models in an emerging market: A quest for parsimony. *Borsa Istanbul Review*, *22*(2), 272-284..

Ali, F., He, R., & Jiang, Y. (2018). Size, value and business cycle variables. The three-factor model and future economic growth: Evidence from an emerging market. *Economies, 6*(1), 14. 1-24

Ali, F., Khurram, M. U., & Jiang, Y. (2019). The five-factor asset pricing model tests and profitability and investment premiums: Evidence from Pakistan. *Emerging Markets Finance and Trade*, 1-23.

Alroaia, Y. V., Abadi, H. E. M., & Khosravani, A. (2012). The investigation of price-earnings ratio (P/E) and return on stock: The case of Tehran Stock Exchange. *Journal of Asian Development Study*, *1*(2), 35-44.

Ameer, B. & Jamil, Dr. M. (2013). A test of fama and french three factor model in Pakistan equity market. *Global Journal of Management and Business Research*. *13*(7-C), 24-28.

Ardila-Alvarez, D., Forro, Z., & Sornette, D. (2021). The acceleration effect and gamma factor in asset pricing. *Physica A: Statistical Mechanics and its Applications*, *569*, 125367.

Arikan, O., Gozluklu, A. E., Kim, G. H., & Sakaguchi, H. (2019). Primacy in stock market participation: the effect of initial returns on market re-entry decisions. *The European Journal of Finance*, *25*(10), 883-909.

Arsalan, T., & Iqbal, M. (2020). The rol of Risk and Macroeconomic Environment on Stock Returns: Evidence from Banking Sector of Pakistan. *Pakistan Business Review*, *22*(1), 18-29.

Arshad, M. A., Munir, S., Ahmad, B., & Waseem, M. (2019). Do factors matter for predicting high-risk stock returns? Comparison of single-, three-and five-factor CAPM. *International Journal of Financial Engineering*, *6*(02), 1950015.

Azam, M. (2021). Multidimensional Liquidity (Liu, 2006) and Momentum (Carhart, 1997) augmented Fama & French (2015) five-factor model: Evidence from Pakistan. *International Journal of Business and Management Sciences*, *2*(3), 108-130.

Azam, M. (2022a). The CAPM Revisited Using Structural Equation Model: Mediating Role of GDP-Growth in Pakistan Stock Exchange. *Journal of Managerial Sciences*, *16*(1), 93-108.

Azam, M. (2022b). Selectivity and Market-Timing Performance of Mutual Funds Using Human-Capital Augmented Various Asset-Pricing Models: Evidence from Pakistan. *International Journal of Management Research and Emerging Sciences*, *12*(3), 1-31. https://doi.org/10.56536/ijmres.v12i3.173

Azam, M., & Ilyas, J. (2011). An empirical comparison of CAPM and Fama-French Model: A case study of

KSE. *Interdisciplinary Journal of Contemporary Research in Business*, *2*(12), 415-426.

Azam, M., & Azeem, N. (2021). Does COVID-19 Affect Stock Market Volatility?. *International Journal of Business and Management Sciences*, *2*(2), 57-66.

Azimli, A. (2020). Pricing the common stocks in an emerging capital market: Comparison of the factor models. *Borsa Istanbul Review*, *20*(4), 334-346.

Balfoussia, H., & Gibson, H. D. (2019). Firm investment and financial conditions in the euro area: evidence from firm-level data. *Applied Economics Letters*, *26*(2), 104-110.

Bano, S., Chughtai, S., & Awan, T. (2020). Quality minus junk factor: A study on asset pricing dynamics in the equity market of Pakistan. *IBA Business Review*, *15*(2).

Banz, R. W. (1981). The relationship between return and market value of common stocks. *Journal of financial economics*, *9*(1), 3-18.

Basu, S. (1977). Investment performance of common stocks in relation to their price-earnings ratios: A test of the efficient market hypothesis. *The journal of Finance*, *32*(3), 663-682.

Bhandari, L. C. (1988). Debt/equity ratio and expected common stock returns: Empirical evidence. *The journal of finance*, *43*(2), 507-528.

Black, F., Jensen, M. C. & Scholes, M. S. (1972). The capital asset pricing model: Some empirical tests. In: Michael C. Jensen, ed., Studies in the theory of capital markets (Praeger. New York), 79-121.

Bodie, Z., Kane, A., & Marcus, A. (2013). *EBOOK: Essentials of Investments: Global Edition*. McGraw Hill.

Boyle, G. (2005). Risk, expected return, and the cost of equity. New Zealand Economic Papers, 39(2), 181–194.

Callen, J. L. (1988). Estimating the Cost of Equity Capital Using Tobin's q. *The Engineering Economist*, *33*(4), 349-358.

Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of finance*, *52*(1), 57-82.

Chhapra, I. U., Rehan, R., Mirza, Z. U. A., & Sohail, A. B. (2020). Understanding Accrual Anomaly: Evidence from Pakistan Equity Market. *KASBIT Business Journal, 13*(1), 11-24.

Chhapra, I. U., Zehra, I., Kashif, M., & Rehan, R. (2020). Is Bankruptcy Risk a Systematic Risk? Evidence from Pakistan Stock Exchange. *ETIKONOMI*, *19*(1), 51-62.

Chiah, M., Chai, D., Zhong, A., & Li, S. (2016). A Better Model? An empirical investigation of the Fama–French five-factor model in Australia. *International Review of Finance*, *16*(4), 595-638.

Choi, F. D., Hino, H., Min, S. K., Nam, S. O., Ujiie, J., & Stonehill, A. I. (1983). Analyzing foreign financial statements: The use and misuse of international ratio analysis. *Journal of International Business Studies*, *14*(1), 113-131.

Cochrane, J. H. (2011). Presidential address: Discount rates. *The Journal of finance*, *66*(4), 1047-1108.

Davidson, I., Leledakis, G., & Okunev, J. (2002). *Tobin's Q and the Cross Sectional Variation of Stock Returns: Evidence from the London Stock Exchange*. Loughborough: Loughborough University Banking Centre.

Dewandaru, G., Rizvi, S. A. R., Masih, R., Masih, M., & Alhabshi, S. O. (2014). Stock market co-movements: Islamic versus conventional equity indices with multi-timescales analysis. *Economic Systems*, *38*(4), 553-571.

Dirkx, P., & Peter, F. J. (2020). The Fama-French Five-Factor Model Plus Momentum: Evidence for the German Market. *Schmalenbach Business Review*, *72*(4), 661-684.

Dolinar, D., Lončarević, S., & Orlović, Z. (2020, June). Test of the Fama-French five-factor model on the Croatian Stock Market. In *Proceedings of FEB Zagreb International Odyssey Conference on Economics and Business* (Vol. 2, No. 1, pp. 286-297). University of Zagreb, Faculty of Economics and Business.

Douglas, G. W. (1969). Risk in the Equity Markets: An Empirical Appraisal of Market Efficiency. *Yale Economic Essays*, *9*, 3-45.

Ekaputra, I. A., & Sutrisno, B. (2020). Empirical tests of the Fama-French five-factor model in Indonesia and Singapore. *Afro-Asian Journal of Finance and Accounting*, *10*(1), 85-111.

Fama, & French. (1992). The Cross-Section of Expected Stock Returns. *The Journal of Finance, 47*(2), 427-465.

Fama, & French. (1993). Common risk factors in the returns on stocks and bonds. *Journal of financial Economics, 33*, 3-56.

Fama, & French. (2015). A five-factor asset pricing model. *Journal of financial Economics, 116*(1), 1-22.

Fama, E. F., & French, K. R. (2016). Dissecting anomalies with a five-factor model. *The Review of Financial Studies*, *29*(1), 69-103.

Fama, E. F., & French, K. R. (2017). International tests of a five-factor asset pricing model. *Journal of financial Economics*, *123*(3), 441-463.

Fama, E. F., & French, K. R. (2018). Choosing factors. *Journal of financial economics*, *128*(2), 234-252.

Fama, E. F., & MacBeth, J. D. (1973). Risk, return, and equilibrium: Empirical tests. *Journal of political economy*, *81*(3), 607-636.

Feng, J., Wang, Y., & Yin, L. (2017). Oil volatility risk and stock market volatility predictability: Evidence from G7 countries. *Energy Economics*, *68*, 240-254.

Fletcher, J. (2019). Model comparison tests of linear factor models in UK stock returns. *Finance Research Letters*, *28*, 281-291.

Foye, J. (2018). A comprehensive test of the Fama-French five-factor model in emerging markets. *Emerging Markets Review*, *37*, 199-222.

Foye, J., Mramor, D., & Pahor, M. (2013). A respecified fama french three factor model for the new European Union member states. *Journal of International Financial Management & Accounting*, *24*, 3–25.

Frank, M. Z., & Shen, T. (2016). Investment and the weighted average cost of capital. *Journal of Financial Economics*, *119*(2), 300-315.

Fu, L., Singhal, R., & Parkash, M. (2016). Tobin's q ratio and firm performance. *International research journal of applied finance*, *7*(4), 1-10.

Galankashi, M. R., Rafiei, F. M., & Ghezelbash, M. (2020). Portfolio selection: a fuzzy-ANP approach. *Financial Innovation*, *6*(1), 1-34.

Gaunt, C. (2004). Size and book to market effects and the Fama French three factor asset pricing model: evidence from the Australian stockmarket. *Accounting & Finance*, *44*(1), 27-44.

Gibbons, M. R., Ross, S. A., & Shanken, J. (1989). A test of the efficiency of a given portfolio. *Econometrica: Journal of the Econometric Society*, 1121-1152.

Gospodinov, N., Kan, R., & Robotti, C. (2019). Too good to be true? Fallacies in evaluating risk factor models. *Journal of Financial Economics*, *132*(2), 451-471.

Graham, B., Dodd, D. L. F., & Cottle, S. (1934). *Security analysis* (Vol. 452). New York: McGraw-Hill.

Grobys, K., Ruotsalainen, J., & Äijö, J. (2018). Risk-managed industry momentum and momentum crashes. *Quantitative Finance*, *18*(10), 1715-1733.

Guo, B., Zhang, W., Zhang, Y., & Zhang, H. (2017). The five-factor asset pricing model tests for the Chinese stock market. *Pacific-Basin Finance Journal*, *43*, 84-106.

Halliwell, J., Heaney, J. & Sawicki, J. (1999). Size and book to market effects in Australian share markets: a time series analysis. *Accounting Research Journal*, *12*, 122–137.

Hanauer, M. X., & Lauterbach, J. G. (2019). The cross-section of emerging market stock returns. *Emerging Markets Review*, *38*, 265-286.

Hanauer, M. X., & Linhart, M. (2015). Size, value, and momentum in emerging market stock returns: Integrated or segmented pricing?. *Asia-Pacific Journal of Financial Studies*, *44*(2), 175-214.

Hanif, R., Choudhary, S., & Ismail, A. (2017). Implementation of Fama and French Five Factor Model: A Case of Pakistan Stock Exchange. *City University International Journal of Computational Analysis*, *1*(1), 31-38.

Hanif, M. & Bhatti, U., (2010). Validity of capital assets pricing model: Evidence from KSE-Pakistan. *European Journal of Economics, Finance and Administrative Sciences*, (20).

Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators. *Econometrica: Journal of the Econometric Society*, 1029-1054.

Haqqani, K., & Aleem, M. (2020). Testing Liquidity Augmented Fama-French Five-Factor Model in Pakistan Stock Exchange. *Global Economics Review*, *1*, 255-265.

Haqqani, K., & Rahman, W. (2020). The Empirical Test of Fama-French Five-Factor Model: Evidence from Pakistan Stock Exchange. *Global Management Sciences Review*, *5*(3), 32-39.

Haque, A., & Nasir, A. (2018, June). The application of Value at Risk and Expected Shortfall as Controlling Mechanism of Systematic Risk of Pakistani Stock Market. In *Proceedings of Economics and Finance Conferences* (No. 7108551). International Institute of Social and Economic Sciences.

Harvey, C. R., Liu, Y., & Zhu, H. (2016). … and the cross-section of expected returns. *The Review of Financial Studies*, *29*(1), 5-68.

He, W., Shi, X., Chang, Y., & Wu, W. (2021). Pay disparity within top management teams, real earnings management, and firm value: destructive competition or value creation? A moderated mediating model. *Applied Economics Letters*, 1-7.

Hirshleifer, D., & Jiang, D. (2010). A financing-based misvaluation factor and the cross-section of expected returns. *The Review of Financial Studies*, *23*(9), 3401-3436.

Hou, K., Mo, H., Xue, C., & Zhang, L. (2019). Which factors?. *Review of Finance*, *23*(1), 1-35.

Hou, K., Mo, H., Xue, C., & Zhang, L. (2021). An augmented q-factor model with expected growth. *Review of Finance*, *25*(1), 1-41.

Hou, K., Xue, C., & Zhang, L. (2015). Digesting anomalies: An investment approach. *The Review of Financial Studies*, *28*(3), 650-705.

Huang, T. L. (2019). Is the Fama and French five-factor model robust in the Chinese stock market?. *Asia Pacific Management Review*, *24*(3), 278-289.

Huberman, G., & Kandel, S. (1987). Mean-variance spanning. *The Journal of Finance*, *42*(4), 873-888.

Huynh, T. D. (2017). Conditional asset pricing in international equity markets. *International Review of Economics & Finance*, *49*, 168-189.

Ibrahim, A., Awan, T., & Khan, M. Y. (2018). Empirical investigation of socially responsible investments in Pakistani firms using Carhart Four Factor model. *IBA Business Review*, *13*(2).

Ishtiaq, M. (2019). Application of Fama-French Five Factor Model in Stock Pricing: Evidence from

Emerging Market. *Pacific Business Review International*, *11*(7).

Ishaq, M., Islam, Y., & Ghouse, G. (2021). Tobin's Q as an Indicator of Firm Performance: Empirical Evidence from Manufacturing Sector Firms of Pakistan. *International Journal of Economics & Business Administration (1)*, 425-441.

Jaffe, J., Keim, D. B., & Westerfield, R. (1989). Earnings yields, market values, and stock returns. *The Journal of Finance*, *44*(1), 135-148.

Jan, M. N., & Ayub, U. (2019). Do the Fama and French Five-Factor model forecast well using ANN?. *Journal of Business Economics and Management*, *20*(1), 168-191.

Jan, S. U., Iqbal, S., & Aamir, A. (2021). Comparing CAPM and FAMA French for Predicting Stock Returns: New Evidence from Pakistan Stock Exchange. *Ilkogretim Online*, *20*(3).

Jareño, F., O González, M. D. L., Tolentino, M., & Rodríguez, S. (2018). Interest rate sensitivity of Spanish companies. An extension of the Fama-French five-factor model. *Acta Oeconomica*, *68*(4), 617-638.

Javed, A. (2020). Dividend Price Ratio and Stock Return: Evidence from Pakistan, India and China. *International Journal of Psychosocial Rehabilitation*, *24*(03).

Javid, A. Y., & Ahmad, E. (2008). Testing multifactor capital asset pricing model in case of Pakistani market.114-138.

Kaldor, N. (1966). Marginal productivity and the macro-economic theories of distribution: Comment on Samuelson and Modigliani. *The Review of Economic Studies*, *33*(4), 309-319.

Kassimatis, K. (2008). Size, book to market and momentum effects in the Australian stock market. *Australian Journal of Management*, *33*(1), 145-168.

Kassimatis, K. (2011). Risk aversion with local risk seeking and stock returns: evidence from the UK market. *Journal of Business Finance & Accounting*, *38*(5-6), 713-739.

Kaya, E. (2020). Relative performances of asset pricing models for BIST 100 index. *Spanish Journal of Finance and Accounting/Revista Española de Financiación y Contabilidad*, 1-22.

Khan, U. E., & Iqbal, J. (2021). The Relationship between Default Risk and Asset Pricing: Empirical Evidence from Pakistan. *The Journal of Asian Finance, Economics and Business*, *8*(3), 717-729.

Kubota, K., & Takehara, H. (2018). Does the Fama and French five-factor model work well in Japan?. *International Review of Finance*, *18*(1), 137-146.

Lau, S. T., Lee, C. T., & 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.

Leal, C. C., Armada, M. J. R., & Loureiro, G. (2018). Individual investors repurchasing behaviour: evidence from the Portuguese stock market. *The European Journal of Finance*, *24*(11), 976-999.

Lee, H. S., Cheng, F. F., & Chong, S. C. (2016). Markowitz portfolio theory and capital asset pricing model for Kuala Lumpur stock exchange: A case revisited. *International Journal of Economics and Financial Issues*, *6*(3S), 59-65.

Li, Q., Vassalou, M., & Xing, Y. (2006). Sector investment growth rates and the cross section of equity returns. *The Journal of Business*, *79*(3), 1637-1665.

Li, X., Wu, X., & Zhou, W. (2017). Optimal stopping investment in a logarithmic utility-based portfolio selection problem. *Financial Innovation*, *3*(1), 1-10.

Liammukda, A., Khamkong, M., Saenchan, L., & Hongsakulvasu, N. (2020). The Time-Varying Coefficient Fama-French Five Factor Model: A Case Study in the Return of Japan Portfolios. *The Journal of Asian Finance, Economics, and Business*, *7*(10), 513-521.

Lin, Q. (2017). Noisy prices and the Fama–French five-factor asset pricing model in China. *Emerging Markets Review*, *31*, 141-163.

Lintner. (1965). Security prices, risk, and maximal gains from diversification. *The Journal of Finance, 20*(4), 587-615.

Liu, J., Stambaugh, R. F., & Yuan, Y. (2019). Size and value in China. *Journal of Financial Economics*, *134*(1), 48-69.

Liu, S. (2020, December). Analysis of COVID-19 on Service Industry Based on Fama and French Five-Factor Model. In *2020 Management Science Informatization and Economic Innovation Development Conference (MSIEID)* (pp. 154-157). IEEE.

Liu, W. (2006). A liquidity-augmented capital asset pricing model. *Journal of financial Economics*, *82*(3), 631-671.

Lohano, K., & Kashif, M. (2018). Testing asset pricing models on the Pakistan Stock Exchange. *IBA Business Review*, *13*(2), 1-19.

Madsen, J. (2003). Equity prices, share price valuation, crashes and depressions. *Nationalokonomisk Tidsskrift*, *141*, 3-34.

Markowitz, H. (1952). Portfolio Selection. *The Journal of Finance*, *7*(1), pp. 77-91.

Mengoli, S. (2004). On the source of contrarian and momentum strategies in the Italian equity market. *International Review of Financial Analysis*, *13*(3), 301-331.

Merton, R. C. (1973). An intertemporal capital asset pricing model. *Econometrica: Journal of the Econometric Society*, 867-887.

Merton, R. C. (1987). A simple model of capital market equilibrium with incomplete information.

Miller, M. H., & Scholes, M. (1972). Rates of return in relation to risk: A reexamination of some recent findings. *Studies in the theory of capital markets*, *23*, 47-48.

Minović, J., & Živković, B. (2014). CAPM augmented with liquidity and size premium in the Croatian stock market. *Economic research-Ekonomska istraživanja, 27*(1), 191-206.

Mirza, N., & Reddy, K. (2017). Asset pricing in a developing economy: Evidence from Pakistan. *Economics Bulletin*, *37*(4), 2483-2495.

Mirza, N., & Shahid, S. (2008). Size and Value Premium in Karachi Stock Exchange. *Lahore Journal of Economics*, *13*(2), 1-26.

Mosoeu, S., & Kodongo, O. (2020). The Fama-French five-factor model and emerging market equity returns. *The Quarterly Review of Economics and Finance*. DOI: https://doi.org/10.1016/j.qref.2020.10.023

Mossin, J. (1966). Equilibrium in a capital asset market. *Econometrica: Journal of the Econometric Society*, 768-783.

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

Munir, S., Sajjad, M., Humayon, A., & Chani, M. (2020). Determination of stock returns using five-factor CAPM: evidence from PSX. *International Transaction Journal of Engineering, Management, & Applied Sciences & Technologies*, *11*(8), 1-10.

Nichol, E., & Dowling, M. (2014). Profitability and investment factors for UK asset pricing models. *Economics Letters*, *125*(3), 364-366.

Novy-Marx, R. (2013). The other side of value: The gross profitability premium. *Journal of financial economics*, *108*(1), 1-28.

Pástor, Ľ., & Stambaugh, R. F. (2003). Liquidity risk and expected stock returns. *Journal of Political economy*, *111*(3), 642-685.

Peng, L., & Xiong, W. (2006). Investor attention, overconfidence and category learning. *Journal of Financial Economics*, *80*(3), 563-602.

Penman, S. H. (1992). Return to fundamentals. *Journal of Accounting, Auditing & Finance*, *7*(4), 465-483.

Pietrovito, F. (2016). Do price-earnings ratios explain investment decisions better than Tobin'sq? Evidence from German firm-level data. *Applied Economics, 48*(34), 3264-3276.

Pojanavatee, S. (2020). Tests of a Four-Factor Asset Pricing Model: The Stock Exchange of Thailand. *The Journal of Asian Finance, Economics, and Business*, *7*(9), 117-123.

Qin, S., Luo, W., & Wang, Y. (2021). Policy uncertainty and firm-level investment: Evidence from public-private partnership market in China. *Applied Economics Letters*, 1-7.

Ragab, N. S., Abdou, R. K., & Sakr, A. M. (2019). A Comparative Study between the Fama and French Three-Factor Model and the Fama and French Five-Factor Model: Evidence from the Egyptian Stock Market. *International Journal of Economics and Finance*, *12*(1), 52-69.

Rendón, J. A. (2020). Foreign exchange risk in stock returns. *International Journal of Finance & Economics*, *25*(3), 430-443.

Racicot, F. E., & Rentz, W. F. (2016). Testing Fama–French's new five-factor asset pricing model: evidence from robust instruments. *Applied Economics Letters*, *23*(6), 444-448.

Racicot, F. E., & Rentz, W. F. (2017). A panel data robust instrumental variable approach: A test of the new Fama-French five-factor model. *Applied Economics Letters*, *24*(6), 410-416.

Racicot, F. É., Rentz, W. F., & Théoret, R. (2018). Testing the new Fama and French factors with illiquidity: A panel data investigation. *Finance*, *39*(3), 45-102.

Rizwan, S., Shaikh, S. J., & Shehzadi, M. (2013). Validity of capital assets pricing model (CAPM): evidence from cement sector of Pakistan listed under Karachi stock exchange. *Kuwait Chapter of the Arabian Journal of Business and Management Review*, *2*(6), 66.

Rosenberg, B., Reid, K., & Lanstein, R. (1985). Persuasive evidence of market inefficiency. *The Journal of Portfolio Management*, *11*(3), 9-16.

Ross, S. (1976). The Arbitrage Theory of Capital Asset Pricing. *Journal of Economic Theory*, *13*, 341-360.

Roy, R., & Shijin, S. (2018). A six-factor asset pricing model. *Borsa Istanbul Review*, *18*(3), 205-217.

Sadhwani, R. Bhayo M. R. & Bhutto, N. A. (2019). A Test of the Five-Factor Model in Pakistan. *Pacific Business Review International*,*11*(7), 42-52.

Sehrawat, N., Kumar, A., Nigam, N. K., Singh, K., & Goyal, K. (2020). Test of capital market integration using Fama-French three-factor model: Empirical evidence from India. *Investment Management & Financial Innovations*, *17*(2), 113-127.

Shah, S. H. A., Shah, A., Khan, M. K., & Ullah, H. (2021). The Risk and Return Relations: New Evidence from Pakistani Stock Market. *Journal of Accounting and Finance in Emerging Economies*, *7*(1), 195-204.

Shaharuddin, S. S., Lau, W. Y., & Ahmad, R. (2018). Is the Fama french three-factor model relevant? Evidence from Islamic unit trust funds. *The Journal of Asian Finance, Economics, and Business*, *5*(4), 21-34.

Shaikh, S. A., Ismail, M. A., Ismail, A. G., Shahimi, S., & Shafiai, M. H. M. (2019). Cross section of stock returns on Shari'ah-compliant stocks: evidence from Pakistan. *International Journal of Islamic and Middle Eastern Finance and Management*.

Sharpe. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance, 19*(3), 425-442.

Shoaib, A., Siddiqui, M. A. & Ayub, M. (2020). Revisiting Fama-French Model through Alternative Size Measures: Evidence from South Asian Countries. *Abasyn University Journal of Social Sciences*, *13*(1), 137-151.

Situm, M. (2021). Determination of expected cost of equity with the CAPM: Theoretical extension using the law of error propagation. *Managerial and Decision Economics*, *42*(1), 77-84.

Škrinjarić, T. (2020). Dynamic portfolio optimization based on grey relational analysis approach. *Expert systems with applications*, *147*, 113207.

Stattman, D. (1980). Book Values and Stock Returns, The Chicago MBA: *A Journal of Selected Papers*. 4, 25-45

Stowe, J. D., Robinson, T. R., Pinto, J. E., & McLeavey, D. W. (2007). *Equity asset valuation* (Vol. 4). John Wiley & Sons.

Tharwani, R., Chhapra, I. U., Shakeel, S., & Sarwat, S. (2020). The Gross Profitability Premium: An Empirical Examination in Pakistan Stock Exchange (PSX). *Global Management Journal for Academic & Corporate Studies (GMJACS)*, 65.

Titman, S., Wei, K. J., & Xie, F. (2004). Capital investments and stock returns. *Journal of financial and Quantitative Analysis*, *39*(4), 677-700.

Tobin, J. (1970). On limiting the domain of inequality. *The Journal of Law and Economics*, *13*(2), 263-277.

Treynor, J. L. (1962), Toward a theory of market value of risky assets, the first paper on CAPM, yet rarely cited and often incorrectly referred to as 'Treynor (1961)'

Tsai, J. F., Mai, N. T., & Bui, D. G. (2021). Managerial ability, financial constraints, and the value of cash holding. *Applied Economics Letters*, 1-7.

Vassalou, M. (2003). News related to future GDP growth as a risk factor in equity returns. *Journal of financial economics*, *68*(1), 47-73.

Wang, L., & Xiong, X. (2021). The impact of herding behaviour of Chinese securities investment funds on firm value: the mediating effects of stock price informativeness and agency cost. *Applied Economics Letters*, 1-8.

Watanabe, A., Xu, Y., Yao, T., & Yu, T. (2013). The asset growth effect: Insights from international equity markets. *Journal of Financial Economics*, *108*(2), 529-563.

Wernerfelt, B., & Montgomery, C. A. (1988). Tobin's q and the importance of focus in firm performance. *The American Economic Review*, 246-250.

Wolfe, J., & Sauaia, A. C. A. (2003). The Tobin q as a company performance indicator. In *Developments in Business Simulation and Experiential Learning: Proceedings of the Annual ABSEL conference* (Vol. 30).

Wu, W., Chen, J., Xu, L., He, Q., & Tindall, M. L. (2019). A statistical learning approach for stock selection in the Chinese stock market. *Financial Innovation*, *5*(1), 1-18.

Wu, M., Imran, M., Feng, Y., Zhang, L., & Abbas, M. (2017). Review and validity of capital asset pricing model: evidence from Pakistan stock exchange. *International Research in Economics and Finance*, *1*(1), 21.

Xie, S., & Qu, Q. (2016). The three-factor model and size and value premiums in China's stock market. *Emerging Markets Finance and Trade*, *52*(5), 1092-1105.

Zada, H., Hassan, A., Khan, M. Z., & Afeef, M. (2019). An Appropriate Investment Portfolio for Stock Market Investors: Evidence from Pakistan. *Sarhad Journal of Management Sciences*, *5*(2), 343-356.

Zada, H., Rehman, M. U., & Khwaja, M. G. (2018). Application of Fama And french five factor model of asset pricing: Evidence from Pakistan stock market. *International Journal of Economics, Management and Accounting, 26*(1), 1-23.

Zaremba, A., & Czapkiewicz, A. (2017). Digesting anomalies in emerging European markets: A comparison of factor pricing models. *Emerging Markets Review*, *31*, 1-15.

Zhang, L., Li, Y., Huang, Z., & Chen, X. (2018). Stock liquidity and firm value: evidence from China. *Applied Economics Letters*, *25*(1), 47-50.

Zhang, Q., Saqib, Z. A., Saqib, K. A., Mahmood, S., & Cao, M. (2019, July). Alternative Three Factor Model for Asset Pricing for the Investment, Market and Profitability Premium in Emerging Markets: An Evidence from Pakistan's Stock Exchange. In *2019 16th International Conference on Service Systems and Service Management (ICSSSM)* (pp. 1-6). IEEE

Zheng, D., Chiang, T. C., & Nelling, E. (2020). Tests of Multifactor Asset Pricing Models in Asian Stock Markets. In *Emerging Market Finance: New Challenges and Opportunities*. Emerald Publishing Limited.

RESEARCH ARTICLE

Terrorism and Uncertainty among Investors: the case of Peshawar School Massacre

Seema Rehman[1], Rashidi Muhammad Zaki[2]

[1]Department of Management Sciences, Shaheed Zulfiqar Ali Bhutto Institute of Science and Technology (SZABIST), 90 and 100 Clifton, Karachi-75600, Pakistan
[2]Faculty of Business Administration, IQRA University, Shaheed-e-Millat Road, Phase 2, Defence View Housing Society, Karachi- 75500, Pakistan

Corresponding Author: Seema Rehman; seemarehman2014@yahoo.com

Abstract
This paper focuses on the effect of terrorism on stock returns in Pakistan by taking into account major incidents, mainly the Peshawar School Massacre. Structured approach of Grounded Theory by (Corbin and Strauss 1990) and (Strauss and Corbin 1998) has been used as Grounded Theory is based on data and its constructs do not face the problem of accuracy that plagued the other Qualitative Data Analysis methods. Data have been collected primarily through interviews. The theory developed around the central category or the central phenomenon: feelings of insecurity among investors. The strategies developed for coping with the overarching phenomena are past experience, financial soundness of organizations, previous worth of the company, asset holding for a longer period and togetherness among nation. Overall, there was stability in stock prices, improved confidence of investors and outperforming of shares. This study is distinctive in examining the coping strategies from the perspective of investors who experienced the impact on stock prices of the occurrence of terrorist attacks.

Introduction

A systematized stock exchange channelizes investment schemes and mobilizes savings, thereby promoting economic development of a country. Stock markets function primarily as mediators between investors and borrowers by activating savings from large pool of small savers and mobilizing these deposits into prolific investments. The choices of the borrowers and lenders are coordinated through operation of stock market. Re-allotment of funds is also supported by stock market among corporations. Liquidity needed for domestic proliferation and credit expansion provided by stock market in turn benefit several sectors of economy, such as agriculture, commerce and industry (Iqbal, 2012).

Stock markets show extreme sensitivity in case of any advancement internally and externally. Stock exchanges are considered as barometers for measuring favourable and unfavourable situations for firms' trades, the information arrival causes an immediate effect on business activities. Studying the impact of important incidents on equity markets has been a major area in financial econometrics. This type of research tries to observe the degree to which the regular routine of equity market is affected, around the time period, the incident occurred. Economic theory suggests that stock prices are reflective of expected income of companies and as corporate profits have a significant contribution in calculating Gross Domestic Product (GDP) therefore exhibit an important link to constituents of GDP, such as consumption and investment. The far-seeing properties of equity prices are indicative of their role as a major gauge of economic events.

Terrorist attacks are momentous events which can bring about broad violence, perturb daily lives of people, adversely impact the economy and eventually create volatility in stock prices. Contemporary terrorists are devoted on causing harm to an economy that targeted countries agree to their wishes. This damage may be in the form of human or capital losses. Both types of losses reveal inability of government to secure its assets, thereby losing people confidence and its legitimacy. The intent of terrorist group is to create an atmosphere of dread and terrors making virtually citizens feel at threat. If a beleaguered government takes the expected costs of future attacks as more than the price of agreeing to the demands of terrorists, then the authorities will manage some adjustment. A determined group may get its demands fulfilled by increasing the harm to the society. Terrorist attacks increase uncertainty which reduce investments and deflect Foreign Direct Investment (FDI). In developing countries, public funds in the shape of overhead capital such as highways, bridges and canals are especially significant to enhance growth. Terrorism also obstructs economic growth by increasing the price of conducting business in the form of

higher salaries, greater insurance premiums and larger security costs. The greater costs eventually led to smaller profits and thus reduced return on investment. Terrorism destroys infrastructure, damages key industries such as airline business, export sector and tourism and causes business disruptions, reducing Gross Domestic Product (GDP) and economic growth (DeCook & Kelly, 2022).

In this research any activity which had huge impact on stock prices is considered as major incident like the assassination of former Prime Minister Benazir Bhutto in Liaquat National Bagh Rawalpindi on 27 December, 2007 at a political rally.

Need for Capital Market

The maturity period for the deposits of most commercial banks is less than one year, therefore they can only involve in limited lending of long-term finances. In the past, such loans were generated by DFI's in public sector. DFI's played a significant role in the development of industries in Pakistan from sixties to eighties, but poor governance led to losses which eventually resulted in the closure of these institutions. It was expected that establishing new investment companies in collaboration with other countries would fill this gap. Unfortunately, joint venture companies like Pak Kuwait, Pak Iran, Pak Oman didn't show significant performance in financing long term projects. During the last three decades, arranging finance for long-term plans and building infrastructure has been shifted from public organizations to capital markets on international level. The limited availability of resources in Pakistan for both government and private institutions indicate the absence of a liquid debt market. Despite of these hurdles, the Pakistan Stock Exchange has played its role in providing long-term finance to government and private organizations.

Pakistan Stock Exchange

Pakistan Stock Exchange (PSX), formerly known as Karachi Stock Exchange, the largest and most liquid market of Pakistan was established in 1947. It was labeled as the best performing stock exchange of the world in recent years. A total of 531 companies are listed on PSX with a market capitalization of Rs.7.68 trillion. According to the report of Economic Survey of Pakistan (2018-2019), around 90% of the trade activities of our country, take place at Pakistan Stock Exchange. After 9/11 incident, Pakistan has been in a state of war against terrorist activities for the last twenty years, which has changed the economic structure of the country drastically. Terrorism creates ambiguous environment in stock markets as it increases risk on investments. Pakistan has already paid more than seventy billion dollars as a cost of terrorism directly or indirectly, which is almost half of Pakistan's total debts, as reported by the Pakistan Economic Survey (2012-2013). There is no doubt that the performance of stock market as well as the whole economy is affected by terrorism.

Since 1990, the structural changes like the building of the KSE-100 price index, market capitalization and alterations in settlement periods has increased the noteworthiness of Pakistan Stock Exchange. These changes were the outcomes of financial liberalization. To play the obligatory role in mobilizing capital, many deregulation policies were adopted to provide openness to foreign investors and attract local investors. The institutional progress and reforms led to more divulgence of information through regular publications of reports, notification of dividends, official meetings and announcement of daily quotation. Many measures have been taken by Pakistan stock market in protecting buyer's interest from high volatility in stock prices. These are initiation of Karachi Automated Transaction System (KATS), advancement in handling excessive trade volume; Central Depository System (CDS), to help deal with more than 1 million shares daily and National Clearing System, which manages the clearing and bargain of the stock market of the country at one place. The chances of facsimile frauds and detainments in transfer are eliminated by these measures and have driven a reduction in the volatility of stock prices. The exchange supplies information through the internet to investors on real time basis. The Security and Exchange Commission of Pakistan (SECP) supplies guidelines to substantiate good governance with the objective of improving investor assurance by augmenting transparency in the trading activities of listed corporations. The government officials have privatized many institutions with a view to minimize organizational problems and to enhance financial soundness. These institutions generated the capital from stock market that eventually enhanced the progress of stock market. Furthermore, they also assisted in providing knowledge about the unstable political and economic conditions and guided investors to link all supplied information to the business activities of the stock market in a profitable manner. This has also reduced the chance for buyers to earn abnormal profits.

According to the economic survey of Pakistan 2018-19, the stock market of Pakistan exhibited a distinguished performance in the period from July 2018 to March 2019. This period has evidenced a tremendous growth as a result of numerous favorable events that took place at political and economic level. The various factors which contributed in propelling the index growth are implementation of Capital Gain Tax Rules, demutualization of the stock, substantiate decrease in the rate of discount by The State Bank of Pakistan which was reduced to 10% on 3 December 2018, notable foreign investment in stock, declining rates of inflation etc. Furthermore, political stability in the country also helped in achieving a thriving capital market.

Terrorism in Pakistan

For the last two decades, terrorism has become a substantial and extremely destructive phenomenon. In 2003, the annual death rate from terrorist killings was 164, which rose in 2009 to 3318. The total number of Pakistanis killed during the period 2001 to 2011 is 35,000. According to official records, the government paid $68 billion from 2000 to 2010 as a cost of terrorism directly and indirectly. The two former presidents, Asif Ali Zardari and ex-Army Chief Pervaiz Musharaf admitted that terrorist activities were created and promoted purposely by past leadership with a planning to achieve some tactical objectives on short term basis. This trend started with the controversial policies of Islamization by Ziaul Haq in the eighties, under which there was dissonance against Soviet interference in Afghanistan. In Zia's period, Pakistan got involved in the war between Soviet Union and Afghanistan, which drove a higher influx of Mujahideens to the close tribal areas and expanded supply structure of arms and ammunition. The Mujahideens were encouraged by the state and its intelligence services, in collaboration with CIA to act as a proxy in war against Soviet presence in Afghanistan. These Mujahideens later were activated as Lashkare Tayba, Harkatul Mujahideen and Tehreeke Taliban on the behest of the country. These groups are now a threat to the state and its citizens by involving in the politically motivated target killings of civilians and government officials (Abiden, Zhilong & Mubeen, 2019).

Major Terrorist Incidents in Pakistan

The war on terrorism had an important effect on Pakistan, as the terrorism inside the country increased twofold. The government was already arrested with sectarian fervidness, but after the 9/11 attacks in New York, it had to battle the threat from Al Qaeda and other groups, who retreated from Afghanistan and mostly targeted political leaders. In 2006, more than 657 terror incidents took place with 907 dead and 1,542 people injured as per the security report of Pak Institute for Peace Studies (PIPS).

In 2007, according to the security report of PIPS, 1,503 terrorist incidents, including suicide blasts and target killings left 3,448 dead and 5,353 injured. The report says that most of the suicide attacks were targeted at police officials in 2007 with more than 770 casualties and 1,574 injuries. According to PIPS report, operation at Lal Masjid increased suicide attacks.

In 2008, the state witnessed 2,148 terrorist incidents, resulting in 2,267 casualties and 4,558 serious injuries. The annual report of Human Rights Commission of Pakistan (HRCP) declared that there were more than 67 suicide blasts across the country with 973 people killed and 2,318 injured. A source from the investigation bureaus revealed that since 2002 the number of suicide attacks in Pakistan surged to 140 till the end of 2008 while in 2007, there were 56 suicide blasts.

2009 was the worst year as 2,586 terrorist and other incidents related to sectarian took place killing 3,021 and injuring 7,334 people, according to the security report printed by PIPS. The fatalities calculate 48 percent greater in comparison to 2008. The number of suicide blasts rose to 87 by one third, killing 1,300 and injuring 3,600 people. In Pakistan, terrorist incidents have killed more than 35,000 people, of which 5,000 are security personnel and caused damage of US$67 billion to the economy.

Terrorist Attack on Peshawar School, 16 December, 2014

The armed forces of Pakistan conducted a combined military offensive in June 2014 against numerous groups in a violent area of the state, called Waziristan. This military offensive named Zarbe Azab operation was started in response to the attack on Jinnah airport Karachi on 8 June, for which the Tehreek-e-Taliban owned responsibility. As a reaction to Zarbe Azab, 9 gunmen allied to Tehreek-e-Taliban administered a terrorist strike on an army school in Peshawar. The terrorists, all of whom belonged to foreign countries comprised of 1 Chechin, 3 Arabs and 2 Afghans. They started firing on school officials and children as soon as they entered the school, depriving 145 people of life, including 132 children all boys, between the ages of 8 and 18 years. The Special Services Group of Pakistan army launched a rescue drive, killing all the 7 terrorists and saved 960 people. Major General Bajwa, the chief military spokesman said that there had been more than 130 injuries in the attack. This attack is marked as the deadliest attack in the history of Pakistan, transcending the Karachi bombing in 2007.

Against literature which depicts a negative impact of terrorist activities on stock prices, the capital market of Pakistan showed outstanding performance throughout the year hitting historic levels regarding volume and value. In 2014, for the 3rd consecutive year, Pakistan was able to maintain its place in the top 10 best performing stock markets of the world.

Terrorist incidents instil the feeling of insecurity and perturb the regular business routine leading to distressed economic conditions. Foreign investors are not willing to make investments in countries with threatening law and order environment. They are concerned about the security of their investment as well as their personal security while meeting their business partners. As (Alam 2013) quotes, all those incidents, whether it is a terrorist event or unstable law and order situation that create the feeling of uncertainty about the expected profits, deflect investment in equity exchanges. Terrorism causes disturbance in regular life of masses, drives violence broadly, impacts the market adversely which finally results in stock market volatility.

The major research questions are:

1. What is the theory that explains the change process related to stock returns in case of Peshawar School Massacre?
2. What were the major events or benchmarks in the process?
3. How did the stake holders participate in the process?

The objectives of the Study are:

The purpose of this grounded theory study is to understand the uncertainty among investors at the event of major terrorist attacks. At this stage in the research, the uncertainty among investors will be generally defined as," Increased perceptions of risk, eventually affecting the pricing mechanism of risky stocks."

1. To examine the impact of major terrorist attacks like the incident of Peshawar (16 December, 2014) on stock prices.
2. To find out any deviation regarding normal stock returns as a consequence of terrorist attacks.
3. To analyze the reaction of the investors pre event, at the time of event and post event.
4. To understand, why some terrorist events affect the returns on stock positively?

Though the term terrorism was not unheard of, the 9/11 episode brings about new frontiers in terrorist activities by spreading geopolitical hazard, impacting the world economic conditions and global financial markets. Understanding the pattern of terrorist incidents and their effects on trading activities clearly, is useful in formulating strategies for dealing with ceaseless terrorist incidents, for decreasing their cost and for enhancing the investor sentiments in equity market. Thus, the purpose of this study is to understand the feelings of uncertainty in investors that impact the stock returns in the emerging market of Pakistan by taking into account a major incident i.e., the Peshawar School Massacre.

The investors have less opportunity to business profitably in inefficient markets because these markets use monopoly to get internal information. The test to check how efficient the market is can be performed by recording the time period, market takes for recovery after the impacts of unexpected events. As terrorist events have no imprecise timings, are confounding incidents and lack favorable information that complex most checks of market effectiveness, observing their impact on investors' feelings may provide better insights to formulate policies in enhancing market efficiency.

This study may help investors in forming better evaluation of equity market volatility while worse kind of terrorism strikes. It may advise investors to plan their investments in equity market of an emerging economy. It may assist regulatory bodies in taking suitable measures for minimizing the impacts of terrorist incidents for protecting investor's confidence at Pakistan Stock Exchange (PSX).

This research will help investors, brokers and also businessmen to take right decision at the time of any major crisis. It may help financial analysts to predict future forecasting for debentures and shares. This study will be helpful to boost the confidence of foreign investors.

The organization of the remaining paper is as follows. Section 2 discusses the existing literature, Section 3 presents the data and methodology, Section 4 deals with data analysis and findings and Section 5 concludes the study.

Literature Review

As regional security has surfaced as a huge concern for the leaders and members, public is willing to support the rollback of unspecified civil liberties. (Napoleoni 2003) asserts that the new-fangled terrorism cannot be considered as a mere philosophical term or a political idea. The economy of terror is supportive in terms of funding needed for the cause. It was estimated to have a yearly value of half trillion dollars during last decade and continual growth was predicted.

The assessment of the impact of terrorist incidents on equity markets is limited in existing literature, especially within the context of behavioral finance (Karolyi 2006). Terrorism influences the investors' confidence directly leading to market downturns (Barth, Li et al. 2006, Gul, Hussain et al. 2010). Some find no impact of terrorist events on equity markets (Chen and Siems 2007, Eldor and Melnick 2007) and others (Johnston and Nedelescu 2006) argue that efficient stock markets are able to absorb such concussion strikes due to timely action by regulatory bodies. (Gunaratna and Nielsen 2008) assert that the shift of Al Qaida headquarters to northern areas from Afghanistan is a major cause of terrorism in Pakistan. However, (Khokhar 2007) blames madrasas and Shia foundations for planning the terrorist attacks. While (Asal, Fair et al. 2008) denies this charge while asserting the family role to join or decline jihad bands.

The increasing interest related to economic price of terrorism has spawned innovatory lines of scholarly research. (Eldor and Melnick 2007) estimated the response of stock prices of Israel's market to terrorism by taking daily observations for 3,515 days. They examine the impact of six hundred and thirty-nine terrorist events on financial markets from the period 1990 to 2003. They discovered that suicide blasts had a persistent impact, while the event location had no impact on stock markets. According to them, financial markets show efficiency and there is no proof to state that the stock market grows desensitized over the period of time to terrorism. They assert that liberalization policies of market contributed to deal with the impacts of terrorist activities. (Buesa, Valiño et al. 2007) estimate the cost of damage caused by terrorism on 11 March, 2004 in Madrid, Spain. They find 291 fatalities and

1600 major injuries due to this incident along with infrastructure damages.

Literature shows that terrorist events impact negatively. Terrorist attacks have a negative effect on GNP, economic gains and stock markets in the whole world, however the intensity of the impact varies from region to region. (Abadie and Gardeazabal 2003) examined the price of strife in terms of growth in economic sector and market assets of government firms in the city of Basque. They found that GDP per capita of Basque on average decreased by ten percent as compared to a country without terrorism. In peace days, stocks of Basque outperform the stocks of non-Basque, while reverse performance results when the cease fire comes to an end. Barth et al. studied the impact of terrorist events on economic gains and capital formation and found that terrorist attacks have significant negative impact on economic growth. They also discovered that the aim of the strike is important in making a difference (Abiden, Zhilong & Mubeen, 2019).

When the target of attack is private institutions, it has a disastrous association with economic growth and capital formation (Zakaria, Jun et al. 2019). (Drakos 2010) observes the effects of terrorist attempts on equity exchanges of twenty two countries and reports negative impact of terrorism on the performance of financial markets. In the same vein, (Arin, Ciferri et al. 2008) inspect the adverse impact of terrorism on the equity exchanges of six countries in increasing volatility. They also concluded that, the shocks of terror vary from country to country and emerging markets suffered the most. (Karolyi and Martell 2010) investigate the devastated after effects of 75 incidents targeting public firms in the US across eight years and find the varying effects for different states. They discovered greater negative stock price volatility in more affluent and republican states. The authors discovered that human capital destruction in the form of kidnappings especially of company executives resulted in larger negative effect on stock prices than physical damage.

The study of (Nguyen and Enomoto 2009) estimates the economic price of seven global terrorist strikes in the equity exchanges of Pakistan and Iran and finds unfavourable volatility episodes especially in the incidence of 9/11. (Gul, Hussain et al. 2010) observe the terrorism effect in Pakistan and suggested investment in security related institutions by the government.

Acccording to Abbas and Syed (2021), terrorism has generated a new type of risk faced by business, which may be named as security risk or terrorism risk. This risk directly or sometimes indirectly impacts the functions of multinational organizations or their franchise partners, resulting in loss of income or trade opportunities (Warnick 2006). Conventionally, scholars of international business categorize any country related effect on trade under political risk. The security risk is consequentially different. Political risks take place within the regional territory of a nation. As (Weidenbaum 2003) notes security risk has consequences,

in the shape of terrorism cross nationally. (Spich and Grosse 2005) observed that, whereas risks of political type like strikes, extortion and arrogations impact a business directly, the security risk affects both directly and indirectly. Moreover, (Moran 1998) noted that political risk appear gradually through the nation's political system and can be predicted to some extent. Security risk on the other hand takes place randomly and without any previous information or warning.

Behavioral finance has gained stirring pace in elaborating the behavioral facets of investment making decisions. Behavioural finance determines selection under uncertainty. Three main components of behavioral finance are Prospect Theory, remorse revulsion and control on oneself. Each component draws behavioural features of private investor. To divide investors, we apply patterns in attitudes and views introduced in the literature of behavioral finance. According to (Barber and Odean 2001), increased level of trading may be one reason for creating overconfidence among investors. In addition, the individual investors commit ordered mistakes during the process of getting information. Investors' risk revulsion is largely an outcome of visceral reflection as against rational deliberation (LeBaron, Farrelly et al. 1989). Age, gender, earning and schooling affect individual preferences for gains on capital, dividends and aggregate returns (Lewellen, Lease et al. 1977). Overall behavior of individual investor can be forecasted by attributes of lifestyles, risk revulsion, manage orientation and profession (Barnewell 1988). Demographic characteristics and lifestyle determine the selection of investment by individuals (Warren, Stevens et al. 1990).

(Griffin and Tversky 1992) note that, confidence is highest for arduous affairs, for low predicted forecasts and for affairs with insufficient, instant and unambiguous feedback. Investing in stock market is an arduous task with low forecasting power and poor information. The knowledge illusion can take place when individuals are given abundant information to build their prediction or assessment. (Oskamp 1965) investigated that as compared to investor confidence, accuracy of forecast improves more slowly; which means investors feel that data particularly available at internet sources bestows knowledge and the accuracy of the data may be overestimated by them.

One of the major problem investors encounter in the initial period of the twenty first century is, how do stock markets react to immediate, large, rises in uncertainty derived by the possibility of terrorism on international level? This type of uncertainty is hard to quantify as compared to other quantifiable types of uncertainty, individuals usually face, for example risk of shortfalls in corporate earnings, rising rates of inflation or a downturn of economic cycle. (Knight 1921) was the first to note that uncertainty can be distinguished from risk as it is randomness which cannot be quantified with unknowable probabilities, while risk is randomness which can be quantified with knowable probabilities. This is a significant distinction as rise in the

level of investor's uncertainty can be translated into increased perceptions of risk, eventually affecting the pricing mechanism of risky stocks. (Caballero and Krishnamurthy 2008) tried to model the financial crises on uncertainty as described by (Knight 1921) and illustrated that uncertainty shock is one reason resulting in agents, who behave as they would amidst a flight to episode of quality. (Basil and Herr 2006) elucidate through numerous theoretical analyses, the effect of uncertainty as defined by (Knight 1921) on stock markets. According to him, an agent's behavior regarding ambiguity has a critical role in determining asset price and choice of portfolio. (Easley and O'Hara 2010) demonstrate the significant role of ambiguity and uncertainty in finding the distinct structure of stock markets.

Even though it is possible to quantify most of the probabilities regarding possible future forms of the economy, the impact of uncertainty on stock prices and structure of the market exist. The rising possibility of international terrorist activity in the early stages of the twenty first century can be viewed as a worldwide rise in uncertainty presented by (Knight 1921). It is important to note that how higher uncertainty impact systematic and non-systematic risks which in turn can affect prices of assets and the relationship between risk and return. The recent change of terrorism from initially a national phenomenon to a global difficulty makes it problematic for investors in diversifying some of the risks on an international level. In addition, the capacity of investors to assess the financial effect of future incident is harshly tested under this circumstance. However, the investors should still strive to manage the exposure of portfolio to systematic risk by judicious allocation of asset or using hedging instruments.

Additional research that focused on specific businesses have been administered. Some research observed the effect of terrorist activities on banking business and financial sector firms. (Ito and Lee 2005) studied terrorism impact on airlines industry. Tourism has been the subject of (Dimanche (2004).) study. (Kunreuther, Michel-Kerjan et al. 2003) and (Kleindorfer 2004) explored the impact of terrorism on international supply chain. Several studies for example, (Chopra and Sodhi 2004), (Fabbri 2005) and (Sheffi and Rice Jr 2005) have recommended for achieving competitive advantage by alleviating risks and improving resilience despite terrorism. (Kotabe 2005) states that terrorism is a typical phenomenon in geopolitical life and a worthwhile issue, for international business academics to conduct scholarly inquiry. All these studies highlight how terrorist activities have affected firms across regional borders. (Suder 2004) explored the association between terrorist activities and the global business environment. The effect of terrorism on flows of foreign direct investment has been the topic of research by (Abadie and Gardeazabal 2008). (Czinkota, Knight et al. 2004) and (Li, Tallman et al. 2005) studied how companies operations and progress are impacted by terrorism. (Czinkota, Knight et al. 2005) work

on international marketing implications of terrorism. (Spich and Grosse 2005) looked at the effect of risks and regulations related to security on global competitiveness.

Research Methodology

This paper studies the impact of Peshawar incident and other major terrorist attacks on Stock prices. This study uses structured approach of grounded theory by (Corbin and Strauss 1990) and (Strauss and Corbin 1998). The classic Grounded Theory comprises of an amalgamated set of conceptual hypotheses comprehensively developed to create an inductive theory about a substantial field. As Grounded Theory is based on data, its constructs do not face the problem of accuracy that plagued the other Qualitative Data Analysis methods. Data has been collected primarily through interviews. First categories of information are formed and then the data is reassembled through systematically relating the categories in the form of a visual model. The theory developed around the central category or the central phenomenon: feelings of insecurity among investors. Factors causing this phenomenon are past experiences of the consequences of major attacks. The article relates the theoretical model back to the literature on this topic.

This research places value on (Fitzgibbons 2002) ideas regarding investor behaviour. Athol Fitzgibbons argues that Keynes's epistemology, formally laid out in A Treatise on Probability, is put to work with adaptations in The General Theory.

Whereas A Treatise on Probability expounded the possibility of rational decisions, The General Theory argued that the instability of capitalism arose from irrational decision in the capital markets. Once again irrational meant a 'failure to think systematically' and not a 'failure to maximize'; in fact investors were irrational when they maximized in the absence of full information. Investors often relied on 'conventions' to paper the gaps in their knowledge, and in particular they typically adopted the convention that the present situation would continue into the future.

(Fitzgibbons 2002) notes that, Keynes later emphasized on the arbitrariness of investment decisions in stock markets, the shakiness of market customs and the role of animal spirits. (Fitzgibbons 2002) acknowledges the link between Keynes's epistemology and his political philosophy and calls it 'the Third Way'.

Participants

Interviews are conducted from eight male participants, who are investors and experts closely involved in trading activities of stock market. Three are active investors of stock market, one runs a private institute in Zamzama, one is a head of brokerage firm and three are involved in different businesses. All the interviewees are engaged in the

trading of shares for more than ten years in Stock Exchanges. The research questions focus on understanding how individuals experience the process and identifying the steps in the process. After initially exploring these issues, more detailed questions were asked from the participants, which assisted in shaping the axial codes, questions like what was the main reason of their reaction to the terrorist attack news? What contributed to this phenomenon to happen? What strategies were adopted during the process? What were the consequences?

Procedure

Four of the participants were contacted, one backed out later. Two of the respondents were acquainted through a friend who further provided the details of all the other participants. Interview protocol was mailed to all the participants and with the exclusion of one, appointment was made for an interview with all of them. The purpose of the study was discussed in detail with the interested participants and their valued suggestions were taken into account regarding interview questions.

Each of the eight investors participated in a fifteen to twenty minutes in depth, open ended interview, during which two major questions were asked: "What were your feelings, when you heard about the news of major terrorist incidents," and "What has been the impact on stock prices of these incidents." All the interviews were audio recorded and listened to three or four times while transcribing process. The websites of Dawn Newspaper and Pakistan Stock Exchange were used as secondary sources of data and valuable information was extracted from these resources. All of the audiotapes were transcribed verbatim and the data output was sent to the participants for verification.

Data Analysis
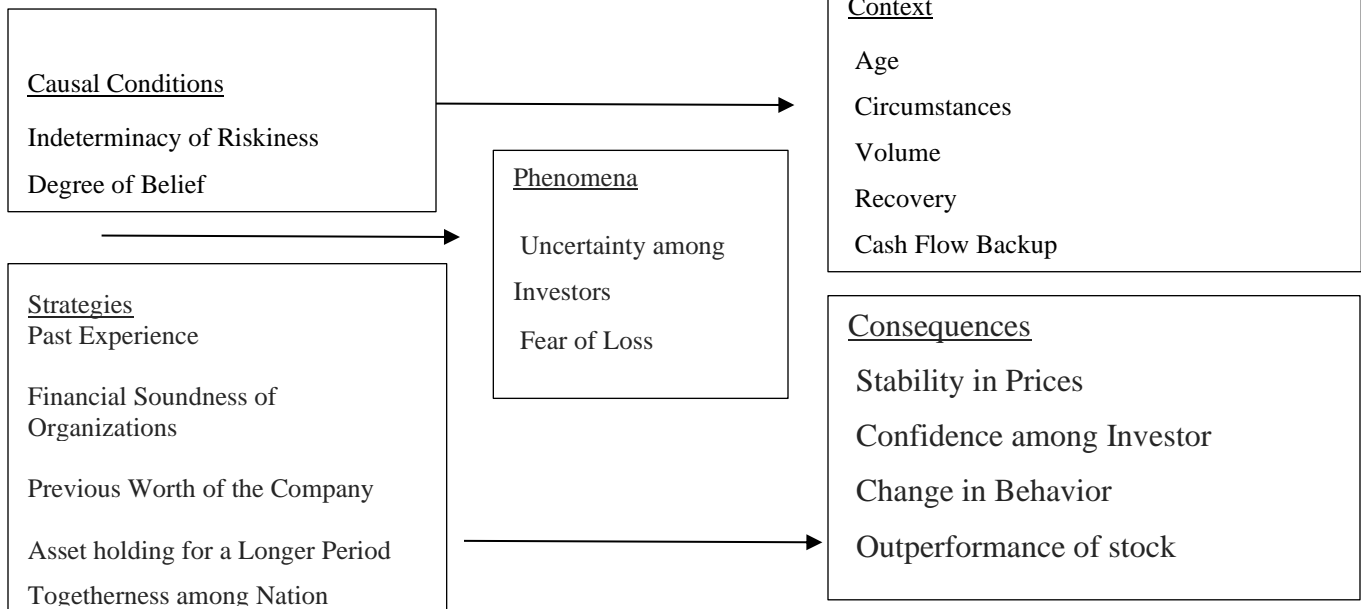
In the open coding, text is examined for prominent categories of information. (Corbin and Strauss 1990) described open coding as that which "fractures the data and allows one to identify some categories, their properties and dimensional locations" (p. 97). Then these categories are saturated using constant comparison approach until new information does not provide further insight. In the next stage central phenomenon is recognized by exploring the interrelationship of categories, called axial coding. A conditional matrix is created at this stage. The final step, then, is selective coding, in which the model is selected and propositions (or hypotheses) are developed. Writing down ideas throughout the process of open, axial and selective coding called memoing helped to evolve a theory.

Data Analysis and Results

The emerging model for change in the behaviour of investors at the happening of Peshawar School Massacre evolved from present research is presented in the flow chart below.

Contribute Conditions of Phenomena

Two kinds of contribute conditions emerged from the data, which eventually headed to certain phenomenological experiences associated with uncertainty among investors when a major terrorist event strikes leading to decline in stock prices. These are indeterminacy of riskiness and degree of belief. Degree of belief varies with age, information, past experiences and traditional concept of volatility in stock market.
Fig. 1

Causal Conditions

Indeterminacy of Riskiness

Degree of Belief

Strategies
Past Experience

Financial Soundness of Organizations

Previous Worth of the Company

Asset holding for a Longer Period

Togetherness among Nation

Phenomena

Uncertainty among Investors

Fear of Loss

Context

Age

Circumstances

Volume

Recovery

Cash Flow Backup

Consequences

Stability in Prices

Confidence among Investor

Change in Behavior

Outperformance of stock

Usman (all names used are pseudonyms) shared his feelings regarding indeterminacy of riskiness, "There are no specific guidelines for subscription related to my investment in riskier assets or safe assets but due to lack of availability of stock information I prefer to invest in less riskier ventures." He further asserted that, "Every major terrorist incident affects economy and it also affects stock market and other financial markets. As stock market is very volatile so I feel that such incidents can create huge amounts of loss for me so I always try to hold stocks for shorter time period."

One aged investor, Mr. Shaukat incurred tremendous loss when General Pervaiz Musharraf released his position and thought that he was too old to bear any major losses and shift his investments to long term shares. On the other hand one young investor Faraz Soomro has seen many elderly investors investing in risky shares because they are experienced and have personal attitude towards investing in risky stock. So, degree of belief varies from investor to investor.

Phenomena Resulting from Indeterminacy of Riskiness and Degree of Belief

Contributive conditions resulted in two core categories of subjective phenomena described by the respondents, uncertainty among the investors and fear of loss. Most, but not all, of the participants experienced uncertainty about the future returns and fear of loss when a major terrorist incident stroke. Higher idiosyncratic uncertainty or larger dissension on the market wide signal insinuate a greater association of beliefs, a firmer co-occurrence of stock returns and a significant correlation risk premium produced by the satisfactory risk sharing endogeneity among investors.

As Mustafa quotes when he heard the news of assassination of former Prime Minister Benazir Bhutto and was certain that the stock market would definitely crash because the event had a power to inspire helplessness and fear, "The uncertainty prevailed at macro level and every new piece of information changed the variance of our own belief over the time." Throughout the data others echoed his words. Usman provided an exemplar of the core categories by describing his reaction to major terrorist events.

Those were really sad news and as an investor it greatly affect my investment decision because it create uncertainty in the economy and that is one reason I always investment in less riskier assets and if I ever invest in stock I always look for financially stable organizations as I feel financially strong organization will be able to bear the shocks of economy to a certain extent.

Not only did Usman experience uncertainty, but her fear of loss shaped all his forthcoming decisions.

Context in Which Recovery and Coping Strategies Developed

Strategies for recovery and coping were developed in response to uncertainty among investors regarding future events and fear of loss. These strategies were influenced by certain contextual markers linked to the causal conditions especially the degree of belief and the resultant phenomena. These contextual markers included, age, circumstances, volume, recovery and cash flow backup.

As Yousuf Farooq commented, "Diversification in my portfolio can increase with my age. Now I've very carefully selected four or five stocks in my portfolio. Dividend yield related things can add to my portfolio with age." Almost all the participants' investments are indexed by circumstances keeping in view the uncertain economic conditions of Pakistan. Trading volume varies with the level of uncertainty and from investor to investor. Hope to recovery engages trader in the same firm for long time periods as Mr. Shaukat reported that individuals who incurred losses in General Pervaiz Musharraf's regime have been holding their stocks in the hope of recovery. Investors' confidence develops readily with cash flow back ups and morale to invest declines with diminishing backups.

Intervening Conditions Affecting Recovery and Coping Strategies

There were also intervening conditions in addition to context that helped in changing investor behavior towards major terrorist incidents. Intervening conditions included the role of specialized people, brokers, fund managers and government regulations. Mustafa stated that he gained good profit by keeping in touch with the specialized people and listening to their advice for taking investment decisions. "In touch with Initial Public Offering IPO's and banks has really given me good profit because they know the market and they know which company gives good profits."

Fayaz and Shaukat reported that government has set lower and upper cap after the last crash of Pakistan Stock Exchange, which sets a limit of five percent that is, the stock prices can rise or fall by five percent at a time and not more or less than that.

Strategies for Recovery and Coping with Impact of Terrorist Attack on Stock Prices

The strategies developed for coping with the overarching phenomena are past experience, financial soundness of organizations, previous worth of the company, asset holding for a longer period and togetherness among nation. The first strategy used by participants to reduce uncertainty was to revive past experiences. At the time of Peshawar School Massacre the anxiety was lower as compared to other major

incidents because the people who panicked at the time of other major terrorist events incurred losses. Yousuf Farooq explained, "Since 1991, Benazir Bhutto government dismissed twice; Nawaz Shareef government faced dismissal two times; history witnessed, event of nuclear blast; there was Kargal attack and all major terrorist attacks. Despite all these major instances, stock market is growing pretty steadily and the market has grown from 1000 points to 31,000 points."

Financial soundness and previous worth of the company matter a lot when major terrorist incidents strike, as these firms can absorb the shocks easily. The economic condition is risky in Pakistan, especially in Karachi, the behavior of all the participants of this study gradually changed towards risk aversion to cope with the feelings of uncertainty and fear of loss. Mustafa elaborated,

To avoid risk I go for the long term investment and wait for increase in the prices of my shares. When the prices increase, I sell the stock. I do not invest in daily stocks and the impact of terrorism is not on the long term investments for a long time. These kind of terrorist attacks only affect for a few days and after a few days the market stables and the stock start rising up.

Mr. Shaukat said," We didn't panic at the time of Peshawar incident because the nation was united against terrorism on this occasion. So many young children got killed. Everyone with kind heart was crying. That incident was really hurting."

Consequences of Strategies for Recovery and Coping

There were consequences of strategies adopted by investors helping them to change their behavior in face of major terrorist events. Except one investor Usman, all the others didn't panic on this occasion. His account of feelings at Peshawar school event is, "My feelings changed as it was a really big incident of Pakistan's economy. For example as finance student and investor of stock market I quickly sold my shares as I thought that stock exchange might crash and I invested my funds in term deposit bank account." Overall there was stability in stock prices, improved confidence of investors and outperforming of shares.

Asim Cheema lives in Karachi, but has his investments in Lahore and Islamabad Stock market. He stated that little and mix trends on money markets were observed as a consequence of Peshawar attack. According to other investors, as the attack was in Peshawar and they thought it would not affect regular business activities in Karachi so they didn't fear any major loss.

Conclusion

Terrorist attacks increase uncertainty which reduce investments and deflect Foreign Direct Investment (FDI). This type of uncertainty is hard to quantify as compared to other quantifiable types of uncertainty, individuals usually

face, for example risk of shortfalls in corporate earnings, rising rates of inflation or a downturn of economic cycle. Two kinds of contributive conditions emerged from the data, which eventually headed to certain phenomenological experiences associated with uncertainty among investors when a major terrorist event strikes leading to decline in stock prices. These are indeterminacy of riskiness and degree of belief. There were also intervening conditions in addition to context that helped in changing investor behavior towards major terrorist incidents. Intervening conditions included the role of specialized people, brokers, fund managers and government regulations. The study further identifies the theory that explains the change process related to stock returns in case of Peshawar School Massacre. (Bryman 2002) have criticized the use of grounded theory as "an approving bumper sticker" invoked to confer academic respectability rather than as a helpful description of the strategy used in analysis. (Melia 1999) claims that most researchers use a pragmatic variant, whereby they can achieve added value by identifying new themes from the data alongside those that could have been anticipated from the outset. All too often, however, the tension between these two different sorts of insight and its potential to illuminate the topic being studied is not explored in the presentation of findings. Uncertainty is interpreted as personal belief degree. Uncertain logic is a methodology for calculating the truth values of uncertain propositions via uncertain set theory.

Although the guiding literature is filled with descriptions of the outcomes of the impact of terrorist attacks on stock prices, most research focused on quantifying the resultant uncertainty among investors, instead of finding the causes and consequences of the phenomena. This study is distinctive in examining the coping strategies from the perspective of investors who experienced the impact on stock prices of the occurrence of terrorist attacks. A theoretical model of the coping strategies of eight participants has been developed through qualitative data analysis by engaging the participants to ensure that the model reflects their personal constructs. As is frequently the case in qualitative study, the outcomes of this analysis are peculiar to the specific investigator, participants and context of this study. This research studies investor behaviour only but it points to the need for a theory of terrorist behaviour that can be taken with available data and used to further the understanding of terrorism risk.

Conflict of interest: The authors declare that they have no competing interests in this study.

References

Abadie, A. and J. Gardeazabal (2003). "The economic costs of conflict: A case study of the Basque Country." American economic review 93(1): 113-132.

Abadie, A. and J. Gardeazabal (2008). "Terrorism and the world economy." European economic review 52(1): 1-27.

Abbas, S. A., & Syed, S. H. (2021). Sectarian terrorism in Pakistan: Causes, impact and remedies. Journal of Policy Modeling, 43(2), 350-361.

Abiden, M. Z. U., Zhilong, H., & Mubeen, R. (2019). War on terrorism in Pakistan: Challenges and strategic steps. Вестник Российского университета дружбы народов. Серия: Международные отношения, 19(4), 625-631.

Alam, A. (2013). "Terrorism and stock market development: causality evidence from Pakistan." Journal of Financial Crime.

Arin, K. P., et al. (2008). "The price of terror: The effects of terrorism on stock market returns and volatility." Economics Letters 101(3): 164-167.

Asal, V., et al. (2008). "Consenting to a child's decision to join a jihad: Insights from a survey of militant families in Pakistan." Studies in Conflict & Terrorism 31(11): 973-994.

Barber, B. M. and T. Odean (2001). "The internet and the investor." Journal of Economic Perspectives 15(1): 41-54.

Barnewell, M. M. (1988). "EXAMINING THE PSYCHOLOGICAL TRAITS OF PASSIVE AND ACTIVE AFFLUENT INVESTORS." Journal of Financial Planning 1(2).

Barth, J. R., et al. (2006). "Economic impacts of global terrorism: From Munich to Bali." Available at SSRN 892033.

Basil, D. Z. and P. M. Herr (2006). "Attitudinal balance and cause-related marketing: An empirical application of balance theory." Journal of Consumer Psychology 16(4): 391-403.

Bryman, A. a. B., R.G. (2002). Reflections on qualitative data analysis. Analyzing qualitative data, . A. a. B. Bryman, R.G. (Eds.), . London, , Routledge, : 230-240. .

Buesa, M., et al. (2007). "The Economic Cost of March 11: Measuring the Direct Economic Cost of the Terrorist Attack on March 11, 2004 in Madrid." Terrorism and Political Violence 19(4): 489-509.

Caballero, R. J. and A. Krishnamurthy (2008). "Collective risk management in a flight to quality episode." The Journal of Finance 63(5): 2195-2230.

Chen, A. H. and T. F. Siems (2007). The effects of terrorism on global capital markets. The Economic Analysis of Terrorism, Routledge: 99-122.

Chopra, S. and M. Sodhi (2004). "Supply-chain breakdown." MIT Sloan management review 46(1): 53-61.

Corbin, J. M. and A. Strauss (1990). "Grounded theory research: Procedures, canons, and evaluative criteria." Qualitative sociology 13(1): 3-21.

Czinkota, M., et al. (2004). "Terrorism and international business: conceptual foundations." Terrorism and the international business environment: The security-business nexus: 43-57.

Czinkota, M. R., et al. (2005). "Positioning terrorism in management and marketing: research propositions." Journal of International Management 11(4): 581-604.

DeCook, J. R., & Kelly, M. (2022). Interrogating the "incel menace": assessing the threat of male supremacy in terrorism studies. Critical Studies on Terrorism, 15(3), 706-726.

Dimanche, F. ((2004).). "The tourism sector". Terrorism and the International Business Environment: The Security–Business Nexus,. G. Suder. Nottingham, , Edward Elgar, : 157-170. .

Drakos, K. (2010). "Terrorism activity, investor sentiment, and stock returns." Review of financial economics 19(3): 128-135.

Easley, D. and M. O'Hara (2010). "Liquidity and valuation in an uncertain world." Journal of Financial Economics 97(1): 1-11.

Eldor, R. and R. Melnick (2007). Financial markets and terrorism. The Economic Analysis of Terrorism, Routledge: 137-161.

Fabbri, W. a. T., N. (2005). Law Enforcement-Related Agencies. Medical Response to Terrorism: Preparedness and Clinical Practice. D. C. E. Keyes, Lippincott Williams & Wilkins, : 385.

Fitzgibbons, A. (2002). The microeconomic foundations of Keynesian economics Keynes, Uncertainty and the Global Economy: Beyond Keynes,. S. C. D. a. J. H. (Ed.). Cheltenham, United Kingdom, Edward Elgar, : 6. .

Griffin, D. and A. Tversky (1992). "The weighing of evidence and the determinants of confidence." Cognitive psychology 24(3): 411-435.

Gul, T. G., et al. (2010). "Impact of terrorism on financial markets of Pakistan (2006-2008)."

Gunaratna, R. and A. Nielsen (2008). "Al Qaeda in the Tribal Areas of Pakistan and beyond." Studies in Conflict & Terrorism 31(9): 775-807.

Iqbal, J. (2012). Stock market in Pakistan: An overview. Journal of Emerging Market Finance, 11(1), 61–91.

Ito, H. and D. Lee (2005). "Assessing the impact of the September 11 terrorist attacks on US airline demand." Journal of economics and business 57(1): 75-95.

Johnston, R. B. and O. M. Nedelescu (2006). "The impact of terrorism on financial markets." Journal of Financial Crime.

Karolyi, G. A. (2006). "The consequences of terrorism for financial markets: what do we know?" Available at SSRN 904398.

Karolyi, G. A. and R. Martell (2010). "Terrorism and the Stock Market." International Review of Applied Financial Issues & Economics 2(2).

Khokhar, M. (2007). "Reforming militant madaris in Pakistan." Studies in Conflict & Terrorism 30(4): 353-365.

Kleindorfer, P. R., Van Wassenhove, L. (2004). Risk management for global supply chains: an overview The Alliance on Globalizing. H. a. K. Gatignon, J. (Ed.). Cambridge, Massachusetts. , Cambridge University Press,.

Knight, F. H. (1921). Risk, uncertainty and profit, Houghton Mifflin.

Kotabe, M. (2005). "Global security risks and international competitiveness." Journal of International Management 11(4): 453-455.

Kunreuther, H., et al. (2003). Assessing, managing, and financing extreme events: Dealing with terrorism, National Bureau of Economic Research Cambridge, Mass., USA.

LeBaron, D., et al. (1989). "Facilitating a dialogue on risk: A questionnaire approach." Financial Analysts Journal 45(3): 19-24.

Lewellen, W. G., et al. (1977). "Patterns of investment strategy and behavior among individual investors." The Journal of Business 50(3): 296-333.

Li, S., et al. (2005). "Developing the eclectic paradigm as a model of global strategy: An application to the impact of the Sep. 11 terrorist attacks on MNE performance levels." Journal of International Management 11(4): 479-496.

Melia, J. (1999). "Holes, haecceitism and two conceptions of determinism." The British journal for the philosophy of science: 639-664

Moran, C. C. (1998). "Stress and emergency work experience: a non-linear relationship." Disaster Prevention and Management: An International Journal.

Napoleoni, L. (2003). Modern jihad: tracing the dollars behind the terror networks, Pluto Press.

Nguyen, A. P. and C. E. Enomoto (2009). "Acts of terrorism and their impacts on stock index returns and volatility: The cases of the Karachi and Tehran stock exchanges." International Business & Economics Research Journal (IBER) 8(12).

Oskamp, S. (1965). "Overconfidence in case-study judgments." Journal of consulting psychology 29(3): 261.

Sheffi, Y. and J. B. Rice Jr (2005). "A supply chain view of the resilient enterprise." MIT Sloan management review 47(1): 41.

Spich, R. and R. Grosse (2005). "How does homeland security affect US firms' international competitiveness?" Journal of International Management 11(4): 457-478.

Strauss, A. and J. Corbin (1998). "Basics of qualitative research techniques."

Suder, G. G. (2004). Terrorism and the international business environment: the security-business nexus, Edward Elgar Publishing.

Warnick, R. B. (2006). Back to the Future: Trends in Northeast Recreation, Tourism and Future Research A Founders' Forum Presentation. In: Peden, John G.; Schuster, Rudy M., comps., eds. Proceedings of the 2005 northeastern recreation research symposium; 2005 April 10-12; Bolton Landing, NY. Gen. Tech. Rep. NE-341. Newtown Square, PA: US Forest Service, Northeastern Research Station: 110-118.

Warren, W. E., et al. (1990). "Using demographic and lifestyle analysis to segment individual investors." Financial Analysts Journal 46(2): 74-77.

Weidenbaum, M. (2003). "The role of business in fighting terrorism." Business Horizons 46(3): 6-6.

Zakaria, M., et al. (2019). "Effect of terrorism on economic growth in Pakistan: an empirical analysis." Economic research-Ekonomska istraživanja 32(1): 1794-1812.

RESEARCH ARTICLE

Agency Theory: Its Discourse and Practice in the Selected Public-Sectors

Benegrew Walie Mengiste[1]

[1]Amhara management Institute, Bahi Dar, Ethiopia

Abstract

This research investigates the discourse and practice of Agency Theory (AT) in the selected public-sectors of Ethiopia. The Agency Theory is assumed to bring about efficiency and accountability of the public-sector by adopting a contract and Pay-for-Performance (PFP) scheme; however, performance and citizens-cum-customers satiety was not improved as envisioned. Thus, to investigate this problem, the researcher has employed the mixed methods approach and, hence the cross-sectional design, where data has been collected at a point in time from selected public-sector employees to respond to the research problem and questions. To gather data, measurement scales like Binary and Likert Scales and research instruments like Self-Completion Questionnaires (SCQ), Semi-Structured Interviews (SSI), and Secondary Sources (SS) have been carried out at different tiers of government. The results indicated that the complex contexts like "Diverse Objectives, Public Values, and Diffuse Power" in the selected public-sectors required the co-existence of different initiatives and approaches based on what works and what does not work standard. Therefore, this study recommended adopting the home-grown reform system: The needed competencies that include the Traditional Public Administration (TPA), New Public Management (NPM), or Public Service Motivation (PSM) in the selected public-sectors based on the fitting contexts could increase the likelihood of performance enhancement.

Keywords: Agency Theory; Contract; Home-Grown Reform; Information Asymmetry; Management Autonomy.

Introduction

Background of the Study

From the early 21st century to the present, confirming enhanced performance, better service delivery, and good governance of a country is becoming a critical concern in the Public-Sector (PS). Then, what is the PS? So, to define the PS, it is all right to identify who undertakes the economic activities dominantly. The economy was traditionally divided into two discrete segments: the public and the private. The PS represented activities controlled by the government; while the private-sector was occupied largely by the private and voluntary-sector (Aulich, Halligan, and Nutley, 2001). Thus, the part of the economy that is scrutinized by the government represents the PS, though the boundary between the two sectors sometimes becomes blurred for hybridity (Benegrew, 2021; Filc and Cohen, 2015).

In the 1980s and the 1990s, the PS adopted the NPM-driven reforms at different times and in different countries to bring about change in the PS. In the TPA, the employees are paid the same regardless of the performance results. Poor performers of public employees do not miss their incomes or lose their job like the private-sector (Hughes,

2003; Osborne, 2007). Thus, the personnel administration was based on jobs for life; it was not easier to transfer and sack staff members, who were inefficient in their performance. However, the NPM practice in the PS has changed the scenario by creating the performance appraisal and later the performance management that focuses on employees' development, and hence, employees are paid and incentivized based on performance results and excellence called "Pay-for-Performance."

Besides, in the TPA, political leaders often have inadequate knowledge of lower-level functions to allow managerial oversight; and efficiency and accountability were never easy to ensure when inadequate knowledge was reinforced by poor measures of performance. Therefore, one of the reasons for the adoption of NPM is the perceived failure of the system for efficiency and accountability of performance under the TPA (Bovens, 2007; Ferlie et al., 2015; Hughes, 2003).

Conversely, after the emergence of NPM-driven reform, incentives come to be emphasized as instruments of efficiency and performance enhancement. Thus, incentive mechanisms are considered positive reinforcements in the PS to encourage the type of behavior and attitude that is

required to take place. Incentive mechanisms are the ways and means to ensure "Agency Theory" through individual assessment and PFP. Thus, the Agency Theory (AT) or the principal-Agent Theory (PAT) is defined as the contract agreement between the principal and the agent primarily for information exchange and management autonomy for two basic consequences of outcomes: incentives and sanctions (Benegrew, 2020; Røiseland et al., 2015). Accordingly, the contract scheme is the best feature that sets the paradigm shift from TPA to NPM (Lane, 2000), since the public service duty is guided through a variety of contracts that devote to results.

Hence, the reform measures have also changed the way we treat work experiences. It has lowered the value given to work experiences just by adopting the principle of universality, i.e., there is no difference for an individual who works in a vehicle workshop or in a university. It also affords less value for an individual who performs the same activity for many years; consequently, it has lowered the weight given to the length of service years for advancement, especially for those who worked in similar positions (Klikauer, 2015; Pollitt, 2011).

However, the practice of incentives as a means of employees' motivation is not universal across countries, especially in shortage economies. That means, for example, the theory of Public Service Motivation (PSM) is based on motivation and drive "To do good for others as well as for the society" (Benegrew, 2021; Horton as cited in Vandenabeele et al., 2018) instead of maximizing self-interest through incentive mechanisms. The PSM is about yearning to serve the society and the public interest, not yearning for incentives.

Accordingly, there are knowledge gaps in the area, i.e., there are dissimilar theoretical outlooks that interplay in the PS. The NPM-driven reform measures not only lack country-specific contexts, for example, it lacks to consider unique characteristics in the PS like "Diverse Objectives, Public Values, Political Meddling, Budget Austerity, and Diffuse Power, but also to consider other approaches and initiatives that can co-exist abreast (Benegrew, 2021).

Finally, NPM is supposed to ensure performance enhancement in the PS through the application of generic skills and theories (Doran, 2016; Hood, 1991; Osborne & Gaebler, 1992; Pollitt, 2011). Hence, different theories like the Public-Choice Theory (PCT), the Agency Theory (AT), and the Transaction-Cost Theory (TCT) contributed much to the emergence and practice of Managerialism in the PS (Walsh; Boston et al., as cited in Hughes, 2003). This research study has tried to discern the answers to doubts as to why the AT does not ensure better performance in the PS. So, to investigate it, this is a mixed methods study that has carried out to investigate the discourse and practice of the AT (PAT) in the selected Ethiopian public-sectors at Federal, Amhara National Regional State (ANRS) including zonal levels (next to state level), and Addis Ababa (AA) city administration at city government and sub-city levels.

Research Objectives and Questions

• Research Objective: To investigate the practical application of Agency Theory in the selected public-sectors.
• Research Questions: Have the incentive and sanction mechanisms of the Agency Theory been applied universally for performance enhancement in the selected public-sectors?
Thus, a Null Hypothesis (H_0) has been developed, which is born out of the above research question (Creswell, 2014). It is constructed on the assumption that two attributes are the same or the H_o assumes "no significant discrepancy between the two items" (Creswell, 2014). The statistical analysis has considered the computed values of the binary logistic regression and if the alpha (P) value is lower than the level of significance (0.05), then the H_o will be rejected which means there is a difference between the two attributes. Thus, the following H_o statements have been developed based on the above research question:
• H_{0A}. Emphasis on either "Individual Interest or Organizational Interest" doesn't lead to performance enhancement.
• H_{0B}. Emphasis on either "Extrinsic Benefit or Intrinsic Benefit" doesn't lead to performance enhancement.
• H_{0C}. Emphasis on either "Waiting for Instruction or Taking Initiative" doesn't lead to performance enhancement.

Literature Review

Some of the outcomes of NPM are of employees' motivation and accountability. The employees' motivation and accountability have been structured in AT (PAT) arrangement relying on incentives and sanctions (Benegrew, 2021; Ferlie et al., 2015; Røiseland et al., 2015). With the advent of NPM reform, incentives become the center of emphasis as an instrument of accountability and control (Toonen; Maclagan as cited in Røiseland et al., 2015) that centers on performance, output, outcome, and auditing. Similarly, the AT (PAT) is one element within what is often called the "New institutional economics" or "Rational Choice Theory" (Pollitt, 2003) that focus on individual interest, extrinsic benefits (financial), and taking initiatives (Benegrew, 2021; Bovens, 2007; Lane, 2000; Røiseland et al., 2015).
The Agency Theory (AT) is first "proposed by Stephen Ross and Barry Mitnick" (Mitnick, 2019); and it is an organizational economic approach to motivation within organizations. Whereas, others argued that the AT theory that the PS is supposed to provide public duties to the users is popular with economists, like Klitgaard, 1988 and 1991 as well Rose-Ackerman, 1975 and 1978 (Mishra &

Abdullahi, 2020). The AT (PAT) assumes that actors in the PS have personal ambitions and self-interests that need to be controlled contrary to the TPA that largely relies on trust (Røiseland et al., 2015). The TPA assumption is about public ethos, while under the AT (PAT), the "Principal" needs information about the action taken by the "Agent" and the "Principal" sets incentives and sanctions based on performance management.
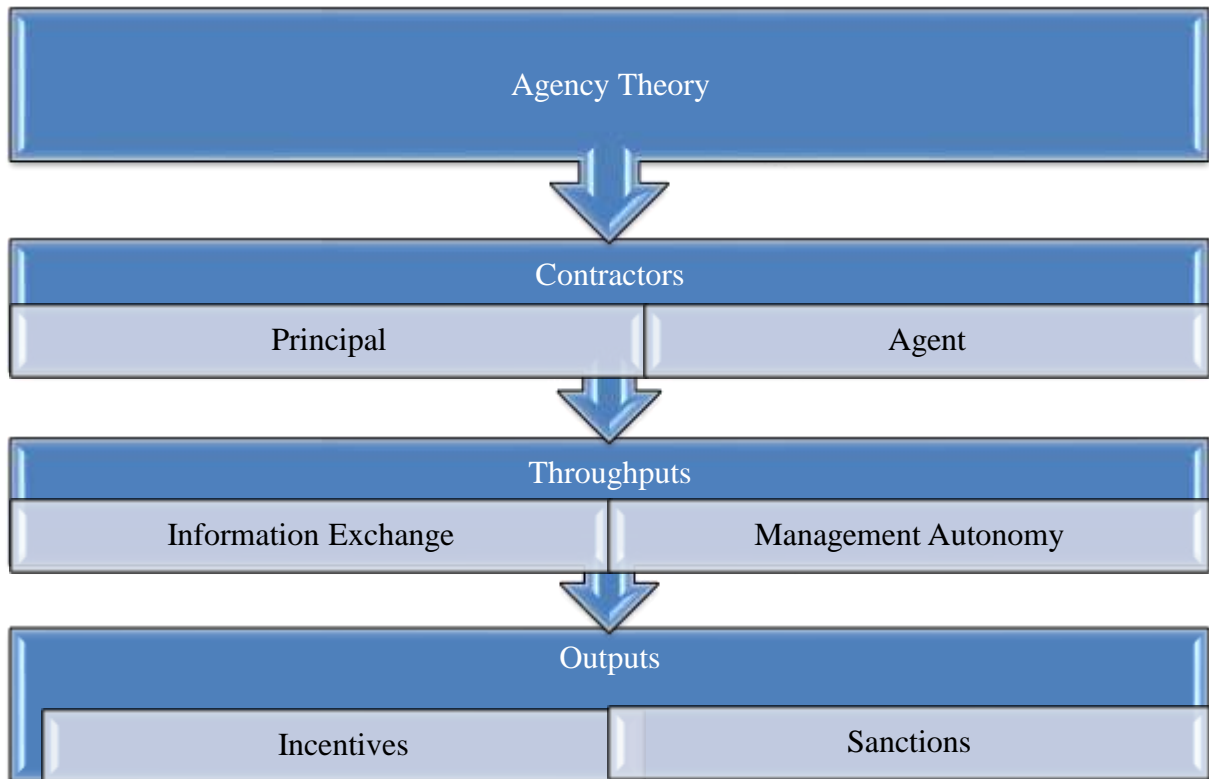

Figure 2 1: *Agency Theory*
Source: Benegrew, 2020

The AT (PAT) has been applied to the PS, especially concerning its accountability. First, it was established for the private-sector to compare the disparity between the goals of managers (agents) and shareholders (principals) (Bovens, 2007; Hughes, 2003). The application of AT (PAT) to the PS is not as simple and leads to disturbing comparisons in accountability when compared to the private-sector. Accountability in the PS is difficult to determine who the principals are, or detect what they want. The principals and the owners of the PS are the entire public, but its interests are so diffuse that effective control of the agents (Public Managers or Actors) is unlikely to be successful. It is challenging for the agents to detect what each principal might want them to do in any instance. Besides, there is no influence from the profit motive, no market in shares, and nothing comparable to bankruptcy (Bovens, 2007; Hughes, 2003).

Second, other authors also revealed that in AT (PAT); the commonly asked question is who the principal is and who the agent is. In a formal authority relationship, the parliament members confer political authority to the council of ministers collectively or to the prime minister individually who distributes responsibilities among the council of ministers (Strøm, 2000). For example, is a member of the council of ministers a Principal, or an Agent, or both? Here, voters want the parliament (principals) to do what they voted them to do (construct infrastructures, quality education, lower taxes, better health service, etc.). The Members of the Parliament are the voters' agents, but simultaneously Members of the Parliament are themselves in the position of principals' vis-à-vis executive governments. Ministers are (theoretically) agents of the legislature, who may be removed (by impeachment, votes of no confidence, etc.,) if they are seen to veer too far off the agreed track. But ministers, like Members of the Parliament, are simultaneously both an agent and a principal.

There are also similar challenges in the Principal-Agent rapport. The parliament may delegate authority to the prime minister. The prime minister as an agent is required to account himself/herself regularly for his/her performance in office. This is often the case with the political type of accountability (Strom as cited in the Bovens, 2007). However, in other accountability types, the

Principal-Agent does not satisfy the relationship, for example, courts are not the principal in cases of legal accountability or professional associations are not the principal under the circumstances of professional accountability.

As it is elucidated above, government ministers are principals to all those public managers who are supposed to carry out the government's policies and programes. The public managers, as agents of political leaders, are motivated by self-interest (such as higher salaries, higher status, more interesting work, or just an easier time) as far as the system allows them to. The problem the minister's face is a lack of day-to-day monitoring of the agents due to other issues. Furthermore, in many situations, it is in practice, hardly feasible for the Minister as well as for members of the parliament to have full information about the subject as the Agent has, and in turn, an information asymmetry, shirking, and conflict of interest may occur.

Thus, the conflict of interest is one of the constraints in the Agency Theory i.e., the elected political representatives of the parliament are at the same time members of the parliament (as Principal) and a minister, a bureau head, or administrator (as an agent) at federal, state, and zonal levels respectively. Therefore, a minister, who is a member of a parliament, may not take action and make decisions independently on his/her interest and his/her ministry. Besides, it is possible to argue that political accountability is not limited to the delegation of authority to ministers through citizens to the members of the parliament.

Practically, it is hardly possible for the minister to know the subject matter equally to the agent. One way of addressing these problems is to try to fix the relationship between the principal and agent through a contract. The contract can stipulate the targets the agent must work to achieve, the information she or he must provide, and the incentives and penalties that good performance/bad performance will attract from the principal. Hence, accountability is a connection between the principal and the agent, in which the agent must justify his or her conduct, the principal can ask questions and pass judgment, and the agent may face consequences (Bovens, 2007; Hughes, 2003; Pollitt, 2003).

Empirical Studies

Studies about AT theory were conducted in other countries. For example, an empirical study has been carried off to evaluate whether executive pay is consistent with the AT theory; and the result has indicated that the AT theory considerations play a part in setting executive payments (Garden, 1994). A conceptual study has also been carried off to critically review the AT theory, and this study has also indicated that the AT theory seems unrealistic to support the idea that individuals and organizations are primarily motivated by financial gain, rather individuals can also be motivated by status, their community, and their need for self-fulfillment (Zogning, 2017). Besides, an empirical study has been carried off to assess AT theory to training and development outcomes; and this study result has indicated that much of the theoretical implications of the AT theory are transferable to human resource development (Baker, 2019).

However, according to the present knowledge of the researcher, there is no study so far conducted in the country on the effectiveness of AT related to performance enhancement in the PS. Yet, there are studies (IEG, 2008; Markos, 2013) conducted about reform measures in the country; though those studies don't differentiate which is what. That means the empirical studies don't take the AT features distinctly and without it, the empirical studies cannot measure its application and effectiveness in the PS. Therefore, this study throws in much to fill up the knowledge gap, since there were no empirical studies so far which has been done in Ethiopia that measured the effects of AT theory on performance enhancement.

Research Method

To respond to this research problem, the mixed method has been employed to address the effects of AT (PAT) in the selected public-sectors (PSs). In alignment with it, the convergent parallel design has been applied, and dominantly the quantitative data and minorly the qualitative data have been collected almost in parallel, analyzed independently, and then merged in at the interpretation stage of this study. The investigator has applied both probability & non-probability techniques to collect data on the attitudes, opinions, and perceptions of public-employees. The purposive sampling has been applied to select an "Area Cluster" (Federal, ANRS, and AA city administration); it has been also applied to select the population of the study (3830) based on study areas, the purposive sampling has been applied to select the target population of 2862. The random sampling has been addressed to select informants and the theoretical saturation has been addressed to select a number of interviewees (10), and the researcher has taken Krejcie & Morgan (1970) for sample determination of 349.

The quantitative data has been gathered using the Self-Completion Questionnaires (SCQs) and the qualitative part of the data has been gathered using Semi-Structured Interviews (SSI) and Secondary Data Sources, and it has been analyzed using binary logistic regression and ATLAS.ti for quantitative and qualitative data respectively. The selection of public-sectors using the purposive sampling technique was anchored in the following reasons: First, it is based on "Extra Proximity" to the reform measure, i.e., sectors which are both executive and regulatory organizations for the reform measures were included. Second, it is based on the empirical research result (special emphasis is given to a research result that indicated negativity or failed pronouncement of

Managerialism) (Dunleavy et al., 2006). Finally, others are selected based on the trafficking of customers and its developmental role in the economy. Accordingly, the Civil Service, Trade and Industry, and Innovation and Technology Sectors have been taken to be the study areas.

The researcher took informants who work not less than six months in the PS to demonstrate their opinion. Besides, informants who achieved a diploma and above level of education qualification were included in the target population and each of the respondents had an equal value. Since employees with fewer than six-month experience and below diploma levels of qualifications may not have enough information and knowledge to share with the researcher about the problem at hand. The questionnaire is self-administered by the researcher and a self-completion process was carried out by the respondents; hence 328 (94%) of the respondents completed the questionnaire and it was included in the dataset. However, 16 (5%) questionnaires were not returned and 5 (1%) of the questionnaires filled were incomplete, so these questionnaires were discarded based on quality control and ten interviewees have been included in the qualitative study based on the principle of theoretical saturation.

Besides, the completion of all the SCQs in the survey was voluntary.

Results and Discussion

Results

- H_{0A}. Emphasis on either "Individual Interest or Organizational Interest" doesn't lead to performance enhancement.

As shown in table 4.1 below, the Binary Logistic Regression (BLR) has been used to examine whether there are differences in treatment probability between the binary outcomes. According to block 1 of the model summary, Cox & Snell R Square and Nagelkerke R Square have values of 0.000 and 0.000 respectively. The Hosmer and Lemeshow Chi-square Test have a value of 0.000 with a DF value of 0. The variable values in the equation have also a significant value of 0.001, which is below the p-value of 0.05. Therefore, the null hypothesis is rejected with an overall percentage of 67.1, who opted for "Organizational Interest." That means there is a difference in the treatment ability between the binary outcomes.

Table 4.1: *Binary logistics for Organizational vs. Individual Interest*

1.	1. Model Summary		
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	415.669[a]	.000	.000

a. Estimation completed at iteration # 3, since parameter estimates changed by less than .001.

2.	2. Hosmer and Lemeshow Test		
Step	Chi-square	df	Sig.
1	1.000	0	.

3.	3. Classification Table[a]		Organizational interest	Individual interest	Percentage Correct
Step 1	whose interest should come first	Organizational interest	220	0	100.0
		Individual interest	108	0	.0
	Overall Percentage				67.1

a. The cut value is .500

4.	4. Variables in the Equation							95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Gender(1)	-.027	.253	.011	1	.916	.974	.593	1.600
	Constant	-.693	.210	10.890	1	.001	.500		

a. Variable(s) entered in step 1: Gender.

Source: Own field survey, 2020

- H_{0B}. Emphasis on either "Extrinsic Benefit or Intrinsic Benefit" doesn't lead to performance enhancement.

The BLR has been used to examine whether there are differences in treatment ability between the binary outcomes. According to the block 1 of the model summary, Cox & Snell R Square and Nagelkerke R Square have values of 0.006 and 0.008 respectively. The Hosmer and Lemeshow Chi-square Test have a value of 0.000 with a DF value of 0. The variable values in the equation have also a significant value of 0.000, which is below the p-value of 0.05. Therefore, the null hypothesis is rejected with an overall percentage of 67.4, who opted for "Intrinsic Benefits." That means there is a difference in the treatment ability between the binary outcomes.

- H_{0C}. Emphasis on either "Waiting for Instruction or Taking Initiative" doesn't lead to performance enhancement.

Similarly, the BLR has also been used to examine whether there are differences of treatment ability between the binary outcomes of "Waiting for Supervisor's Instruction or Taking Initiative." According to the block 1 of the model summary, Cox & Snell R Square and Nagelkerke R Square have values of 0.001for both measures. The Hosmer and Lemeshow Chi-square Test have a value of 0.000 with a DF value of 1. The variable values in the equation have also a significant value of 0.000, which is below the p-value of 0.05. Therefore, the null hypothesis is rejected with an overall percentage of 69.5, who opted for "Taking Initiatives." That means there is a difference in the treatment ability between the binary outcomes.

Besides, the SCQ results also indicated that the practice of incentivization, which is the best pillar of competition, is less likely supported by respondents of employees with 45.7 percent of a positive reply. Similarly, the qualitative data analysis also indicated that in the case of ethics and accountability standard, which are mostly cascaded from the strategy document, some of its components don't go along with the agency theory (MoPSHRD, 2017), rather the PS promoted like the Motto of "Serving the public is an honor!" The contents of the 12 Principles of ethics slung almost in most of the PS walls have taken "Honor" as an important attribute of the civil servants. So, the employees are motivated due to an honor not to the benefits gained from employment like the market philosophy of incentives or opportunisms.

Therefore, the ethical codes like serving the public interest, confidentiality, and respecting the law are among the 12 Principles of public servants' ethics standard. These ethical codes showed mixed results. On the one hand, the characteristics of the TPA like confidentiality are practiced; on the other hand, the characteristics of other initiatives or approaches like the PSM, i.e., the principle of serving the public interest are also included and practiced.

Finally, the accountability practice of the AT (PAT) in the PS has changed the scenario of the TPA by creating performance management and measurement that incentivizes or penalizes based on performance results. But, one significant issue that emerges from this study is

that poor performers most likely were not penalized or sanctioned based on performance management and measurement scheme. Though, the public employees are being evaluated on their performance according to the contracts signed, there has been little direct consequence, especially for poor performers. The results indicated that seven people out of ten people believe that there is no sanction for poor performers in the selected public-sectors.

Discussion

The complex contexts like "Diverse Objectives, Public Values, and Diffuse Power" in the selected PS required "Pride in Serving the Public" as in the PSM. It is also important to heed a lesson from the weaknesses of the "One-best-way of doing work (enunciated by Frederick W. Taylor, 1911) of the TPA model. Therefore, the PS needs to consider "Eclecticism and Contexts," i.e., the co-existence, the dependency, and the home-grown reform approaches to thrive and evolve. Although the Managerialism themes have been recognized as key causal factors for public-sector performance enhancement, they cannot solve by themselves issues that are associated with complex public policies and programes; thus, succeeding PS reforms required the co-existence of different management approaches called eclecticism.

Therefore, adopting a home-grown civil service reform that considers national contexts and values as part and parcel of the institutional building is of paramount importance. Indeed, the home-grown civil service reform targets the root cause of the problem and delineates home-grown reform trajectories. Accordingly, the study indicated for low levels of competence that knowledge, attitude, and skill aren't at the required level; resource insufficiency; lack of true accountability that best performers are less recognized and poor performers are less accountable for their accomplishments; and less innovation and creativity in the selected public-sectors. Therefore, these home-grown problems highly require home-grown reform measures as part and parcel of institutional building.

Besides, regarding countries' contexts, this study explored selected initiatives of NPM in the four Asian regions to analyze cross-country variations to identify the causes that subsidize the problems of the PS reforms. The four countries were taken as the assessment cases for a comparative study, i.e., Malaysia, Singapore, Bangladesh, and Sri Lanka. The study considered that the extent and scope of the contextual factors are different among those Asian countries. So, it tried to examine how the contextual elements, like "political history, party politics, state tradition, macroeconomic considerations, the role of International Development Agencies, and civil society" impact the outcome of NPM initiatives in those countries. The study indicated that contextual factors subsidized a foundational role in which Singapore and Malaysia are in

line with it and are relatively successful to Bangladesh and Sri Lanka (Samaratunge, Alam, & Teicher, 2008).

Consequently, studies (both qualitative and quantitative data types) indicated the insufficiency of resources at all government tiers (Benegrew, 2021; Markos, 2013), though the local or Woreda level is the most affected by deficiencies of resources and equipment (Mo Ibrahim Foundation [MIF], 2018, p. 64) in which insufficient resource can destroy the genuine competition, the conducive working milieu, and the motivation of employees in the PS. For example, the lack of developed or vibrant private firms, the lack of a developed competition system, and the lack of a developed judicial system in the PS have caused negatively the efficiency of the AT (PAT).

… It is the real situation on the ground in developing and poor countries. There was a meeting with the prime minister of Ethiopia in the House of People's Representative with the Members of Parliament in October 17, 2018. The question raised by the Members of Parliament was salary increment of the civil servants across the country. The prime minister is convinced with the salary increment issue raised by the members as well as the civil servants. However, the Prime Minister explained that the country has faced budget pressure due to displacement of citizens in different places of the country and hence, salary increment will not be considered this year. Rather, the Premier requested and emphasized civil servants to be more committed and motivated than ever before to curve the problems the country has faced. (Benegrew, 2020, p. 14)

Similarly, contrary to some authors (Buchanan, 1975; Mueller, 2004; Niskanen, 1971; UPSC, 2017), the holistic approach is less likely to be misleading. For example, in this study, respondents were provided to choose a single option between two outcomes, i.e., individual interest or organizational interest. Almost 7 respondents out of 10 people preferred organizational interest to individual interest (Benegrew, 2020). However, respondents were provided with the binary outcomes to choose either waiting for instructions or taking initiative. Then, taking an initiative type of culture has got much of the respondents' attention.

This empirical study did not support the assumptions of the universality of AT or PAT. It showed that the public employees are motivated by organizational interest contrary to individual interest, especially skewed to the PSM that stems from an idea of providing public service based on motivation and drives to do good for others or the society (Benegrew, 2020; Horton as cited in Vandenabeele et al., 2018; O'Flynn, 2007). The PSM takes the notion that serving the public is a badge of honor by itself. This is the slogan (serving the public is an honor), where it is placed in most of the Ethiopian public-sector. This indicated organizational interest and human relations

as facts of organizational life beside to individual interest and economic benefits.

The other important aspect of Managerialism characteristic is autonomy aka management discretion. The AT (PAT) that underpins the NPM thought focuses on management autonomy. For example, the change of emphasis from ex-ante to the ex-post assessment of results was to create discretionary room for managers. It is recalled that the TPA or the Bureaucratic model diminishes creativity by reducing room for discretionary action (Barzelay as cited in Feeney & DeHart-Davis, 2009) and suppressing the consideration of novel ideas (NPR; NCSLPS as cited in Feeney & DeHart-Davis, 2009).

Therefore, did the transformation from ex-ante orientation to ex-post orientation or from process orientation to result orientation occur in the selected public-sectors? The transformation seemed blurred with less emphasis to result-based civil service. Besides, the SCQ and the qualitative data also indicated "Input" as part of the Capacity Building component instead of adding in "Result" as a component. Accordingly, this incomplete shift could be associated with less management autonomy and less room for discretionary actions. In addition, there has no mechanism so far adopted to monitor the abuse of discretionary authority (just in case) in the selected public-sectors. This study also showed that poor performers and omission of a task are less likely to be accountable. Subsequently, some of the characteristics like being answerable to actions and omissions and entrepreneurial government (doing business and taking risks) are in question.

Finally, under AT (PAT) management discretion is central, i.e., the relationship between the "Principal" and the "Agent" is fixed through a contract. That means the contract lays down the targets like giving information to the principal as to what, how, and when to achieve the results and in turn, the agent is given the autonomy to achieve the results. Therefore, the achievement of result is the central point of AT (PAT) that necessitated management autonomy to practice. However, there was also inconsistency between the principal and the agent in designing, signing, and implementing a contract agreement. With the absence of setting targets for results in the contract agreement, one party will not be able to enforce the other party about the consequences, especially regarding the penalties.

Conclusion and Recommendation

Conclusion

Indeed, the AT theory assumes that individuals and organizations are primarily motivated by financial gain, individual interest and initiative, greater discretion, incentive-based motivation, and centrality of results or

outcomes (Hughes, 2003; Hood, 1991; McCourt, 2013; O'Flynn, 2007; Osborne & Gaebler, 1992; Pollitt, 1993; Robinson, 2015; Rosenbloom et al., 2009; Zogning, 2017). Accordingly, the incentive-based scheme (contract scheme), the centrality of results, and hence management autonomy are not realized as envisioned in the selected public-sectors. Regarding the incentive mechanism, it has been taken as positive reinforcement under NPM to encourage the type of behavior and attitude that is required to take place in the PS (Hughes, 2003; McCourt, 2013; O'Flynn, 2007; Osborne & Gaebler, 1992; Pollitt, 1993; Robinson, 2015).

However, this study indicated mixed practices in the selected PSs, which means it is undertaking both organizational and individual interest-based civil service; the practice of intrinsic and extrinsic benefits, as well the application of waiting for supervisors' instruction and taking initiative in the selected PSs. Accordingly, these features indicated for the required competency frameworks to be different approaches like the TPA, NPM, and PSM adjusted to socio-economic and political realities. Hence, the centrality of results in the selected public-sectors can be ensured by making results as the key factor in planning, reporting, evaluations, rewards, and accountability activities.

In this study, it is also indicated that the contract agreement was not binding as in the AT (PAT) assumptions. The contracting parties also did not discharge their accountability as specified in the contract agreement. Besides, it is indicated that there is information asymmetry, i.e., it is hardly possible for the legislative body to know the performances of the executive body. Similarly, the executive body is unable to know the performances of the private-sector in the case of outsourcing and other forms of privatized public services. So, it is unlikely for the council of ministers to know the performances of each ministry and for the minister to know the subject matter equally like the agent, even among the executive body workforces. Then, it is relatively less likely to measure, manage, and evaluate performances of the executive body and it is also hardly possible to conclude that the system of check and balance works properly; being more deficient to ensure accountability, especially in the case of poor performers.

Furthermore, the study indicated unwritten restrictions to outsource core functions and regaining the already outsourced ancillary services like sanitation, security, and greening services (Benegrew, 2020). Under Managerialism, public-sector services can be delivered in many ways (Shah, 2005). The "Alternatives" range from complete public provision to complete private provision or a mix of these two ways. The rationale for plurality of service provision is that the private-sector, where there is competition, is more efficient and effective than the monopoly in the PS.

One way of addressing these problems is to try to fix the relationship between the principal (legislative body) and the agent (executive body) through a contract. The contract can stipulate the targets the agent must work to achieve, the information she or he must provide to the principal, and the incentives and penalties which good performance/bad performance will attract from the principal (Pollitt, 2003). However, the lack of a developed or vibrant private firm, the lack of a developed competition system, and the lack of a developed judicial system in the PS have likely hindered the efficiency of PAT in the selected public-sectors (Benegrew, 2020).

Finally, as suggestions for future research, this study indicated a creative and an initiative type of PS and a stable type of PS that accepts the existing rules and procedures, which is against the backdrop of the AT theory, both are undertaken in the selected PSs. The initiative is more likely a departure from conformity to rule-breaking. Thus, more research is needed into the creativity and initiative issue in that to what extent it conforms or varies with the issue of taking initiative (NPM) and accepting the rules (TPA); and how to measure it to ensure performance enhancement.

Recommendation

The analysis and results indicated mixed findings. Accordingly, this study recommended the adoption of home-grown reform measures within the context. For example, the "Economic Model of Man" and the "Humanistic Model of Man" are the two models of organizational realities, which indicated recognizing the potencies and preserving what works or else rejecting what does not work. Similarly, the best way of aligning organizational and individual interest and other issues is through adopting the home-grown reform system: The needed competencies (TPA, NPM, or PSM) in the selected public-sectors. The study indicated that there is no one best model or initiative for the PS efficiency, effectiveness, and accountability. The PS needs to practice different approaches based on "What works and what doesn't" standard.

Consequently, the co-existence and application of different approaches in the selected public-sectors founded on the fitting contexts is an organizational reality. Hence, this study indicated that poor performers may not be penalized as the AT proposes; rather the PS may grant them training and development opportunities to enhance their competence and best performers may not be incentivized, since the public value concept supports the idea that being an employee of this sector is an incentive to them in itself. Yet, the information exchange and management autonomy part of the AT theory is basic for the PS to bring about performance enhancement.

Obviously, the PS needs to pass through continuous improvement. Hence, the home-grown problems require

home-grown solutions drawn on socio-economic cultures. The home-grown civil service reform addresses the root cause of the problem and delineates the country's reform trajectories. It assists in appropriately realizing the problems, constraints, and success stories of the PS. It can also enable the PS to back up with relevant theories and forward solutions that best fit the environment. For example, some of the problems in the selected public-sectors include a lack of competence in how to develop, monitor, and evaluate the contract scheme. Then, the reform measures should take into account to solve these practical problems at hand. It should focus on context-based reform measures. The public-sector should develop its own strategic development approach through home-grown civil service reform for successful performance achievements.

References

Akoglu, H. (2018). User's guide to correlation coefficients. *Turkish journal of emergency medicine*, 18(3), 91-93.

Aulich, C., Halligan, J., & Nutley, S. (Eds.). (2001). Australian handbook of public sector management. Allen & Unwin.

Baker, R. M. (2019). The agency of the principal–agent relationship: An opportunity for HRD. *Advances in Developing Human Resources*, *21*(3), 303-318.

Benegrew, W. M. (2021). The effects of Managerialism on performance enhancement: The case of selected public-sectors in Ethiopia. [Unpublished doctoral dissertation]. Ethiopian Civil Service University.

Benegrew, W. M. (2020). Public Choice Theory: Its Application and Challenges in Public-Sector. *International Journal of African and Asian Studies*, *Vol.*66, 2020. https://DOI: 10.7176/JAAS/66-02

Bovens, M. (2007). Analyzing and assessing accountability: A conceptual framework 1. *European law journal*, 13(4), 447-468.

Buchanan, J. M. (1975). The Limits of Liberty: Between Anarchy and Leviathan, University of Chicago Press, Chicago.

Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approach. (4th ed.). Sage, Los Angeles.

Doran, C. (2016). Managerialism: an ideology and its evolution. *International Journal of Management, Knowledge and Learning*, (1), 81-97.

Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). New public management is dead-long live digital-era governance. *Journal of public administration research and theory*, 16(3), 467-494.

Feeney, M. K., & DeHart-Davis, L. (2009). Bureaucracy and public employee behavior: A case of local government. *Review of Public Personnel Administration*, 29(4), 311-326.

Ferlie, E., Lynn, L. E., & Pollitt, C. (Eds.). (2015). The Oxford handbook of public management (e-book). Oxford University Press, USA.

Filc, D., & Cohen, N. (2015). Blurring the boundaries public and private health care services as an alternative explanation for the emergence of black medicine: The Israeli case. Health econ. pol'y & l., 10, 293.

Garen, J. E. (1994). Executive compensation and principal-agent theory. *Journal of political economy*, *102*(6), 1175-1199.

Hood, C. (1991). A public management for all seasons? Public administration, 69(1), 3-19.

Hughes, O. E. (2003). Public management and administration: an introduction (3rd ed.). Palgrave macmillan.

Independent Evaluation Group [IEG]. (2008). Decentralization in client countries: An evaluation of World Bank support, 1990-2007.

Klikauer, T. (2015). What is Managerialism? Critical Sociology, 41(7-8), 1103-1119.

Lane, J. E. (2000). New public management. Taylor & Francis US.

Markos, S. (2013). Civil service reform in Ethiopia: Issues, lessons, and future directions. *International Journal of Public Administration*, 36(4), 235-247.

McCourt, W. (2013). Models of public service reform: A problem-solving approach. The World Bank.

Ministry of Public Service and Human Resource Development. (2017). National public service human resource statistics. Addis Ababa, Ethiopia.

Mishra, S. S., & Abdullahi, M. M. (2020). Citizens' Satisfaction with Government in a Highly Corrupt Public Life: Role of Trust in Democracy and Civil Society Participation in Somalia. *Journal of Asian and African Studies*, *55*(5), 762-779.

Mitnick, B. M. (2019). Origin of the theory of agency: an account by one of the theory's originators. *Available at SSRN 1020378*.

Mo Ibrahim Foundation. (2018). Ibrahim forum report: Public service in Africa.

Mueller, D. C. (2004). Public choice: an introduction. In the encyclopedia of public choice (pp. 32-48).Springer, Boston, MA.

Niskanen, W. A. (1971). Bureaucracy and representative government, Aldine-Atherton, Chicago.

O'Flynn, J. (2007). From new public management to public value: Paradigmatic change and managerial implications. *Australian journal of public administration*, 66(3), 353-366.

Osborne, D. (2007). Reinventing government: What a difference a strategy makes? 7th global forum on reinventing government trust in government 26-29 June 2007, Vienna, Austria.

Osborne, D., & Gaebler, T. (1992). Reinventing Government: How the entrepreneurial spirit is transforming the public sector.

Pollitt, C. (2011). 30 years of public management reforms: Has there been a pattern. World Banks consultation exercise. Obtenido el, 10.

Pollitt, C. (2003). The Essential Public Manager, Public policy and management, Maidenhead: Open University Press.

Pollitt, C. (1993). Managerialism and the public services: Cuts or cultural change in the 1990s? Blackwell Business.

Robinson, M. (2015). From old public administration to the new public service: Implications for public sector reform in developing countries.

Røiseland, A., Pierre, J., & Gustavsen, A. (2015). Accountability by professionalism or Managerialism? Exploring attitudes among Swedish and Norwegian local government leaders.

International Journal of Public Administration, 38(10), 689-700.

Rosenbloom, D. H., Kravchuk, R.S., & Clerkin, R. M. (2009). Public administration: Understanding management, politics, and law (7thed.). McGraw-Hill. New York.

Samaratunge, R., Alam, Q., & Teicher, J. (2008). The new public management reforms in Asia: A comparison of South and Southeast Asian countries. *International Review of Administrative Sciences*, 74(1), 25-46.

Strøm, K. (2000). Delegation and accountability in parliamentary democracies. *European journal of political research,* 37(3), 261-290.

UPSC. (2017). Public choice theory for public administration [YouTube]. Retrieved October 13, 2018 from https://www.youtube.com/watch?v=kWHfbEQxsVU

Vandenabeele, W., Ritz, A., & Neumann, O. (2018). Public service motivation: State of the art and conceptual cleanup. Palgrave Macmillan, London.

Zogning, F. (2017). Agency theory: A critical review. *European journal of business and management*, 9(2), 1-8.

RESEARCH ARTICLE

Impact of capital adequacy, liquidity management and credit risk management on economic performance: Evidence from Pakistan

Shahid Hussain[1]*, Abdul Rasheed[1]

[1]Department of Management Sciences, Khwaja Fareed University of Engineering and Information Technology, Rahim Yar Khan, Pakistan, 64200

Corresponding Author: Shahid Hussain; shahid.randhawa@live.com

Abstract

The main purpose of this study is to evaluate the relationship between capital adequacy, liquidity management, credit risk management, and financial performance with moderating role of bank ownership. This study used secondary data approach and collect 10 years panel data from 2012-2021 from the financial statements of the 15 Pakistani commercial banks. State software is used to analyze the data. Results show that there is a positive relationship between capital adequacy, liquidity management, credit risk management, and financial performance. But, on the other hand, there is not a strong moderating effect of bank ownership. The outcomes have been nearly the equal in all samples indicating that foreign ownership is not an important component of profitability in the quarter and as such a public coverage to encourage the presence of foreign banks might also, therefore, no longer yield any advantage in terms of financial institution profitability. This result is robust to the use of regulate- local measures whilst endogeneity concerns are controlled for. Furthermore, the findings imply that the stock liquidity issue of profits management is undoubtedly associated with future stock returns in Chinese corporations. Our outcomes reveal that the inventory liquidity thing of quick- termism in managerial choices performs a crucial role in figuring out destiny inventory returns.

Keywords: Capital Adequacy; Liquidity Management; Credit Risk Management; financial performance; Bank ownership; Pakistani Banks

Introduction

A bank's monetary value is a measure of capital adequacy, which is the amount of money a bank controls that is expressed as a percentage of its net assets (Abdul Karim et al., 2014). The Strategic Guidelines for Capital Adequacy set out three key factors that determine the adequacy of bank financing. These are; credit risks associated with exposure, market risk arising from banking activities and the form and quality of money held in support of this disclosure (Louati et al., 2015). Due to the strong influence of banks on the economy, plentiful pressure has been placed on the regulation and instruction of the banking sector (Okoye et al., 2017). The poor performance of the banking sector has created many problems, such as insufficient funds, high unemployment assets and so on, which have exacerbated the everyday stress in the banking sector and the collapse of other banks (Kosmidou et al., 2020). Bank adequacy plays a vital role in maintaining the security and stability of banking systems and the security of banking systems in general. It represents a protective gateway that prevents any unexpected losses that banks may incur, which may amount to bank deposits, given the banks' unpredictable performance (Chen et al., 2021).

Liquidity status is essential in reducing the expected or unexpected balance sheet movements and providing targeted growth resources (Huang & Ho, 2020). This type of risk is critical to meeting loan requests and having sufficient debt repayment that can be guaranteed when and at what amount in bank stability. Therefore, it covers a necessary type of risk in commercial banks. The ban on interest-based lending to banks has limited the ability of these banks to manage their financial positions as efficiently as regular banks. At the same time, the lack of sufficient Sharia-compliant tools such as secondary market debt instruments makes this type of risk critical for banks (Chen et al., 2021). In addition, banks are obliged to provide cash for liquidity if they need to invest only a tiny portion of the extensive portfolio of their accounts due to their flexible currency under the short-term sharia law (Vitkova et al., 2021). Credit risk management has become an integral part of the lending process in the banking business. Credit risk and potential cash flows or receivables from a failure of the

obligation to meet the terms of any contract with the bank (Ekinci & Poyraz, 2019). When banks offer loans, they expect customers to pay the principal and interest on the agreed date. The credit bureau is said to be effective if your principal and interest payment is timely in accordance with the agreed payment terms. NPLs represent bank loans that feel that it is possible to lose money due to NPLs. They are also classified as substandard, sceptical or lost. The bank debt in the lost category prevents the bank from achieving its intended objectives (Yuan et al., 2022).

The division of ownership and control reveals a potential conflict of interest between shareholders and executives who may have the opportunity to increase their wealth at the expense of shareholders. Therefore, business governance has emerged as a need to curb the opportunistic behaviour of senior management. The board of directors is regarded as the cornerstone of business governance; its role is to monitor and direct executives to act on behalf of shareholders (Habtoor, 2020; Ju & Zhao, 2009; Sadaa et al., 2020; ur Rehman et al., 2021). Among the characteristics of the board, the composition of the board is an indicator of the quality of the board as independent directors, directors, and non-executive directors, the dominant features of the board influencing its efficiency, as well as its robust performance (Ali et al., 2019).

Researchers have described capital adequacy, liquidity management, and credit risk management in many ways to embody environmental dimensions, dating with the society, ethical and voluntary dimensions, socio-economic factors, and relationships with numerous stakeholders (İncekara & Çetinkaya, 2019). There are various definitions of capital adequacies, liquidity management, and credit risk management. In essence, capital adequacies, liquidity management, and credit risk management may be considered as an extension of companies' efforts to ensure robust company governance using sound enterprise practices (Ekinci & Poyraz, 2019).

The objectives of the study are: (1) To investigate the impact of capital adequacy on the financial performance of Pakistani banks. (2) To investigate the impact of liquidity management on the financial performance of Pakistani banks. (3) To investigate the impact of credit risk management on the financial performance of Pakistani banks. (4) To investigate the impact of bank ownership on credit risk management and financial performance of Pakistani banks.

Literature Review

The following segment of the chapter formerly starts with the literature relevant to the study to realize the reasons that may impact financial performance. We discuss the variable used in the fundamental research.

Capital adequacy and financial performance

Capital adequacy, with the aid of definition, is visible as a quantum of the fund. Financial organizations must plan to maintain their enterprise's prudent behaviour (Sadaa et al., 2020). Bank's capital consequently relies upon some things along with the financial institution's length, the extent of credit in its operations, the market forces, the lending coverage, its control capabilities, and its portfolio (assets and coins) (Kabir Hassan et al., 2016). Capital adequacy also can see as a per cent ratio of a financial institution's primary capital to its (loan and investments), used as a degree of its economic power and balance (Ali et al., 2021; Ju & Zhao, 2009; Ongore & Kusa, 2013). Economic overall financial performance is an individual degree of how a firm uses assets from its primary mode of industry and makes sales (Kenneth, 2013). It's computing the result of a corporation's recommendations and procedure financial terms. A banking institution's financial performance is typically assessed by employing factor which includes income prepared within the year's route and the capacity to maintain it. The addition of subdivisions to the grass source, net earnings of the financial group, computerization of its numerous branches, internet income afterwards tariff proportion, the share of credit score rating in local loan.(Abdul Karim et al., 2014; Gupta & Kashiramka, 2020; Kosmidou et al., 2020; Munangi & Sibindi, 2020).

Control of capital includes all the picks that should be made if you want to ensure the superior quality of capital instruments. Banks, the various crucial establishments, provide liquidity to the markets (Bulgurcu, 2012). The top-quality degree of capital allotted by using the banks reconsiders the necessary controls imposed via regulators because banks are the maximum closely regulated industry, particularly concerning the capital adequacy requirement. Even though the capital adequacy requirement is ready as the minimum ratio to be accompanied by the banks, a bank can also optimally increase its capital ratios to offer a warranty that it's miles in a stable situation (Çam & Özer, 2022).

Tons of empirical studies focus on the effect of debt on a firm's profitability as a measure of financial performance. Typically, most previous research concluded that firm profitability and capital structure have a negative relationship. Chebbi et al. (2021) compared the capital and ownership structure of manufacturing concerns in Japan and found that there is a negative effect of capital structure on profitability. Kenneth (2013) for the US companies reported the same results (Mizgier et al., 2015) in the G7 members, the evolving countries and China. In their study on Kenyan firms, Lin et al. (2005) showed a significantly negative effect of leverage on return on asset (ROA). More recently, the paper of Muiruri et al. (2015) points out the negative effect of capital structure by using return on assets (ROA), return on equity (ROE) and Tobin's Q as indicators for financial performance in Vietnamese firms. Goel et al. (2015) examined the relation between capital structure and firm performance of SMEs in UK, on manufacturing sector over the period from 1998 to

2008 and concluded that ROA and ROE of these firms are affected negatively by leverage.

In contrast, many other studies and articles show a positive correlation between firm performance and capital structure. For example, ur Rehman et al. (2021) proposed the same pattern in changes in debt and profitability -in which companies that might have a large proportion of debt in capital funding are also highly profitable firms. Vitkova et al. (2021); Yuan et al. (2022) examine US manufacturing corporations and show that all liabilities (current and long-term) have a positive effect on return on equity (ROE).

H1: Capital adequacy positively impacts the financial performance of the banks

Liquidity management and financial performance

Capital controls have been planned to measure economic strategy to restrict market instability. As an illustration, Weber et al. (2010) suggested the practice of an identical worldwide tax on forex dealings. These measures were not explicitly unusual until the 80s (Umoru & Osemwegie, 2016). But, due to the non-stop effort through establishments and the IMF for extra-liberalized emerging markets, the use of capital controls decreased until the Asian disaster (Milcheva et al., 2019). Consequently, despite the talk about the usefulness of capital controls (Okoye et al., 2017), there is a bent on using these measures as a last answer during a financial crisis from a macroeconomic perspective (Ho & Hsu, 2010). For instance, throughout the Asian disaster, Malaysia used capital controls to decrease the results of the catastrophe (Huang & Ho, 2020). Corporations face coins liquidity troubles, which cause problems in manufacturing due to restricted entry to imported raw materials and troubles because of the high debts receivable. Apart from these first-order effects on companies, a difficulty with capital flows additionally influences the inventory market due to reduced market liquidity. As sulieman Alshatti (2015) argues, marketplace liquidity increases after the liberalization of markets and given that liquidity is an indicator of a long-run GDP boom (Lin et al., 2005) it can be asserted that the terrible impact of capital controls on market liquidity have actually to have a terrible impact at the actual economic system.

Our studies consider the impact of stock liquidity on income control, an effect that has been the difficulty of lots of discussion and debate. One view is that liquidity induces managers to interact in short-termism conduct and increases the hazard of a hostile takeover. Liquidity will increase this danger by reducing the transaction costs related to entering and exiting a role. Managers prevent transient inventory undervaluation because undervaluation complements the probability of an adverse takeover (Huang & Ho, 2020). Liquidity can also purpose an accelerated cognizance on quick-time period overall performance as it attracts transient investors. Shares are much less expensive to sell. Higher

liquidity is related to greater use of equity repayment because higher inventory liquidity impounds non-public facts. This applies to performance measurement functions (Chen et al., 2021). Because higher liquidity can grow equity-based total compensation in addition to the profitability of personal trades, it could incentivize managers to enhance their corporations' short-term overall performance (İncekara & Çetinkaya, 2019). Some other view is that higher liquidity can weaken managers' recognition of brief-term performance by using magnifying shareholder tracking. Ample liquidity ends in extra first-rate direct supervision by using shareholders as it lets investors purchase larger blocks of shares at more favourable expenses (Vitkova et al., 2021). Liquidity can also lead to greater excellent oblique monitoring via growing the threat of investor exits because of the lower transaction prices that result from higher liquidity boom traders willing to sell if managerial opportunism is detected (Goel et al., 2015; Heuver & Berndsen, 2022).

H2: Liquidity management positively impacts the financial performance of the banks

Credit risk management and financial performance

CR and financial success of banks Credit against profits is a topic that is frequently discussed in financial books. However, some studies find a positive correlation between CRM and FP of commercial banks, while others find mixed relationships. Previous research shows 11 inconsistent conclusions. Therefore, it is vital to understand the impact of CRM on various performance indicators when banks make decisions about total profitability and risk reduction. Mizgier et al. (2015) conducted a study in Bangladesh "on the impact of credit risk management on the financial performance of Bangladesh commercial banks." Using data from ten banks took seventeen years (2002 to 2018). Researchers have extracted the second data from the bank's annual reports and analyzed it using aggregation, t-tests to find meaningful comparisons, and multiple retrospectives analyses (Chen et al., 2021). Return on assets (ROA) was used to assess financial performance, while capital adequacy ratio (CAR), nonperforming loans (npls), and advance deposit ratio (ADR) were used to determine credit risk." Although NPL and ADR have a negative and evident influence on ROA, NPL has a significantly higher impact on ROA than ADR.

Furthermore, the study indicated that "CAR has a good effect on ROA but is not statistically significant." IT -tests reveal that private commercial banks' ROA, ADR, and CAR were considerably more significant than those of state-owned commercial banks. "According to the study. "the non-performing interest rate (NPL) for private commercial banks is much lower than for state-owned commercial banks." The study proposes a CRM guideline to promote

sustainable profit and growth (Heuver & Berndsen, 2022; Kenneth, 2013; Kosmidou et al., 2020).

Lin et al. (2005)have considered the effect of RM on the FP of financial institutions. The sample contains ten banks and data for seven years from 2000 to 2006. The limitations used for CAR were automatic estimates, bad credit costs, and costs per loan asset, while ROA estimates profits. In addition, a sulieman Alshatti (2015) study conducted in Ethiopia on the effect of CAR on the financial performance of profitable banks, Ali et al. (2019), is directed in Egypt. The researchers found an affirmative connection between Financial Performance and CAR for commercial banks. In addition, a few studies have shown the importance of capital investment in the banking sector. According to a survey by Chebbi et al. (2021), large-scale financial satisfaction is paramount to l banks. He also said profitable banks have a lawful obligation to keep adequate funds. An organization needs to take multiple decisions in the lifetime of the business, and the most basic ones are related to money. These money-related decisions are termed 'Financing Decisions'. The three essential decisions that financial heads need to take are dividends, which are the distribution of profit earned by the organization. The manager's primary concern is whether to retain profit or distribute dividends to shareholders. In his study, the theory used by (Lee et al., 2022) demonstrates that rewards are irrelevant to firm performance. Firms paying large dividends reduce their risk and influence the stock; tips are considered a roadmap for future earnings or profit (Bulgurcu, 2012). Many kinds of research have been conducted to investigate the dividend policy, but the studies are ambiguous on the issue of corporate dividend policy. However, these policies provide strength and are a sign of prosperity for the development of an organization (Çam & Özer, 2022). This research gives emphasis on the dividend and firm performance relationship.

H3: Credit risk management positively impacts the financial performance of the banks

Bank ownership as a moderator

Agency theory indicates that managers' voting rights can grow tracking efficiency while minimizing business agency problems (Sadaa et al., 2020). Preceding research has also stated that control investors generally tend to boost corporation earnings, an excellent way to acquire blessings. Control investors have extra capacity to display a agency's overall performance and align their interests with other shareholders (ur Rehman et al., 2021). Auditors can also extensively lessen the chances of coping with income whilst there is a disproportionate percentage of managerial possession (Habtoor, 2020). A preceding observation noted that administrative control is essential in lowering discretionary blessings and enhancing EQ (Muiruri et al., 2015). A survey by Sadaa et al. (2020) used every day. It popularized least squares to look at the relationship between

managerial ownership and discretionary practices of managers of 63 groups in Jordan in 2014. The outcomes confirmed that control investments significantly improved the first-rate economic reports. Ur Rehman et al. (2021) advised that centred ownership can reduce agency charges by employing growing to track and reducing opportunistic managerial conduct. Consistent with the manage hypothesis, ownership con- centration limits earnings control and improves overall financial performance (Ongore & Kusa, 2013). The examine observed that managing actual income decreases with dominant ownership. But, the organizations with focused possession are a concerned with conflicts of interest between fundamental and minor shareholders and sometimes dispossession of smaller percentage- holders (Ali et al., 2021). Consistent with the expropriation hypothesis, dominant shareholders can also impose their non-public alternatives even supposing they're opposite to minority rights. In step with previous studies (Ali et al., 2019; Ekinci & Poyraz, 2019; Gupta & Kashiramka, 2020), awareness of ownership may lead to inconsistency of records amongst investors, basically in growing international locations where company governance, regulatory laws, and safety of minority shareholder rights are susceptible. In this example, there can be incentives for most important shareholders to make the most these attitudes to achieve their goals and interact in manipulating profits. The evidence of the effect for ownership attention on income control turned into combined.

H4: Bank ownership moderates the role of capital adequacies, liquidity management, credit risk management and financial performance.

Research Methods

Data and Sample Description

Statistics of this study are acquired from the reviewed yearly reports and all instance banks from 2012 to 2021. Data is collected within Pakistan. Data is collected from 15 banks which are existed in Punjab, Pakistan.

Sample Size

The data for this education will come from audited yearly reports and Fitch attached for all sets sampled between 2012 and 2021. The study examined only fifteen commercial banks. Certain banks were omitted from the analysis due to a lack of critical information. The fifteen selected commercial banks in Pakistan represent the country's total number of banks in 2021; however, while there are twenty commercial banks in 2021, the number of banks varies by year due to acquisitions and mergers. The study's commercial banks are based on 2017 data due to the difficulty in obtaining data on which banks have already merged. The twenty chosen banks include twenty publicly
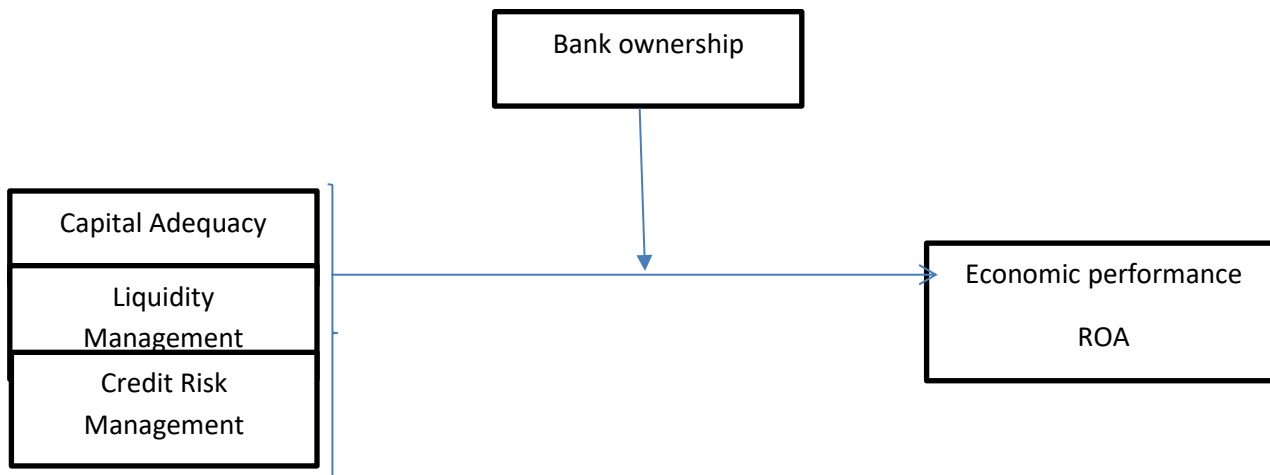
```
                    ┌─────────────────────┐
                    │   Bank ownership    │
                    └─────────────────────┘
```


Fig1. Conceptual framework

traded banks on the PSX. Fifteen banks were selected for data collection using the procedure outlined above. The sample post is more appropriate for individuals who own twenty openly imported banks on the Pakistan Typical Exchange. The panel data study is used to ascertain the investigation's purpose. Milcheva et al. (2019) identify panel data that can account for heterogeneity in data, low-density line polymorphism, and track trends that time-bound data may not provide. To achieve the desired results in this study, a multidisciplinary approach was used. The financial statements of banks are analyzed using descriptive statistics, a standardization matrix, and retrospective models.

Measurement of the variables

Capital adequacy

This observation consists of one (1) unbiased variable: Capital adequacy. Capital adequacy became similarly decomposed
into three components: Liquid Asset Ratio, loan Ratio, and Asset Turnover Ratio. Following ratios and formulas are adapted from (Ekinci & Poyraz, 2019; İncekara & Çetinkaya, 2019). It is determined as the relation of capital to a bank's risk-weighted assets, a measure of a set's money as a fraction of its credit-weighted exposure. It is the minimum capital ratio that a bank must maintain in accordance with regulatory standards. Maintaining a fixed interest rate is required to assess banks' ability to absorb losses and ensure that banks continue to incur acceptable failures in the worst-case scenario (Huang & Ho, 2020). Banks with a high-interest rate calculation rate are generally regarded as low risk and more likely to fulfil their financial responsibilities The higher the ratio, the greater the number of depositors. Are protected and the financial system is

stable. Due to the fact that banks with sufficient capital can absorb possible losses and so avoid bankruptcy, this can be viewed as an increase in profitability. Most studies, however, recommend that CAR be stored in banks to avoid potential losses. As a result, a favourable correlation between capital sufficiency and profitability is anticipated. The CAR equation is calculated as follows.

3.1.1 Liquid Asset Ratio
This ratio is calculated through:

$$CAR = \frac{Capital}{Risk\ Weighted\ Assets}$$

3.1.2 Loan Ratios
Provisions for credit losses enable banks to recognize the estimated loss on an individual loan portfolio or portfolios in their income statements as events unfold, and loans are cancelled, even before the actual loss can be calculated with clarity and certainty. In other words, when banks anticipate future loan portfolio losses during recessions, loan loss reserves should result in a direct charge against earnings over the business cycle's ups and downs. Banks can utilize these reserves when expected credit losses occur, absorbing losses without endangering precious capital and allowing banks to continue growing the credit supply of the economy. Ideally, loan loss provisions should reflect the bank's management's assessment of the quality of the loan portfolio it holds, implying that they should be able to cover the full range of expected credit losses if necessary (Duggan, 2009). On the other hand, accounting frameworks permit the creation of a provision for losses that have already occurred at the financial statement's date of publication, which does not adequately address the concept of "expected losses" (Lee, 2009).

Loan ratios are examined by using the following formula:

$$LLP = \frac{(Pretax\ Income + Loan\ Loss\ Provision}{Net\ Charge - offs}$$

Liquidity Management

There are three main ratios to calculate the liquidity of the firms that are; current ratio, quick ratio, and cash ratio. To calculate the values of these ratios, we employed the following formulas. Ratios formulas are adapted from (Ali et al., 2019; Chebbi et al., 2021).

Liquidity in banks refers to their ability to manage sufficient funds in a short period, either by increasing their liability or by converting their assets to cash at a reasonable cost (İncekara & Çetinkaya, 2019). It refers to a bank's ability to finance all short-term liabilities as they mature. Loans, withdrawals from deposits, investment obligations, and debts accrual are all short-term obligations (Vitkova et al., 2021). It is quantified the ratio of recognition facilities to whole deposits (Goel et al., 2015). LR is the risk that a bank will suffer a loss due to its incapability to encounter its financing needs (Heuver & Berndsen, 2022). A high liquidity ratio indicates that the bank has significant liquid assets that can be invested in other profitable ventures.

The current ratio is calculated by using the following formula,

$$current\ ratio = \frac{current\ assets}{current\ liabilites}$$

Credit risk management

This section consists of NPLs; it includes bad debts and doubtful debts. Credit risk management is calculated by using (Muiruri et al., 2015; ur Rehman et al., 2021)

Bad debts

Debt is a substance, usually, money, borrowed from one party. Many organizations and individuals use debt to purchase large items that they could not control under normal circumstances. Debt settlement provides the borrower's share of the borrower's debt under the condition of repayment later, usually with interest.

This ratio is calculated as;

$$Debt = (Short - Term\ Debt + Long - Term\ Debt) \\ - (Cash + Cash\ Equivalents)$$

Doubtful debts

Suspicious debt refers to debt that is impossible for a company or individual to recover. Thus, it avoids over-stating the company's assets as trade debtors report net of

Doubtful debt. When there is no certainty that a debt is not collectable, the debt becomes bad.

This ratio is calculated as follows;

$$\frac{Total\ Amount\ Receivable}{Bad\ Debt} * 100$$

Bank ownership

Bank ownership is calculated through a dummy variable (Ju & Zhao, 2009).

Financial performance

In summary, the state's financial system plays a critical role in the CRM of banks and their management. Effective CRM helps banks avoid severe failures and improves their financial performance. Profitability compensates stockholders for their investment. This will boost economic development and investment. In turn, lousy banking performance can result in bank failures and crises, which can affect economic growth. Adeusi et al. (2014) examined the relationship between risk management techniques and bank financial performance using secondary data from ten Nigerian banks' annual reports and financial statements from 2006 to 2009. Their research is based on cross-sectional units observed across time. The authors employed as independent variables the cost of bad loans, delinquent loans, liquidity, the equity-to-total-assets ratio, the loan-to-equity ratio, and the debt-to-equity ratio. While (ROA) and (ROE) are employed as dependent variables (ROE). The study's findings indicate an inverse relationship between banks' financial success and the cost of non-performing and bad loans. However, there is a positive and strong correlation between the capital-to-assets ratio and bank financial success. The authors concluded that a strong correlation exists between banking performance and risk management. The authors recommend that banks improve their management of recognized credit risk indicators such as the cost of bad and problematic loans, debt-to-equity ratio, and funds under management. ROA and ROE are the bank's financial performance indicators. The findings of this study indicate that NPLs/total loans have a favourable effect on banks' financial performance.

ROA is a relation of net income to complete resources that indicates the amount of profit produced on each dollar of assets. It represents the management's ability to profitably invest the bank's existing investment resources (Ongore & Kusa, 2013). It is calculated by using the following formula;

$$ROA = \frac{Net\ Income}{Total\ Assets}$$

Econometric Models for data analysis

According to different studies Ali et al. (2019); Murdock (2017); and Sadaa et al. (2020), We will use the following models for data analysis of the study:

$$ROA_{it} = \alpha_i + \beta_1 CA_{it} + \beta_2 LM_{it} + \beta_3 CRM_{it} + \varepsilon_{it} \quad \text{-------} \quad (1)$$

Where,

ROA= to measure the financial performance of the bank

α = Intercept

CA= Capital adequacy of financial institutions

LM= Liquidity management of banks

CRM= Credit management ratios to calculate the loan payment of banks

β_s= coefficients of independent variables

It= i denotes bank and t denotes time

ε= error term

The second econometric model is used to analyze the moderation impact of the bank ownership:

$$ROA_{it} = \alpha_i + \beta_1 CA_{it} * BO + \beta_2 LM_{it} * BO + \beta_3 CRM_{it} * BO + \varepsilon_{it} \quad \text{-------} \quad (2)$$

Where all variables are the same that are also used in model 1, here, BO denotes bank ownership that is an extended model with multiplying independent variables.

Data Analysis

Secondary information for all the variable quantity involved in the learning were acquired for the 15 commercial banks from 2012 to 2021 due to the technique discussion and data description published in chapter 3. To determine the nature of the dataset, the unit root tests and descriptive statistics were used initially. Descriptive analysis and correlation regression multicollinearity analysis were also used to assess many hypotheses specified for this study. The following sections detail the results of the different tests

Table 1: Multicollinearity Test

Variable	VIF	1/VIF
CAR	1.21	0.862192
Doubtfulness	1.16	0.862192
CR	1.05	0.798524
LAR	1.08	0.973814
ROA	1.07	0.982063
LLP	1.09	0.994149
Baddebts	1.35	0.997166
Mean VIF	1.15	

Additionally, the Table demonstrates that neither model exhibits multicollinearity, as the adjustment rise issue (VIF) is all fewer than 10. Further, the outcomes indicate that the

ROA typical is not heteroscedasticity and holds no omitted variables.

Table 2: Descriptive stats by using Stata

Variable	Obs.	Mean	Std. Dev.	Min	Max
ROA	150	-9.218554	254.8621	-1662.146	447.0417
CAR	150	10.00747	41.95595	-0.0788941	208.9303
LAR	150	0.7413204	2.230364	-4.094878	13.74655
LLP	150	162.7603	1210.632	-8264.321	6950.359
Bad debts	150	-221000000	2350000000	-28700000000	1520000000
Doubtfulness	150	60800000	643000000	-5543730	7800000000
CR	150	117.9001	867.5907	-0.1887444	10161.71

The standard deviation column indicates how different the variance is in the definition. ROE and LR have slightly different variations, while ROA, CAR, and LLP have standard deviations. They developed the standard deviation; they formed the inconsistency of the variable. CAR is also an exploratory variable because it measures the financial capacity of the bank from the point of view of the regulator. It contains the financial capital considered reliable and liquid, especially the shareholders' equity. Banks with a reasonable rate of good interest rates have a good return. With suitable financial needs, local banks can get loans that do not go well. It arises when obligations meet the payment of disbursement or banks wish to take advantage of potential investment opportunities to finance existing debt. CR is the chance that loan payments may not be made on time or that the principal may not be developing on their own.

Percentage of NPLs measures the CR of TL (total loan) (Muiruri et al., 2015). ROA was used in earlier research (Mangena et al., 2020). It shows the effectiveness of management in operating the funds distributed by shareholders of a rural bank. The provision for the loss of a loan is the expense provided to allow for unpaid loans and loan repayments. Banks are expected to respond to credit crunch and costs to ensure they provide accurate assessments for the rest of their financial lives. Banks' sets mention to pay off bad debts - those that can be repaid in full because the customer makes a mistake or those that offer low-interest rates because the borrower negotiates at a lower rate.

Table 3: Correlation Analysis by using Stata

	ROA	Bad debts	CAR	CR	Doubtf~s	LAR	LLP
ROA	1						
Bad debts	-0.0071	1					
CAR	0.0093	0.016	1				
CR	0.0052	-0.005	0.1323	1			
Doubtfulness	0.0036	0.0062	0.3693	0.024	1		
LAR	0.1581	-0.0476	-0.0741	0.1898	-0.0294	1	
LLP	-0.0483	0.0016	-0.0326	-0.0197	-0.0126	0.1089	1

*P<0.01, **P<0.05 ***P<0.1

Table 4: Regression Analysis by using ROA as financial performance indicator

ROA	Coef.	Std. Err.	T	P>t	[95% Conf.	Interval]
Bad debts	0.00	0.00	0.01	0.993	0.00	0.00
CAR	0.15	0.55	0.27	0.787	-0.93	1.23
CR	-0.01	0.02	-0.38	0.705	-0.06	0.04
Doubtful debts	0.00	0.00	0.00	0.997	0.00	0.00
LAR	19.81	9.70	2.04	0.043	0.63	38.99
LLP	-0.01	0.02	-0.81	0.42	-0.05	0.02
_cons	-21.95	22.92	-0.96	0.34	-67.25	23.36

Table 5: Moderation effect (Bank ownership used as dummy variable Domestic=1 and Foreign=0)

ROA	Coef.	Std. Err.	T	P>t	[95% Conf.	Interval]
CAR	0.15	0.55	0.27	0.79	-0.93	1.23
1.domestic	0.00	0.03				
Domestic#c.CAR	1					
Foreign	0.00	0.04				
LAR	19.81	9.70	2.04	0.04	0.63	38.99
Domestic#c.LAR	1					
Foreign	0.00	0.13				
LLP	-0.01	0.02	-0.81	0.42	-0.05	0.02
Domestic#c.LLP	1					
Foreign	0.00	0.07				
CR	-0.01	0.02	-0.38	0.71	-0.06	0.04
Domestic#c.CR	1					
Foreign	0.00	0.23				
Baddebts	0.00	0.00	0.01	0.99	0.00	0.00
Domestic#c.baddebts	1					
Foreign	0.00	0.06				
Doubtfuldebts	0.00	0.00	0.00	1.00	0.00	0.00
Domestic#c.Doubtfuldebts	1					
Foreign	0.00	0.53				

_cons	-21.95	22.92	-0.96	0.34	-67.25	23.36

According to Table 3, there is a positive and significant relationship between firm performance and credit risk management at the 5% significance level. On the other hand, liquidity management has a positive connection with firm performance but a negative relationship with bad debts.

It is an indication that the company is profitable compared to the number of its assets. Return on assets (ROA) allows managers, investors or analysts to understand how a company's management uses its assets to create income.

According to table 4, bank ownership is used as a dummy variable by checking moderating impact. The dummy variable is donated with "Domestic=1, and foreign=0. According to the data analysis, domestic ownership existed in the results. The outcomes have been nearly equal in all samples, indicating that foreign ownership is not an essential component of profitability in the quarter. As such, a public coverage to encourage the presence of foreign banks might also, therefore, no longer yield any advantage in terms of financial institution profitability. This locating is diametrically in opposition to the argument that overseas banks bring with them higher understanding and technical ability, which then spills over to the relaxation of the banking machine and, consequently, improves profitability (Muiruri et al., 2015).

The benefit of the Heckman model is too accurate the endogenous issues resulting from self-selection and pattern choice bias. The version is usually divided into two degrees: the first stage is the probit model, which is used to estimate the probability of the incidence of selective bias variables and obtain the inverse mills ratio. The second stage is to regress the inverse mills ratio together with other variables to accurate the endogenous hassle due to choice bias. Consequently, it's far reasonable to undertake this model here. In this paper, the structured variable inside the first stage is the dummy variable, bank ownership.

Table 6: Heckman selection model -- two-step estimates

	Coef.	Std. Err.	Z	P>z	[95% Conf.	Interval]
ROA						
CAR	-0.08	1.63	-0.05	0.96	-3.28	3.12
LAR	14.40	29.07	0.50	0.62	-42.58	71.37
LLP	-0.02	0.05	-0.33	0.74	-0.12	0.08
Baddebts	0.00	0.00	0.05	0.96	0.00	0.00
Doubtfuldebts	0.00	0.00	-0.01	1.00	0.00	0.00
CR	-0.01	0.07	-0.15	0.88	-0.16	0.13
_cons	21.91	70.58	0.31	0.76	-116.43	160.25
CAR	21.04	6.50	3.24	0.00	8.30	33.78
LAR	2.12	1.36	1.56	0.12	-0.55	4.79
LLP	0.00	0.00	-1.55	0.12	0.00	0.00
Baddebts	0.00	0.00	-1.66	0.10	0.00	0.00
Doubtfuldebts	0.00	0.00	0.66	0.51	0.00	0.00
CR	11.54	12.02	0.96	0.34	-12.02	35.10
Mills						
Lambda	-765.23	175.91	-4.35	0.00	-1110.01	-420.45
Rho	-1.00					
Sigma	765.23					

Conclusion & Recommendations

Chapter 1 introduced and discussed the study's significance and purpose. As stated previously, the study's secondary objective is to determine the effect of CRM on the profitability of Pakistan's profitable banks. Chapter 2 summarized the many studies conducted in established and developing countries. Appropriate variables for analysis were chosen based on the review. Following that, each variable was defined, and the rationale for its selection was presented. Additionally, the control method and predictable symbol were deliberated. However, two new IVs were included in the final models that had not been included in previous studies. ROA and ROE were chosen as dependent variables indicating commercial bank profitability because they stood as the most frequently used variable star in the

literature. Credit risk management variables include CAR, LR, LLP, NPLR, CAR, bad debt, and full dough dept. Correlation regression and other tests were used to analyses data from all two hundred commercial banks in Pakistan from 2011 to the present. "What is the link between credit risk management and commercial bank profitability between 2011 and 2019?" was the second research question. The solution is based on the findings of several scientific investigations. According to the statistics, credit risk management and commercial bank financial performance appear to be connected; according to the statistics—the study attention to the issues that move the of profitable banks. According to the data, the capital adequacy ratio (CAR) appears to have a favorable and statistically significant impact on commercial bank profitability. The outcome agrees with forecasts and Gupta & Kashiramka (2020).

Furthermore, the bulk of the other research yielded mixed results and failed to demonstrate a connection between CAR and set profitability. This research, by contrast, avoids financial loss for the banks. Bank size (BS) positively and significantly affects commercial banks' financial performance. This finding is consistent with expectations and Huang & Ho (2020) findings but conflicts with (Ni et al., 2022). This finding supports the hypothesis that large commercial banks can earn a higher profit. The exposure ratio (CR) has been shown to have a significant positive link with the profitability of a commercial bank. The finding supports the theory. CR is one of two brand-new variables in this study since it has never been used. The evidence supports that commercial banks with a higher coverage ratio have a higher-quality loan portfolio with higher interest revenue, resulting in improved bank profitability. NPLR also has a statistically significant negative impact on commercial bank financial performance, according to the study (Teirlinck, 2017). This demonstrates that commercial banks have an efficient credit assessment process. The findings indicate that NPLs reduce loan payments in commercial banks, resulting in decreased income and available capital for investment, thereby reducing bank profitability. The leverage ratio (LR) has an undesirable and statistically significant effect on the financial performance of profitable banks. The conclusion is consistent with that of (Danso et al., 2019). The result, however, is inconsistent with the hypothesis that FBM has a helpful association with bank effectiveness. This variable was novel in this research because it had never been used.

Nonetheless, the study rejects the hypothesis that women in senior positions in Nepal's commercial banks improve bank performance. In summary, the study's findings indicate that Nepal's commercial banks practice sound credit risk management, as evidenced by the study's significant results for CAR, LLP, CR, and NPLR. The overall result indicated that credit risk management is an important predictor of bank financial performance, implying that a bank's profitability is contingent on risk management.

Recommendations

As the study's findings indicate, risk organization has a sizable impact on bank presentation. It is recommended that banks place a greater emphasis on RM. Generally, banks should maintain an optimal equal of CAR (or as required by regulation) to ensure that they can meet their financial obligations, protect their depositors' investments, and thus contribute to the financial system's stability. Banks must comprehend that their size also influences their presentation. More outstanding banks typically earn developed profits because they can differentiate their products and expand their risk in less modest markets. Additionally, the study mentions that banks switch and display NPLs, and seek to maintain them as low as possible by putting a more significant emphasis on the capacity to repay before issuing credit. This strategy will help banks achieve better results. Furthermore, banks must priorities coverage ratio, which means they must actively monitor all factors impacting loan interest income, such as interest rate fluctuations, loan quality, and resources and liabilities, as they disturb the bank. Additionally, banks should avoid excessive debt financing, as increased financial leverage results in increased liabilities, which negatively affects FP. Additionally, the set is optional to maintain a balance of capital between shareholder equity and debt when financing its operations. Although the study discovered no relationship between CRR and bank performance, this does not negate the importance of these variables. These variables must be taken into account when banks manage risk.

NPLs have a detrimental effect on the financial performance of the commercial banks chosen for this study. That is why this study advises bank managers to attempt to reduce NPLs to minimize credit risk and maximize profit. The manager must exercise extreme caution when disbursing loans. Additionally, the capital adequacy ratio has a negative relationship with the bank's profitability. Thus, it is prudent for a bank to maintain an optimal level of core and statutory capital to enhance financial performance and ensure its ability to fund its liabilities when required. The loan-to-deposit ratio has a beneficial effect on financial performance. This means that banks are generating revenue from their assets, and the investment that commercial banks deliver to customers is increasing at the same rate as deposit growth. This demonstrates that banks are reinvesting their assets in the market through loans or other forms of investment. There are numerous additional recommendations for the bank to mitigate credit risk, including the following: It should include the terms and conditions that borrowers must adhere to qualify for loans. Lending to CIB-registered businesses or known defaulters properly insured the security assets pledged. Banks should refrain from granting credit where their security position is weaker than any other financial institution.

Conclusion

Credit risk refers to the circumstance in which an investment's actual return falls short of its expected return. Credit risk exists for the lender when a borrower, counterparty, or debtor fails to meet their contractual obligations. Credit risk management is a multifaceted task that can be approached in several ways. Bangladesh's banking system is afflicted by financial crime. Banks continue to struggle with a significant volume of NPLs.

Risk management that is properly implemented can provide a significant advantage to the bank. It is critical to understand the influence of credit risk on various types of performance indicators. The researchers extracted secondary data from the bank's yearly reports and analyzed it using correlation, t-test for mean comparison, and multiple regression analysis. The return on assets, dispute resolution, and interest rate control of private commercial banks are much higher than that of state-owned commercial banks. NPL has a statistically significant effect on ROA.

Data were gathered from minor sources, specifically the annual reports of chosen sets from 2000 to 2015. NPLs include substandard, doubtful, and virtual loss and loss. If the borrower resumes payments on a non-performing loan, the loan becomes performing, even if the borrower has not repaid the entire amount owed. This study advises bank managers to attempt to use NPLs to minimize credit risk.

Managerial Implications

One implication of our findings is that popular-setters must enforce rules that cap the number of outside board seats that board administrators of listed corporations can maintain so one can shield firms' economic choices and shareholders' pursuits. Further, the observes findings advocate that corporations may pick out busy directors inappropriately for monetary decisions throughout life cycle stages in their company. Hence, regulators must keep in mind the dynamics of the corporate existence cycle to improve corporate governance systems in corporations. Destiny research should discover empirically whether or not and how demographic traits of busy administrators at exceptional tiers of the life cycle influence companies' market-threat disclosures, investment performance and accounting conservatism, among different factors. This can provide precious insights into strengthening corporate governance internationally.

This look does have a few obstacles. Because our sample is based on publicly listed corporations, our pattern may also have an availability bias. Further, the observation is region particular; hence, the findings might not be generalizable to other countries with specific cultural mores, backgrounds, and company-governance environments. Destiny studies may also yield notable results and offer coverage implications similarly. Moreover, because indexed financial companies have been excluded from our examination, destiny research ought to obtain new insights into those firms.

Limitations of the Study

As we all know, the world is currently battling coronavirus. Because it is a contagious disease, everyone is advised to maintain a social distance. As an intern student, this gave me an excellent opportunity to gain practical knowledge by working in an organization or valuable field. However, due to the pandemic, this could not occur. I needed to complete my report by gathering secondary data. There is a constraint on verifying data accuracy because no technique exists for doing so. Finally, as a student, I can state that I am currently in the process of completing a research paper of this nature. However, I concerted effort to cover every critical aspect of this study.

References

Abdul Karim, M., Hassan, M. K., Hassan, T., & Mohamad, S. (2014). Capital adequacy and lending and deposit behaviors of conventional and Islamic banks. *Pacific Basin Finance Journal*, *28*, 58–75. https://doi.org/10.1016/j.pacfin.2013.11.002

Ali, S., Rehman, R. U., Sarwar, B., Shoukat, A., & Farooq, M. (2021). Board financial expertise and foreign institutional investment: the moderating role of ownership concentration. *Review of International Business and Strategy*, *August*. https://doi.org/10.1108/RIBS-02-2021-0032

Ali, S., Zhang, J., Naseem, M. A., & Ahmad, F. (2019). Moderating Role Of Ownership In Relationship Between CSRD And Firm Performance. *The Journal of Developing Areas*, *53*(3). https://doi.org/10.1353/jda.2019.0048

Bulgurcu, B. (Kiran). (2012). Application of TOPSIS Technique for Financial Performance Evaluation of Technology Firms in Istanbul Stock Exchange Market. *Procedia - Social and Behavioral Sciences*, *62*, 1033–1040. https://doi.org/10.1016/j.sbspro.2012.09.176

Çam, İ., & Özer, G. (2022). The influence of country governance on the capital structure and investment financing decisions of firms: An international investigation. *Borsa Istanbul Review*, *22*(2), 257–271. https://doi.org/10.1016/j.bir.2021.04.008

Chebbi, K., Ammer, M. A., & Hameed, A. (2021). The COVID-19 pandemic and stock liquidity: Evidence from S&P 500. *Quarterly Review of Economics and Finance*, *81*(August 2020), 134–142. https://doi.org/10.1016/j.qref.2021.05.008

Chen, W. Da, Chen, Y., & Huang, S. C. (2021). Liquidity risk and bank performance during financial crises. *Journal of Financial Stability*, *56*(June), 100906. https://doi.org/10.1016/j.jfs.2021.100906

Danso, A., Lartey, T., Amankwah-Amoah, J., Adomako, S., Lu, Q., & Uddin, M. (2019). Market sentiment and firm investment decision-making. *International Review of Financial Analysis*, *66*(November 2018), 101369. https://doi.org/10.1016/j.irfa.2019.06.008

Ekinci, R., & Poyraz, G. (2019). The Effect of Credit Risk on Financial Performance of Deposit Banks in Turkey. *Procedia Computer Science*, *158*, 979–987. https://doi.org/10.1016/j.procs.2019.09.139

Goel, U., Chadha, S., & Sharma, A. K. (2015). Operating Liquidity and Financial Leverage: Evidences from Indian Machinery Industry. *Procedia - Social and Behavioral Sciences*, *189*, 344–350. https://doi.org/10.1016/j.sbspro.2015.03.230

Gupta, J., & Kashiramka, S. (2020). Financial stability of banks in India: Does liquidity creation matter? *Pacific Basin Finance Journal*, *64*(July), 101439. https://doi.org/10.1016/j.pacfin.2020.101439

HABTOOR, O. S. (2020). The Moderating Role of Ownership Concentration on the Relationship between Board Composition and Saudi Bank Performance. *Journal of Asian Finance, Economics and Business*, *7*(10), 675–685. https://doi.org/10.13106/jafeb.2020.vol7.no10.675

Heuver, R. A., & Berndsen, R. J. (2022). Liquidity coverage ratio in a payment network: Uncovering contagion paths. *Latin American Journal of Central Banking*, *3*(1), 100046. https://doi.org/10.1016/j.latcb.2022.100046

Ho, S. J., & Hsu, S. C. (2010). Leverage, performance and capital adequacy ratio in Taiwans banking industry. *Japan and the World Economy*, *22*(4), 264–272. https://doi.org/10.1016/j.japwor.2010.06.007

Huang, H. Y., & Ho, K. C. (2020). Liquidity, earnings management, and stock expected returns. *North American Journal of Economics and Finance*, *54*(April), 101261. https://doi.org/10.1016/j.najef.2020.101261

İncekara, A., & Çetinkaya, H. (2019). Liquidity Risk Management: A Comparative Analysis of Panel Data between Islamic and Conventional Banking in Turkey. *Procedia Computer Science*, *158*, 955–963. https://doi.org/10.1016/j.procs.2019.09.136

Ju, M., & Zhao, H. (2009). Behind organizational slack and firm performance in China: The moderating roles of ownership and competitive intensity. *Asia Pacific Journal of Management*, *26*(4), 701–717. https://doi.org/10.1007/s10490-009-9148-1

Kabir Hassan, M., Unsal, O., & Emre Tamer, H. (2016). Risk management and capital adequacy in Turkish participation and conventional banks: A comparative stress testing analysis. *Borsa Istanbul Review*, *16*(2), 72–81. https://doi.org/10.1016/j.bir.2016.04.001

Kenneth, O. (2013). Impact of Credit Risk Management and Capital Adequacy on the Financial Performance of Commercial Banks in Nigeria. *Journal of Emerging Issues in Economics, Finance and Banking (JEIEFB) An Online International Monthly Journal*, *2*, 703. www.globalbizresearch.com

Kosmidou, K., Kousenidis, D., Ladas, A., & Negkakis, C. (2020). Regulation of capital flows: Effects on liquidity and the role of financial reporting quality. *Journal of Economic Behavior and Organization*, *175*, 86–97. https://doi.org/10.1016/j.jebo.2020.04.005

Lin, S. L., Penm, J. H. W., Gong, S. C., & Chang, C. S. (2005). Risk-based capital adequacy in assessing on insolvency-risk and financial performances in Taiwan's banking industry. *Research in International Business and Finance*, *19*(1), 111–153. https://doi.org/10.1016/j.ribaf.2004.10.006

Louati, S., Gargouri Abida, I., & Boujelbene, Y. (2015). Capital adequacy implications on Islamic and non-Islamic bank's behavior: Does market power matter? *Borsa Istanbul Review*, *15*(3), 192–204. https://doi.org/10.1016/j.bir.2015.04.001

Mangena, M., Priego, A. M., & Manzaneque, M. (2020). Bank power, block ownership, boards and financial distress likelihood: An investigation of Spanish listed firms. *Journal of Corporate Finance*, *64*(May), 101636. https://doi.org/10.1016/j.jcorpfin.2020.101636

Milcheva, S., Falkenbach, H., & Markmann, H. (2019). Bank liquidity management through the issuance of bonds in the aftermath of the global financial crisis. *Research in International Business and Finance*, *48*, 32–47. https://doi.org/10.1016/j.ribaf.2018.12.003

Mizgier, K. J., Hora, M., Wagner, S. M., & Jüttner, M. P. (2015). Managing operational disruptions through capital adequacy and process improvement. *European Journal of Operational Research*, *245*(1), 320–332. https://doi.org/10.1016/j.ejor.2015.02.029

Muiruri, P. M., Memba, F. S., & Njeru, A. (2015). Moderating Effects of Bank Ownership on the Relationship between Securitization Uptake and Financial Performance of Commercial Banks in Kenya. *Academic Journal of Economic Studies*, *1*(2), 24–43.

Munangi, E., & Sibindi, A. B. (2020). An empirical analysis of the impact of credit risk on the financial performance of South African banks. *Academy of Accounting and Financial Studies Journal*, *24*(3).

Murdock, A. (2017). Governance and ownership. *Private Action for Public Purpose: Examining the Growth of Falck, the World's Largest Rescue Company*, 105–133. https://doi.org/10.1057/978-1-349-95214-4_5

Ni, Z., Fang, L., Liu, H., & Lu, X. (2022). Performance and risk of energy industrial firms with stock pledge in China. *Finance Research Letters*, *46*(August),

102410. https://doi.org/10.1016/j.frl.2021.102410

Okoye, A. N. N., Ikechukwu, E., & Leonard, N. C. (2017). The 2017 International Conference on African Entrepreneurship and Innovation for Sustainable Development (AEISD) EFFECT OF CAPITAL ADEQUACY ON FINANCIAL PERFORMANCE OF QUOTED DEPOSIT MONEY BANKS IN NIGERIA. *The 2017 International Conference on African Entrepreneurship and Innovation for Sustainable Development (AEISD)*, *57*, 841–862. https://www.researchgate.net/publication/3194062 30_EFFECT_OF_CAPITAL_ADEQUACY_ON_ FINANCIAL_PERFORMANCE_OF_QUOTED_ DEPOSIT_MONEY_BANKS_IN_NIGERIA

Ongore, V. O., & Kusa, G. B. (2013). International journal of economics and financial issues. *International Journal of Economics and Financial Issues*, *3*(1), 237–252. http://www.econjournals.com/index.php/ijefi/articl e/view/334

Sadaa, A. M., Ganesan, Y., & Ahmed, M. G. (2020). The effect of earnings quality and bank continuity: the moderating role of ownership structure and CSR. *Journal of Sustainable Finance and Investment*, *0*(0), 1–21. https://doi.org/10.1080/20430795.2020.1858690

sulieman Alshatti, A. (2015). The effect of credit risk management on financial performance of the Jordanian commercial bank. *Investment Management and Financial Innovations, 12*(1), 338–345.

Teirlinck, P. (2017). Configurations of strategic R&D decisions and financial performance in small-sized and medium-sized firms. *Journal of Business Research*, *74*, 55–65. https://doi.org/10.1016/j.jbusres.2017.01.008

Umoru, D., & Osemwegie, J. O. (2016). Capital Adequacy and Financial Performance of Banks in Nigeria: Empirical Evidence Based on the Fgls Estimator. *European Scientific Journal, ESJ*, *12*(25), 295. https://doi.org/10.19044/esj.2016.v12n25p295

ur Rehman, R., Zhang, J., Naseem, M. A., Ahmed, M. I., & Ali, R. (2021). Board independence and Chinese banking efficiency: a moderating role of ownership restructuring. *Eurasian Business Review*, *11*(3), 517–536. https://doi.org/10.1007/s40821-020-00155-9

Vitkova, E., Vankova, L., & Kocourkova, G. (2021). Assessment of the Regional Current Liquidity in the Construction Industry of the Czech Republic. *Procedia Computer Science*, *196*, 699–707. https://doi.org/10.1016/j.procs.2021.12.066

Weber, O., Scholz, R. W., & Michalik, G. (2010). Incorporating sustainability criteria into credit risk management. *Business Strategy and the Environment*, *19*(1), 39–50. https://doi.org/10.1002/bse.636

Yuan, G. X., Zhou, Y., Liu, H., & Yan, C. (2022). ScienceDirect The Framework of CAFE Credit Risk Assessment for Financial The Framework of CAFE Credit Risk Assessment for Financial Markets in China Markets in China. *Procedia Computer Science*, *202*, 33–46. https://doi.org/10.1016/j.procs.2022.04.006

RESEARCH ARTICLE

How Tourism Affects Women's Employment in Asian Countries: An Application of Generalized Method of Moments and Quantile Regression

Liton Chandra Voumik[1], Shohel Md. Nafi[2], Bapon Chandra Kuri[3], Asif Raihan[4*]

[1]Department of Economics, Noakhali Science and Technology University, Noakhali 3814, Bangladesh
[2]Department of Tourism and Hospitality Management, Noakhali Science and Technology University, Noakhalin3814, Bangladesh
[3]Department of Tourism and Hospitality Management, Bangabandhu Sheikh Mujibur Rahman Science and Technology University, Gopalganj 8100, Bangladesh
[4]Institute of Climate Change, Universiti Kebangsaan Malaysia, Bangi 43600, Malaysia

Abstract

Based on data collected from 32 Asian countries between the years 1996 and 2020, this study investigated the effect that tourism has on women's participation in the workforce. This research makes use of a panel data model, one-step difference and system Generalized Method of Moments, and quantile regression. Trade, child mortality, foreign direct investment, and government spending are all taken into account in addition to gross domestic product. The findings demonstrate that an increase in tourism led to a greater level of female participation in the employment sector. Additionally, exports and foreign direct investment both contributed to a rise in the number of women in the labor force. However, both remittances and government spending reduce women's participation in the labor force. Out of the three subsectors, the increase in tourism led to more women working in the industry and service sectors. However, a rise in tourism tends to lead to a decline in the number of agricultural jobs held by women. Women's employment opportunities in the industrial and service sectors grow as a result of tourism but shrink in the agricultural sectors. To analyze labor dynamics, this study is crucial for policymakers. It's useful for promoting tourism in Asia and formulating policy related to it. Employment-related policies in the agricultural, industrial, and service sectors of Asian economies would also benefit greatly from this.

Keywords: Women Employment; Tourism; Economic Growth; Generalized Method of Moments; Quantile Regression

Introduction

Tourism, as a significant economic and cultural activity, has played a considerable impact on all aspects of the economy and society (Raihan & Tuspekova, 2022a; Raihan et al., 2022; Raihan & Tuspekova, 2022b). Cohen & Cohen (2019) mentioned that gender has consistently been a critical frontier concern in the sociological research of tourism. Without any question, women can benefit from tourism, which is supported by the extensive literature published on tourism previously (Ferguson, 2011; Figueroa-Domecq et al., 2015; Font et al., 2016; Alrwajfah et al., 2020; Zhang & Zhang, 2020). As more women enter the workforce, their contributions to the economy will grow. Social and economic factors affect the engagement of women in many ways. The level of education, family structure, the number of children,

foreign investment, government expenditure, and the country's financial advancement are the most significant factors influencing women's participation in the workforce (Truong et al., 2020).

Employment opportunity in the tourism industry is heavily gendered and has long had a well-documented history of discrimination against women (Pritchard & Morgan, 2016). According to The United Nations' World Tourism Organization (UNWTO), women constitute around 54% of tourism workers (UNWTO, 2019). As a result of its working nature and employment stability, especially for young ethnic groups, and migrant employees, women are more interested in the tourist business. It was said by Buam (2013) that women play an important part in the hospitality industry, from front-of-house executives to cleaners to chefs. Tourism is a multi-faceted sector that includes everything from lodging and

travel to art and entertainment (Raihan & Tuspekova, 2022c; Raihan & Tuspekova, 2022d). As a result of tourism, linked service industries (e.g., banking, transportation) grow, as well as job prospects for local residents (Raihan & Tuspekova, 2022e). There are several types of jobs in the tourism sector, from full-time to part-time and everything in between. According to Hutchings et al. (2020), some tourism jobs require minimal formal education or on-the-job training, which makes it easy to get jobs.

Asia was the fastest-growing constituency with a 7.4% upsurge in travel and tourism related gross domestic product (GDP) in 2019. The sustained growth of middle-income households, visa facilitation, greater connectivity, infrastructure investment, and government prioritization of the industry all contributed to this (Raihan & Tuspekova, 2022f; Raihan & Tuspekova, 2022g). In 2015, the tourism and travel industry directly supported 47.9 million jobs in Asia and Pacific region (UNWTO, 2017). Asia's quicker rate of economic expansion compared to the West gave birth to an "Asian wave," a change in the hotel and tourist industries' center of gravity (Chon, 2021). Powerhouse states like China, Japan, and India have all become key actors in the global economy as a result of the rapid pace of economic expansion across Asia. The World Travel and Tourism Council (WTTC) reported that the tourist business has a huge impact in Southeast Asia, where it generates $380 billion in sales and accounts for 12.1 percent of the overall economic GDP (WTTC, 2020).

Previous studies mainly focused on women's employment, entrepreneurship, income, education, and work environment related to tourism development (Figueroa-Domecq et al., 2020; Nassani et al., 2019; Gousiou & Lagos, 2021). Most of these studies are case-based and focus on the micro level and only a few studies address the regional level. To fill up the existing gap, this study takes into account the Asian region. This study is unique for four reasons. Firstly, this study used data from 32 Asian countries which are collected from reliable data sources. To measure the impact of tourism on women's employment, this study uses 24 years of data from 1996 to 2020. For the first time, this study measures the long-term effect of tourism and women's employment. Secondly, besides the tourism sector, this study addresses the service sector, agricultural sector, and industry sector to measure women's employment. Thirdly, this study considered variables like remittances, export, GDP per capita, female child mortality, and government expenditure. Lastly, a panel data model, one-step difference and system generalized method of moments (GMMs), and quantile regression are all employed in this study.

The rest of the article is structured as follows. The Introduction is followed by the section Literature Review, where relevant research studies have been discussed. The third section is the Methodology section, followed by the Results and Discussion section. Subsequently, the last section presents the Conclusion, policy recommendations, implications of the research, limitations of the study, and future research directions.

Literature Review

Women's employment is growing with the expansion of economic advancement (Kumari, 2018; Hussain & Rasheed, 2022). Several theoretical and experimental studies have shown that the support of women in the workforce has strong and positive links to financial development (Eng, 2006), and a clear correlation between women's interest in the workforce and their financial development is revealed. For the first time, Besamusca et al. (2015) have gathered a country-level dataset on women's engagement in the workforce in each of the 117 countries. Women are more seemingly to take part in the workforce if they have the option of paid maternity leave accessible, according to the researchers. Age, education, GDP, services, faiths, motherhood, health, and other factors are all considered independent variables in this analysis. Moreover, women's employment is closely linked with gender equality. Gender equality has been schemed at the UN Sustainable Development Summit in 2015 regarded as one of the crucial shared humanity goals. To demonstrate the linkages between gender parity and the other sustainable development goals (SDGs), this study can utilize the example of SDG 8 (Long term economic growth and congenial work). They proposed several measures to assist tourism businesses in improving their gender equality performance, increasing their impact to promote the accomplishment of the SDGs. They recommended that tourism's capacity to assist the SDGs would indeed be restricted without a genuine and serious commitment to gender equality, and sustainable tourism would stay an elusive "pot of gold." (Alarcó & Cole, 2019).

A considerable increase in tourism and gender studies over the last three decades has been observed (Swain, 1993; Norris et al., 1994; Burrell et al., 1997; Pritchard et al., 2007; Ferguson, 2009; Alarcón & Cole, 2019). Tourism and the engagement of women in the workforce will be the focus of this investigation. At least USD9.2 trillion in global GDP and 334 million jobs have been produced by tourism as a result of this economic sector (WTTC, 2020). From 2006 to 2018, researchers used an expanded technique of moments estimation procedure to investigate the impact of tourism on gender equality in 36 Asian countries. Tourism has a significant positive impact on gender equality, according to the studies. East and Southeast Asian countries had the most substantial statistical impact, followed by West and Central Asian countries and South Asian countries (Zhang & Zhang, 2020). In this respect, Mishra et al. (2020) depicted that

from 1997 to 2015, the impact of gender inequalities on the economic expansion of 30 Asian economies. It showed that the gender equity scale of nutrition, literacy, income, and democratic representation positively impacted Asia's economic growth. Moreover, Hutchings et al. (2020) argued that ongoing gender segregation across economies and socio-cultural creates impediments to women's engagement and advancement in tourism. Their study offers human resource management strategies, policy initiatives, and implications for eliminating gender segregation, enhancing management representation, and offering fair job opportunities. Women become more educated and have better-paying employment alternatives, and their participation as entrepreneurs in SMEs may drop.

Furthermore, Rinaldi and Salerno (2019) focused that, in emerging economies, women's overall employment varies widely, extending from 30% in South Asia to more than 60% in Sub-Saharan Africa, even though national circumstances may hamper women's growth. Asia is the most populous region of the world, and the variation of countries is higher than in any other region. Asia comprises developed and very high GDP per capita countries like Hong Kong, Japan, Brunei, South Korea, Singapore, Israel, United Arab Emirates (UAE), Saudi Arabia, Kuwait, Qatar, and Oman. In Asia, male labor force participation ranges from 52 percent in Timor-Leste

to 89 percent in Nepal, while female labor force participation ranges from 16 percent in Afghanistan to 83 percent in Nepal. Despite strong economic development, decreased fertility rates, and greater female education, women's involvement in the work market has remained low (Tanaka & Muzones, 2016). This report also stated that 28 percent of working-aged women lived in four Asian countries such as Pakistan, Indonesia, China, and South Korea. In 2016, the female labor force participation rate in Pakistan is very low representing 28 percent, Indonesia represents 51 percent, China represents almost 64 percent, which is fallen from 73 percent in 1990, and South Korea represents 50 percent of women's employment despite their high economic growth. On the other hand, women's employment has a considerably different impact on tourist development in UAE, Egypt, and Oman. The United Arab Emirates scores best among the three Arab countries studied in terms of the influence of women's employment on tourism development, followed by Egypt and Oman (Abou-Shouk et.al, 2021). The findings have significant ramifications for women's employment in Arab and Muslim countries. Taking all of these factors into consideration, this research will look into the contribution of tourism to women's employment in Asia. Table 1 shows the recent studies on tourism and women's employment.

Table 1. Summary of recent studies on Tourism and women's employment

Authors	Context	Sample size and target population	Country or continent	Methodology and data instrument	Factors tasted
Zhang and Zhang (2020)	Gender parity and tourism	36 countries	Asia continent	GMM estimation method	International tourism, number of arrivals, gender, education, expenditure, agriculture-based employment, industry-based employment, services-based employment.
Hutchin et al. (2020)	Partition of women in the tourism sector	363 respondents	21 Asia-Pacific Economic Cooperation (APEC) member countries	The mix of both quantitative and qualitative data. Survey and questionnaire	Cultural barrier theme, common/uncommon tourism jobs for women, Cultural barriers, employee programs, workplace policies, career development strategies for women, government schemes for women tourism employees

Tambunan (2009)	Women entrepreneurship in developing countries	Association of Southeast Asian Nations (ASEAN)	ASEAN	Literature and a descriptive analysis of secondary data,	SME, MIE, ME, LE, SE, education, economy, empowerment.
Mishra et al. (2020)	Gender equity and women empowerment	30 Asian countries	Asia continent	Cross-section and time-series data	Health, education, employment, and democratic representation on the economic growth o
Putra et al. (2021)	Women empowerment	28,934 married women	Indonesia	Cross-sectional study	Viewpoint for a secured sex dialogue, women empowerment factors. socio-demographic characteristics of women's age, husband and households, spousal communication on HIV prevention, and HIV knowledge
Abou-Shouk et al. (2021)	Women's empowerment and tourism growth	784 respondents	Egypt, the United Arab Emirates, and Oman	Survey and interview	Perceptions of women's work in tourism, women's entrepreneurship, and women's empowerment.
Yang et al. (2019)	Unaccompanied travel for Asian women	35 Asian solo female travelers	10 Asian countries (China, Hong Kong, Taiwan, Indonesia, Japan, South Korea, Malaysia, Singapore, Thailand, and Vietnam)	In-depth interviews	Self-discovery, social expectations, Western-centrism in independent travel, in search of identity.
Alarcón, and Cole (2019)	Gender equality for sustainable tourism	World perspective	World perspective	Experiences of participatory, first-hand practical, and theoretical research	SDG, tourism

Methodology

Theoretical framework

The tourism industry is widely regarded as one of the most important economic sectors worldwide. In recent years, women have become increasingly important contributors to the world of business, particularly in the travel and hospitality industry. Their contributions to the economy will increase in proportion to the number of women who enter the labor force. There are a variety of ways in which women's participation is influenced by social and economic variables. According to a number of theoretical and experimental studies that were discussed in the Introduction and Literature Review sections of this article, women's employment is influenced by factors such as tourism, remittances, export, GDP per capita, female child mortality, and government expenditure. The study, however, focuses on the empirical evidence against the influencing variables of women's empowerment in Asia. Overall, the selection of factors is more intensive in comparison to other research that has been previously published on the theme, which is distinctive and

prominent in this study, and we believe that this study would catch a wider research audience to disclose the other elements that hold promise within the same field of inquiry. Figure 1 presents the relationship between female employment and other attributes.
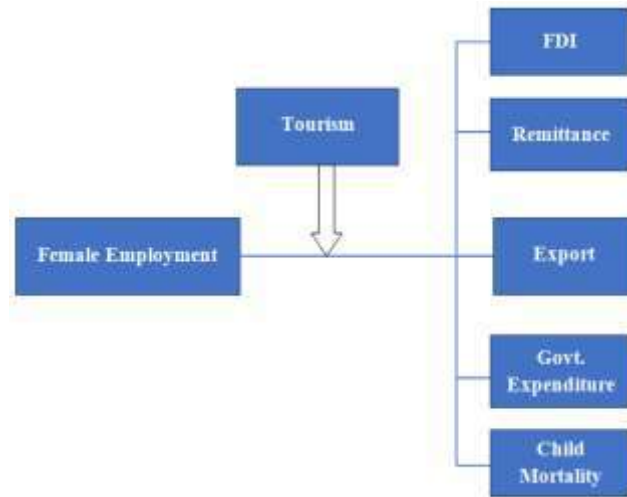

Figure 1. Relationship between female employment and other attributes

Data and descriptive evidence

All of this is based on two sources of information: one is the World Development Indicator (WDI) and the other is data from each country's Government Bureau of Statistics. The United Nations International Children's Emergency Fund (UNICEF) education database was used to acquire information on school enrollment. Table 2 contains the definitions of the variables, as well as information on their data sources. For the sake of our empirical research, the data have been changed to a logarithmic format since the log conversion ensures that the data are compatible with normality.

Table 2. Variable details

Variables	Indicator Name	Sources
FL	Labor force participation rate, female	
Ag	Employment in agriculture, female	
Indus	Employment in industry, female	
Ser	Employment in services, female	
TR	International tourism, receipts (current US$)	
Ex	Exports of goods and services (current US$)	WDI
FDI	Foreign direct investment, net outflows (BoP, current US$)	
Rem	Personal remittances received (current US$)	
GE	General government final consumption expenditure (current US$)	
MR	Mortality rate, infant, female (per 1,000 live births)	

Empirical framework

With the help of alternative data structures, we look at the reduced-form link between travel and female labor market participation. The initial phase was to gather data from all Asian countries in order to create a panel of national data, which included estimations of baseline specifications as follows:

$$FL_{i,t} = \alpha + \beta TR_{i,t} + \gamma X_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \tag{1}$$

FL_{it} is the women participation rate in different countries (i) in a given year (t). The measure of tourism is $Tourism_{c,t}$. β is the parameter estimate of interest is shown below. Other factors that can influence women labor force participation are $X_{i,t}$. We will estimate several different versions of the equation to account for uncertainty in the treatment of the non-tradable sector and to test the robustness of our findings of equation (1). To be here, tourism measures here how many tourists arrive every year. The trade openness measure is total export and import as a proportion of GDP. β is the major estimation parameter. Whatever, the econometric specification of the model is:

$$L(FL)_{it} = \beta_0 + \beta_1 L(TR)_{it} + \beta_2 L(FDI)_{it} + \beta_3 L(Rem)_{it} + \beta_4 L(Ex)_{it} + \beta_5 L(GE)_{it} + \beta_6 L(MR) + \varepsilon_{c,t} \tag{2}$$

Quantile regression (QR regression)

We explore the link between TR and other independent variables at various quantiles, such as 25%, 50%, and 75%, to estimate the women's participation rate (FL). Using these quantiles, we can obtain a reasonable estimate of TR. The quantile factor model is given by:

$$QR_{i,t} = \alpha_i^q + \beta_{i,L(TR)}^q QR_{L(TR)it} + \beta_{i,L(FDI)}^q QR_{L(FDI)it} + \beta_{i,L(Rem)}^q QR_{L(Rem)it} + \beta_{i,L(Ex)}^q QR_{L(Ex)it} + \beta_{i,L(GE)}^q QR_{L(GE)it} + \beta_{i,L(MR)}^q QR_{L(MR)it} \tag{3}$$

Generalized Method of Moments (GMM)

When examining the relationship between tourism and female employment, we primarily rely on the two-step GMM estimator as our primary econometric instrument. A two-step method GMM is necessitated by the following considerations: (1) in this case, the total number of IDs or

countries is greater than the number of years, t; (2) the correlation between dependent variables and lag is greater than 0.8; (3) the mean regression estimator suffers from simultaneity issues; and (4) the two-step system GMM is used to resolve biases that develop while differentiating variables, which are inherent in the mean regression estimator. The following system GMM model was utilized in this paper:

$$L(FL)_{i,t} = \alpha_0 + \alpha_1 L(FL)_{i,t-\tau} + \alpha_2 L(TR)_{i,t} + \sum_{k=1}^{4} \Phi_3 LX_{k,i,t-\tau} + \varepsilon_{i,t}$$

$$(4)$$

With FL representing the female labor force in a given country at a given year t, TR representing tourism receipts in a given year, X representing the vector of control variables, and τ symbolizing the parameter of autoregression and representing the disturbance term with a given year. Many researchers have employed the GMM estimator to examine the effects of information and communications technology (ICT) (Asongu & Odhiambo, 2020), financial development (Batuo et al., 2018), environmental sustainability (Voumik et al., 2022), and tourism (Nyasha et al., 2021) on economic development.

Female labor force participation in three sectors

In Equation 5, we included three sectors, female labor force participation in agriculture, industry, and service sectors. We want to see how much tourism affects women's engagement in agriculture, industry, and service sectors. Here, "j" is working in three separate sectors.

$$FL_{j,i,t} = \alpha + \beta TR_{j,i,t} + \gamma X_{j,i,t} + \mu_i + \pi_j + \delta_t + \varepsilon_{i,t} \qquad (5)$$

Results and Discussion

Table 3 offers descriptive data for each variable, as well as a detailed description. Every single one of these metrics is displayed in this table: average, number of observations, standard deviation, and the lowest and greatest values. The mean value of L(TA) is higher than the mean value of the other variables.

It can be concluded that the sample population in question does not exhibit cross-sectional dependence because the p-value is large for most of the tests performed by Pesaran cross-sectional dependence (CD), Breusch–Pagan's lagrange multiplier (LM), and Pesaran CD. However, the Friedman test assumption is violated as it is the only statistically significant one in Table 4. As these three tests failed to reach statistical significance, it seems that there is no correlation between the error terms reported by different countries. Therefore, methods like first-generation panel unit root tests are implemented. In Table 5 of the paper, all three popular unit root tests are summarized.

At a 5% level of significance, the results show that the null hypothesis is rejected for the first differences. In the case of the first differenced data, all variables are assumed to be stationary because p-values are predicted to be below 5%. All of our variables are stationary at the first difference in the aforementioned unit root test. Also, data is free from CD problems. So, the paper does not need second generation unit root and cointegration tests. Thus, system GMM and quantile regression can be used to solve the problem.

Table 3. Summary statistics

Variables	Number of observations	Mean	Standard deviation	Minimum	Maximum
L(FL)	589	3.398	0.441	2.456	4.025
L(TR)	526	21.51	1.807	15.89	24.90
L(FDI)	492	20.95	2.857	6.908	26.28
L(Rem)	540	20.85	2.354	14.42	25.15
L(Ex)	575	24.60	1.931	18.65	28.63
L(GE)	573	23.64	1.996	18.45	28.53
L(MR)	589	2.604	0.934	0.531	4.412
L(Ag)	589	1.942	2.493	-4.605	4.432
L(Indus)	589	2.485	0.653	0.0296	3.628
L(Ser)	589	3.917	0.640	2.251	4.592

Table 4. Results of CD test

Ho: There exists a cross-sectional dependence		
Test	Statistics	P-value
Pesaran CD Statistics	1.608	0.260
Pesaran LM Statistics	3.538	0.110
Friedman Statistics	102.288***	0.000
Breusch–Pagan's LM Statistics	6.451	0.174

Key: *** shows 1% significant

Table 5. Unit Root Test Result

	At Level			At 1st Difference		
Variables	Harris-Tzavalis	Im-Pesaran-Shin	Levin, Lin & Chut	Harris-Tzavalis	Im-Pesaran-Shin	Levin, Lin & Chut
LFL	0.845	0.874	-0.471	-22.35***	-8.765***	-5.613***
LTR	-1.265	2.746	3.70	-21.44***	10.13***	-6.304***
LFDI	1.247	1.246	1.024	-19.10***	9.956***	-6.152***
LRem	0.856	0.684	0.478	8.956***	8.956***	8.956***
LEx	1.246	-0.784	-0.073	-27.19***	-10.33***	-7.88***
LGE	-1.685	-2.846	-0.559	-21.93***	-10.177***	-7.82***
LMR	-1.975	1.848	0.875	-31.52***	-9.769***	-7.72***

Note: 1%, 5%, 10% significance level denoted by ***, ** and * respectively. Presume as trend and intercept

We continue to estimate numerous sets of models because the unit root findings imply that all variables are stationary at first differenced and N>T. According to Tables 6 to 13, the models contain static and dynamic panel data models that provide generalized least squares (GLS), QR, and two-step system GMM estimators, respectively. Table 6 indicates the log-log model of GLS and Quantile regression analysis. Column 1 shows the GLS regression of female employment, tourism, FDI, and other attributes. Columns 2, 3, and 4 show the different quantiles of regression, the three-phase like Q25, Q50, and Q75. In the QR models for Q25, Q50, and Q75, the coefficients of L(TR) to explain L(FL) are 0.236, 0.0874, and 0.0165, respectively, and these estimations are positive and significant. The variable L(FDI) also has a positive coefficient of 0.135, 0.137, and 0.0831, indicating that a one percent increase in FDI creates a way to woman employment of 0.135%, 0.137%, and 0.0831%, respectively. Women's employment is unaffected by the variables L(TR), L(Rem), and L(Ex) in the Generalized least Square Model (Model 1). L(GE) has a negative and significant impact on L(TR) in both the Q25, Q50, and Q75 models, with coefficient weights of -0.134, -0.155, and -0.162 respectively. Simultaneously, L(MR) coefficients show that if the child mortality rate decreases the women's employment rate, as evidenced by empirical estimates of Q25, Q50, and Q75, and all coefficients are significant.

Table 7 shows the log-log model including dynamic panel data estimation. The coefficient of columns 1, 2, and 3 show different models of two-step System-GMM. As a precaution, we removed the five nations with the highest and lowest adjusted tourism receipts (from columns 2 and 3 respectively) from consideration. Five of Asia's most popular tourist nations were deleted from Model 2 as a result. We omitted five of Asia's least-visited nations from Model 3. There is a statistically significant and beneficial impact on both regressions of tourism from the original data. The statistical credibility of our identification technique is supported by the fact that the Hansen test p-value for all models is above the threshold level of 0.05 (Hansen, 1982). It appears that tourism has a positive and causal effect on the employment of women, as shown in Table 7. In other words, the coefficient here is the percentage change in women's participation rates for a percentage difference in tourism. Columns 1,2, and 3 show that, the dynamic panel regression of our data. The coefficients of L(TR) are 0.720, 0.589, and 0.781 in the two-step System GMM model respectively to explain L(FL) and this estimation is positive and significant.

Table 6. GLS and QR model (Log of female labor force participation rate)

Variables	GLS	Q25	Q50	Q75
LTR	0.117***	0.236***	0.0874**	0.0165**
	(0.0224)	(0.0366)	(0.0351)	(0.0240)
LFDI	0.104***	0.135***	0.137***	0.0831***
	(0.0116)	(0.0190)	(0.0182)	(0.0124)
LRem	-0.0910***	-0.153***	-0.0974***	-0.0344***
	(0.0121)	(0.0197)	(0.0189)	(0.0129)
LEx	0.145***	0.0903	0.000889	0.0704
	(0.0459)	(0.0750)	(0.0719)	(0.0492)
LGE	-0.207***	-0.134**	-0.155***	-0.162***
	(0.0362)	(0.0591)	(0.0567)	(0.0388)
LMR	-0.183***	-0.281***	-0.195***	-0.0615*
	(0.0298)	(0.0487)	(0.0467)	(0.0320)
Constant	3.668***	3.973***	4.602***	4.615***
	(0.424)	(0.694)	(0.665)	(0.455)
Observations	381	381	381	381
Number of id	24			

Standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 7. System GMM (female employment)

Variables	Model 1	Model 2	Model 3
L.LFL	0.910***	0.721***	0.966***
	(0.0547)	(0.0306)	(0.0306)
LTR	0.720***	0.579***	0.781***
	(0.00778)	(0.00917)	(0.00917)
LFDI	0.00457**	0.00502*	0.00492*
	(0.00199)	(0.00263)	(0.00263)
LRem	-0.00311	-0.00258	-0.00268
	(0.00301)	(0.00866)	(0.00866)
LEx	0.0164	0.0155	0.0165
	(0.0102)	(0.0125)	(0.0134)
LGE	-0.0148	-0.00732	-0.00742
	(0.0121)	(0.00852)	(0.00952)
LMR	-0.0290*	-0.0298*	-0.0248*
	(0.0215)	(0.0224)	(0.0227)
Constant	1.579***	0.784**	0.798**
	(0.411)	(0.350)	(0.358)
Excluded	None	Top-5	Bottom-5
AR(1)	0.00	0.00	0.00
AR(2)	0.08	0.12	0.18
Hansen p-value	0.59	0.51	0.68
Sargan p-value	0.248	0.35	0.249
Observations	435	367	367
Number of id	27	22	22

Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

The variable L(MR) shows a negative coefficient like as -0.0290, -0.298, and -0.0248, which means one percent of the decrease in female child mortality rate, increase an approach to woman employment which are 0.0290%, 0.0298%, and 0.0248% respectively for all dynamic models. The variables L(FDI), L(Ex), and L(GE) have a positive impact on female employment. In the dynamic panel estimation, the dynamic GMM model estimates the desired output where log tourism has a remarkable contribution to raising woman empowerment in a particular panel study area.

In considered reliable, the difference and system GMM estimations must be based on the assumption that the error term does not exhibit serial correlation. The p-values in AR(2) are greater than 5%, and all models are insignificant. Because AR(2) rejects the null hypothesis,

it may be concluded that the first-differenced error has no serial correlation at order 2 in either difference or system GMM models. The Hansen and Sargan test for the joint validity of instruments in GMM models is crucial because of the assumption that instruments are exogenous. According to the null hypothesis, the instruments are exogenous; if the null hypothesis is rejected, the instrumental variables are linked to some residuals, and thus they are invalid. Due to the Hansen and Sargen p-values being greater than 5%, the null hypothesis of joint validity is not rejected in both the difference and system GMM estimations. A difference and system GMM approach can be used to estimate the percentage of women in the labor force utilizing the instrument variables as a whole.

Table 8 indicates the log-log model of GLS and quantile regression analysis. Column 1 shows the GLS regression of female employment in the agricultural sector, tourism, FDI, remittance, export, and other attributes. Women's employment is positively affected by the variables L(Rem), L(Ex), and L(MR) in the Generalized least square model (Model 1). Although L(TR), L(FDI), and L(GE), have a negative impact on women's employment in the GLS model. Columns 2, 3, and 4 show the different quantiles of regression, the three-phase like Q25, Q50, and Q75. In the QR models for Q25, Q50, and Q75, the coefficients of L(TR) to explain L(FL) are -0.166, -0.0398, and 0.0546 respectively, and these estimations are negative and significant. If tourist arrival increases by 1% in Asian countries, female employment in the agricultural sector will also decrease by 0.166% and 0.0398%. Similarly, L(FDI) and L(GE) have a negative impact on women's employment in the GLS model with coefficient weights -0.0208, -0.0781, -0.0716, and -0.387, -0.501,

and -0.323 respectively. The variable L(Rem) has a positive coefficient for all quantiles of 0.633, 0.334, and 0.146, indicating that a one percent increase in government expenditure creates a way to women's employment of 0.633%, 0.334%, and 0.146%, respectively. Similarly, L(Ex), and L(MR) have positive coefficients in all quartiles.

Table 9 shows the log-log model including dynamic panel data estimation. The coefficient of columns 1, 2, and 3 show different models of two-step System-GMM. As a precaution, we removed the three Asian nations with the highest and lowest adjusted tourist arrivals (from columns 2 and 3 respectively) from consideration. This study removed the five Asian nations with the highest and lowest adjusted tourism receipts (from columns 2 and 3 respectively) from consideration. Five of Asia's most popular tourist nations were deleted from Model 2 as a result. We omitted five of Asia's least-visited nations from Model 3. There is a statistically significant and beneficial impact on both regressions of tourism from the original data. The statistical credibility of our identification technique is supported by the fact that the Hansen test p-value for all models is above the threshold level of 0.05. In other words, the coefficient here is the percentage change in women's participation rates in agriculture for a percentage difference in tourism. The coefficients of L(TR) are -0.0500, -0.0500, and -0.0469 in the two-step System GMM model respectively to explain L(FL) and this estimation is negative which means one percent of the increase in tourism, decrease an approach to woman employment which are 0.0500%, 0.0500%, and 0.0469% respectively for all dynamic models. The other variables of the model have a positive impact on female employment, despite the small magnitudes.

Table 8. GLS and Quantile Regression (female employment in agriculture)

Variables	GLS	Q25	Q50	Q75
LTR	-0.337***	-0.166**	-0.0398***	0.0546***
	(0.0890)	(0.226)	(0.0757)	(0.0475)
LFDI	-0.0379	-0.0208	-0.0781**	-0.0716***
	(0.0461)	(0.117)	(0.0392)	(0.0246)
LRem	0.590***	0.633***	0.334***	0.146***
	(0.0480)	(0.122)	(0.0408)	(0.0256)
Lex	0.596***	0.321	0.495***	0.272***
	(0.182)	(0.464)	(0.155)	(0.0974)
LGE	-0.474***	-0.387	-0.501***	-0.323***
	(0.144)	(0.366)	(0.122)	(0.0768)
LMR	0.753***	0.767**	0.740***	0.650***
	(0.119)	(0.302)	(0.101)	(0.0633)
Constant	-7.522***	-8.424*	-4.194***	-0.343
	(1.688)	(4.293)	(1.435)	(0.901)
Observations	381	381	381	381
Number of id	24			

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 9. Dynamic GMM (female employment in agriculture)

Variables	Model 1	Model 2	Model 3
LLAg	0.434**	0.681***	0.622***
	(0.175)	(0.150)	(0.175)
LTR	-0.0500	-0.0500	-0.0469
	(0.0753)	(0.0756)	(0.0819)
LFDI	0.0194	0.0235	0.0206
	(0.0187)	(0.0202)	(0.0219)
LRem	-0.0198	0.0282	0.0380
	(0.0267)	(0.0397)	(0.0366)
LEx	0.0220	-0.0957	-0.0686
	(0.109)	(0.0839)	(0.0978)
LGE	-0.0846	0.143**	0.126*
	(0.0848)	(0.0723)	(0.0710)
LMR	0.0238	0.178**	0.165
	(0.206)	(0.0902)	(0.126)
Constant	3.722	-1.285	-1.766
	(3.087)	(1.657)	(2.137)
Excluded	None	Top-5	Bottom-5
AR(1)	0.00	0.00	0.00
AR(2)	0.08	0.12	0.18
Hansen p-value	0.32	0.25	0.168
Sargan p-value	0.24	0.35	0.249
Observations	335	350	334
Number of id	24	24	24

Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 10 indicates the log-log model of GLS and quantile regression analysis. Column 1 shows the GLS regression of women's employment in the industrial sector, tourism, FDI, remittance, export and government expenditure, and mortality rate. Women's employment in Asia is positively affected by variables like L(TR), L(Rem), and L(Ex) in the Generalized least square model (Model 1). Besides that, L(FDI), L(GE), and L(MR) have a negative impact on women's employment in the GLS model. Columns 2, 3, and 4 show the different quantiles of regression, the three-phase like Q25, Q50, and Q75. In the QR models for Q25, Q50, and Q75, the coefficients of L(TR) to explain L(FL) are 0.0186, 0.0763, and 0.0408 respectively, and these estimations are positive. If tourism increases by 1% in Asian countries, female employment in the industrial sector will also increase by 0.0186%, 0.0763%, and 0.0408%. The variable L(Rem) also has a positive and significant coefficient for all quantiles of 0.172, 0.0587, and 0.0540, indicating that a one percent increase in foreign direct investment creates a way to women's employment of 0.172%, 0.0587%, and 0.0540%, respectively. The variable L(Ex) also has a coefficient for all quantiles of 0.0902, 0.205, and 0.236, indicating that a one percent increase in export creates a way to women's employment of 0.0902%, 0.205%, and 0.236% respectively. However, L(FDI) has a negative and significant impact on L(FL) in all the Q25, Q50, and Q75 models, with coefficient weights of -0.0991, -0.0948, and

-0.133, respectively. Therefore, the L(FDI) coefficients reveal a considerable decrease in women's employment in the industrial sector when foreign direct investment increases. L(GE) shows positive relation in the Q25 model with coefficient weights 0.0254 and shows the negative quantile for Q50 and Q75 models. L(MR) has a negative and significant impact on L(FL) in all the Q25, Q50, and Q75 models, with coefficient weights -0.135, -0.0638, and -0.143, respectively. Therefore, the L(MR) coefficients reveal a considerable decrease in women's employment in the industrial sector when the infant mortality rate increases.

Table 11 shows the log-log model including dynamic panel data estimation. The coefficient of columns 1, 2, and 3 show different models of two-step System-GMM. As a precaution, we removed the five Asian nations with the highest and lowest adjusted tourist arrivals (from columns 2 and 3 respectively) from consideration. As a result, three of Asia's most popular tourist nations were removed from Model 2, and three of Asia's least-visited states were eliminated from Model 3. The coefficients of L(TR) are -0.0310, -0.0331, and -0.0293 in the two-step System GMM model respectively to explain L(FL) in the industry sector and this estimation is negative. The variables L(FDI), L(Ex), and L(MR) also show negative coefficients. The variables L(Rem) and L(GE) show a positive impact on female employment which shows in all the coefficients.

Table 10. Quantile regression (female employment in the industrial sector)

Variables	GLS	Q25	Q50	Q75
LTR	0.0132	0.0186	0.0763**	0.0408
	(0.0307)	(0.0476)	(0.0353)	(0.0261)
LFDI	-0.119***	-0.0991***	-0.0948***	-0.133***
	(0.0159)	(0.0247)	(0.0183)	(0.0135)
LRem	0.158***	0.172***	0.0587***	0.0540***
	(0.0165)	(0.0257)	(0.0190)	(0.0140)
LEx	0.203***	0.0902	0.205***	0.236***
	(0.0628)	(0.0975)	(0.0723)	(0.0534)
LGE	-0.108**	0.0254	-0.115**	-0.0946**
	(0.0496)	(0.0769)	(0.0570)	(0.0421)
LMR	-0.141***	-0.135**	-0.0638	-0.143***
	(0.0408)	(0.0634)	(0.0470)	(0.0347)
Constant	-0.744	-2.282**	-0.496	0.325
	(0.581)	(0.902)	(0.669)	(0.494)
Observations	481	481	481	481
Number of id	28			

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 11. Static and Dynamic GMM (female employment in the industry)

Variables	Model 1	Model 2	Model 3
L.LIndus	0.929***	0.955***	0.938***
	(0.0265)	(0.0594)	(0.0574)
LTR	-0.0310	-0.0331	-0.0293
	(0.0318)	(0.0312)	(0.0243)
LFDI	-0.0126	-0.0123	-0.0112
	(0.00785)	(0.00836)	(0.00722)
LRem	0.0267***	0.0256**	0.0236**
	(0.0103)	(0.0104)	(0.00992)
LEx	-0.0446**	-0.0477**	-0.0660**
	(0.0211)	(0.0208)	(0.0276)
LGE	0.0570	0.0599	0.0822*
	(0.0392)	(0.0393)	(0.0442)
LMR	-0.0123	-0.0144	0.0132
	(0.0415)	(0.0361)	(0.0333)
Constant	0.325	0.400	0.161
	(0.463)	(0.405)	(0.386)
Excluded	None	Top-5	Bottom-5
AR(1)	0.00	0.00	0.00
AR(2)	0.08	0.12	0.18
Hansen p-value	0.59	0.51	0.68
Sargan p-value	0.18	0.35	0.42
Observations	367	350	334
Number of id	24	24	24

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 12 indicates the log-log model of GLS and quantile regression analysis. Column 1 shows the GLS regression of female employment in the service sector, tourism, FDI, remittance, export and government expenditure, and mortality rate. Women's employment is positively affected by the variables L(TR), and L(FDI) in the Generalized least square model (Model 1). L(Rem), L(Ex), L(GE), and L(MR) have a negative impact on women's employment in the GLS model. Columns 2, 3, and 4 show the different quantiles of regression, the three-phase like Q25, Q50, and Q75. In the QR models for Q25, Q50, and Q75, the coefficients of L(TR) to explain L(FL) are 0.0446, 0.128, and 0.118, respectively, and these estimations are positive and significant. If tourism increases by 1% in Asian countries, female employment in the service sector will also increase by 0.0446%,

0.128%, and 0.118%. The coefficients of L(FDI) to explain L(FL) are 0.0775, 0.0461, and 0.00984 respectively, and these estimations are positive and significant indicating that a one percent increase in foreign direct investment creates a way to women's employment of 0.0775%, 0.0461%, and 0.00984%. L(Rem) has a negative and significant impact on L(FL) in all the Q25, Q50, and Q75 models, with coefficient

weights -0.134, -0.120, and -0.0872, respectively. Simultaneously, L(Ex), L(GE), and L(MR) have also shown a negative impact in all the Q25, Q50, and Q75 models. Therefore, the L(GE) coefficients reveal a considerable decrease in women's employment in the service sector when remittance, export, government expenditure, and mortality rate increase.

Table 12. Quantile Regression (female employment in the service sector)

Variables	GLS	Q25	Q50	Q75
LTR	0.115***	0.0446**	0.128***	0.118***
	(0.0176)	(0.0217)	(0.0226)	(0.0340)
LFDI	0.0445***	0.0775***	0.0461***	0.00984
	(0.00915)	(0.0112)	(0.0117)	(0.0176)
LRem	-0.109***	-0.134***	-0.120***	-0.0872***
	(0.00951)	(0.0117)	(0.0122)	(0.0183)
LEx	-0.0438	-0.0359	-0.0477	-0.0176
	(0.0362)	(0.0445)	(0.0464)	(0.0696)
LGE	-0.0886***	-0.0971***	-0.0938**	-0.0256
	(0.0285)	(0.0351)	(0.0366)	(0.0549)
LMR	-0.312***	-0.370***	-0.306***	-0.108**
	(0.0235)	(0.0289)	(0.0302)	(0.0452)
Constant	6.879***	8.199***	6.993***	4.629***
	(0.335)	(0.411)	(0.429)	(0.644)
Observations	481	481	481	481
Number of id	24			

Standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 13 shows the log-log model including dynamic panel data estimation. The coefficient of columns 1, 2, and 3 show different models of two-step System-GMM. As a precaution, we removed the five Asian nations with the highest and lowest adjusted tourist arrivals (from columns 2 and 3 respectively) from consideration. As a result, three of Asia's most popular tourist nations were removed from model 2, and three of Asia's least-visited states were eliminated from Model 3. The coefficients of L(TR) are 0.0747, 0.658, and 0.0842 in the two-step System GMM model respectively to explain L(FL) and this estimation is positive. The coefficients of L(FDI), and L(Ex) also show a positive impact on female employment. In the two-step System GMM model, the coefficient of L(FDI) are 0.00358, 0.00318, and 0.00341; L(Ex) are 0.0193, 0.0173, and 0.0183. However, even though the magnitudes are quite small, the coefficients are all positive. The variables L(Rem), L(GE), and L(LMR) have negative coefficients for all statics and dynamic GMM. According to our findings, an increase in female involvement in the industry and service sectors was caused by an increase in tourism which is shown in Figure 2.

The results of the current study are consistent with those found in previous research carried out by Nassani et al. (2019), Hutchings et al. (2020), Zhang and Zhang (2020), and Abou-Shouk et al (2021). Women find it much simpler to enter the tourism industry as a result of the increased education and training opportunities provided by the tourism industry during the employment process. This also stimulates women's entrepreneurial endeavors and employment opportunities within the tourism industry. The growth of tourism in Asian nations also results in more educational opportunities and professional training for women. For instance, in Muslim nations in west Asia, cultural traditions limit women's educational options to conventional "female" fields of study, and their choice to pursue education in traditionally "masculine" subjects is frequently looked down upon by society. In this regard, tourism, which is considered to be a more "feminine" subject, means greater educational options for women, which in turn assures that more women can be engaged in the tourism industries in these more traditional nations (Zhang and Zhang, 2020).

Table 13. Static and Dynamic GMM (female employment in the service sector)

Variables	Model 1	Model 2	Model 3
L.LSer	0.896***	0.874***	0.899***
	(0.0474)	(0.0484)	(0.0458)
LTR	0.0747***	0.658***	0.0842***
	(0.00576)	(0.00576)	(0.00576)
LFDI	0.00358	0.00318	0.00341
	(0.00259)	(0.00259)	(0.00259)
LRem	-0.0189	-0.0162	-0.0159
	(0.00506)	(0.00506)	(0.00506)
LEx	0.0193	0.0173	0.0183
	(0.0196)	(0.0196)	(0.0196)
LGE	-0.0145	-0.0165	-0.0158
	(0.0278)	(0.0278)	(0.0278)
LMR	-0.0425	-0.0399	-0.0438
	(0.0485)	(0.0485)	(0.0485)
Constant	0.459	0.459	0.459
	(0.457)	(0.457)	(0.457)
Excluded	None	Top-5	Bottom-5
AR(1)	0.00	0.00	0.00
AR(2)	0.08	0.12	0.18
Hansen p-value	0.59	0.51	0.68
Sargan p-value	0.24	0.52	0.38
Observations	467	367	367
Number of id	29	24	24

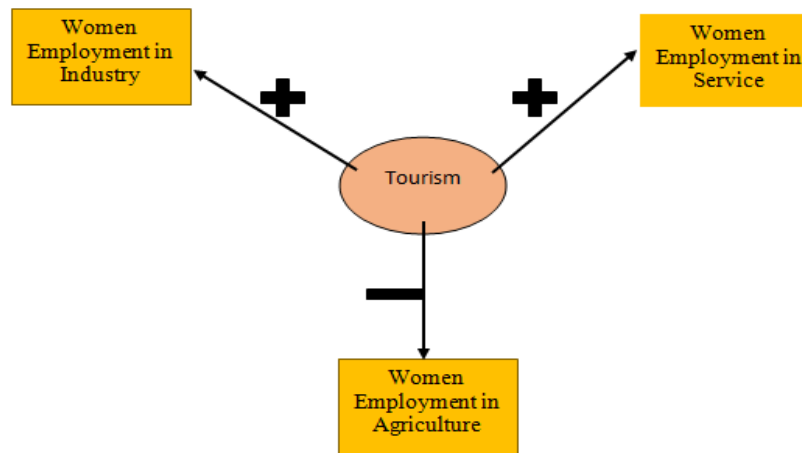Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Figure 2. Women's labor force participation in three sectors

The growth of the tourism industry provides women with increased political rights in addition to improved economic, employment, and educational opportunities. Additionally, women have increased opportunities to enter positions of authority because of the tourism industry. Countries such as the Philippines, Cambodia, and Georgia all have females serving in the position of tourism minister. This effectively closes the gender gap that exists between men and women in the decision-making process of high-level political positions. It's interesting to note that all three nations also fare well on the index measuring gender equality in Asia. The Philippines, in particular, has consistently ranked among the top ten countries in the world in this category. This

lends credence to the idea that tourism's stellar performance in terms of supporting political empowerment is a factor in the achievement of gender equality in Asia. When taken as a whole, the economic, employment, educational, and political empowerment that have resulted from tourism in Asia have made a substantial contribution to gender equality (Zhang and Zhang, 2020).

The findings of this study revealed that financial intermediaries have a catalytic role in the process of empowering women through foreign travel and tourism. Tourism has the potential to economically empower women by providing them with opportunities for business, realizing the concept of women's independence, and highlighting their role in supporting the livelihoods of their families (Abou-Shouk et al., 2021). This would not only fulfill the fifth Sustainable Development Goal (gender equality and women's empowerment), but it would also fulfill the first and eighth goals (no poverty and decent and economic growth respectively). In addition to economic empowerment, community members' pride in traditions and local culture leads to residents having a sense of self-esteem and uniqueness and positively influences their attitudes toward the positive impacts of sustainable tourism development (Abou-Shouk et al., 2021). The residents' sentiments of pride in their nation's heritage and local culture are the most essential component of women's psychological empowerment, which stimulates their support for the growth of tourism. This is because these residents feel pride in their own country. In addition, the participation of women in activities related to tourism is essential to developing a feeling of community cohesion in the local community. It is possible to deepen women's ties to their communities by ensuring their full and active involvement in those communities. As a result of this, we have arrived at the conclusion that social empowerment is a crucial stimulant that contributes to good sentiments held by locals regarding the development of sustainable tourism. In addition, encouraging the self-determination of women in any community necessitates a focus on politics, which in turn necessitates the inclusion of women in the process of decision-making. However, Ferguson (2011) argued that even though the growth of tourism could, in theory, contribute to gender equality and women's empowerment, a substantial re-framing of policies is required in order to be able to maximize the potential of tourism development.

Conclusion and Policy Recommendations

This research uses a system of GMM, GLS, and quantile regression methods. This study takes into account GDP, trade, female child mortality, and urban population. We looked into the influence of tourism on women's labor market employment and discovered that it had a considerable impact. According to our findings, an increase in female involvement in the industry and service sectors was caused by an increase in tourism. The research also considers the efficacy of alternative approaches to dealing with different models of female workforce engagement in various industries. Tourism increases women's work chances in the industry and service sectors, while it decreases employment opportunities in the agricultural sector. Future research and policy discussions on the impact of tourism sectors on women's employment will benefit from the findings of this study. These studies can aid in the formulation of employment-related policy initiatives. This research was based on the idea that policymaking is a social process that involves contact, negotiation, and collaboration among women and other tourist stakeholders. It emphasizes the importance of women's engagement in tourism in boosting the country's GDP and the hospitality industry's overall long-term growth. It is concerned with documenting and assessing the realities of policymaking from the policymaker's social and economic viewpoints and building understanding from the bottom up through empowering and engaging women in the tourist sector. This study can help countries' national tourism organizations figure out how to get the optimum output from tourism by integrating women into the industry. As this research is conducted in Asia, the tourism planner of these regions will get an overall view of women's participation and their contribution to the tourism industry. This research will help them to renovate the tourism industry in their future master plan through the incorporation of women in the tourism industry.

This research paper provides some implications to incorporate some issues in the tourism strategic plan. Firstly, tourism in gender-sensitive legislation and macroeconomic policy be implemented to promote women's engagement and gender parity. Secondly, skill development, leadership and gender equality training for women can play a substantive role in the tourism sector. Thirdly, national tourism policies must encompass gender equality, women's participation in the workforce, training, financial incentives, and promotion. Fourthly, to support grassroots women's organizations in tourism towns and make it as easy as possible for women to join and lead the workforce across the tourism industry. Fifthly, to develop and implement methods that encourage equal pay for women in all facets of the tourism industry. Sixthly, targeted interventions by the public, private, and civil society actors, such as advocating equal pay, addressing sexual harassment, and hiring women into high-level roles, can help to promote good employment for women in tourism. Lastly, gender equality outcomes are enhanced by investing in women's training, particularly soft skills training, and raising awareness of various training alternatives, as well as gender equality mentoring across the industry. When ties are created with all stakeholders

from the root level to the top-level organization, tourism can empower women politically and socially.

Even though the current study has produced significant empirical findings on how tourism affects women's employment in Asian countries, our methodology has several flaws which need to be addressed in future research. Because it was impossible to obtain data from either before or after the period possible to obtain data from either before or after the period that was being researched, the prediction potential of the econometric methodologies was significantly reduced as a result. This was one of the major limitations that our study had to contend with. In future work, the relationship between the factors that were examined may be investigated utilizing data from national time series. In addition, cultural variables may play an essential influence on gender equality which was not investigated in the current study due to constraints in the availability of data. Therefore, determining the extent to which culture has an impact on the connection between tourism, women's employment, and gender equality appears to be something that will be both intriguing and significant in the years to come. Therefore, further research may be carried out by broadening the proxies for women's employment and gender equality through the incorporation of a greater number of segmented variables. This would result in a deeper comprehension of the effect that tourism has on women's employment.

Conflict of interest: The authors declare no conflict of interest.

References

Abou-Shouk, M. A., Mannaa, M. T., & Elbaz, A. M. (2021). Women's empowerment and tourism development: A cross-country study. *Tourism management perspectives*, *37*, 100782

Alarcón, D. M., & Cole, S. (2019). No sustainability for tourism without gender equality. *Journal of Sustainable Tourism*, 27, 903-919.

Alrwajfah, M. M., Almeida-García, F., & Cort´es-Macías, R. (2020). Females' perspectives on tourism's impact and their employment in the sector: The case of Petra, Jordan. *Tourism Management,* 78, 104069.

Asongu, S. A., & Odhiambo, N. M. (2020). Foreign direct investment, information technology and economic growth dynamics in Sub-Saharan Africa. *Telecommunications Policy*, 44(1), 101838.

Batuo, M., Mlambo, K., & Asongu, S. (2018). Linkages between financial development, financial instability, financial liberalisation and economic growth in Africa. *Research in International Business and Finance*, *45*, 168-179.

Besamusca, J., Tijdens, K., Keune, M., & Steinmetz, S. (2015). Working women worldwide. Age effects in female labor force participation in 117 countries. *World Development*, *74*, 123-141.

Burrell, J., Manfredi, S., Rollin, H., Price, L., & Stead, L. (1997). Equal opportunities for women employees in the hospitality industry: A comparison between France, Italy, Spain and the UK. *International Journal of Hospitality Management*, 16(2), 161–179.

Chon, K. (2021). APacCHRIE and Evolution of the Asian Paradigm of Hospitality. *Journal of Hospitality & Tourism Research*, *45*(5), 945-948.

Cohen, S. A., & Cohen, E. (2019). New directions in the sociology of tourism. *Current Issues in Tourism*, *22*(2), 153-172.

Eng, D. L. (2006). Political economics of passion: Transnational adoption and global woman: Roundtable on global woman. *Studies in Gender and Sexuality*, *7*(1), 49-59.

Ferguson, L. (2009). *Analysing the gender dimensions of tourism as a development strategy* (Vol. 2009, No. 03). Instituto Complutense de Estudios Internacionales (ICEI).

Ferguson, L. (2011). Promoting gender equality and empowering women? Tourism and the third millennium development goal. *Current Issues in Tourism,* 14(3), 235–249.

Figueroa-Domecq, C., de Jong, A., & Williams, A. M. (2020). Gender, tourism & entrepreneurship: A critical review. *Annals of tourism research*, 84, 102980.

Figueroa-Domecq, C., Pritchard, A., Segovia-P´erez, M., Morgan, N., &Villac´e-Molinero, T. (2015). Tourism gender research: A critical accounting. *Annals of Tourism Research,* 52, 87–103.

Font, X., Garay, L., & Jones, S. (2016). Sustainability motivations and practices in small tourism enterprises in European protected areas. *Journal of Cleaner Production*,137, 1439–1448.

Gousiou, A., & Lagos, D. (2021). The Gender Dimension in Secondary Vocational Tourism Education. *In Gender and Tourism*. Emerald Publishing Limited.

Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators. *Econometrica: Journal of the econometric society, 50,* 1029-1054.

Hussain, S., & Rasheed, A. (2022). The significance of confidence and own financial literacy: Gender Diversity in asset behaviour. *Journal of Social Sciences and Management Studies, 1*(2), 1-6.

Hutchings, K., Moyle, C. L., Chai, A., Garofano, N., & Moore, S. (2020). Segregation of women in tourism

employment in the APEC region. *Tourism Management Perspectives*, *34*, 100655.

Kumari, R. (2018). Economic growth, disparity, and determinants of female labor force participation: A research agenda. *World Journal of Entrepreneurship, Management and Sustainable Development*, *14*(2), 138-152.

Mishra, P. K., Mishra, S. K., & Sarangi, M. K. (2020). Do women's advancement and gender parity promote economic growth? Evidence from 30 Asian countries. *Millennial Asia*, *11*(1), 5-26

Nassani, A. A., Aldakhil, A. M., Abro, M. M. Q., Islam, T., & Zaman, K. (2019). The impact of tourism and finance on women empowerment. *Journal of Policy Modeling*, 41(2), 234-254.

Norris, J., & Wall, G. (1994). Gender and tourism. *Progress in tourism, recreation and hospitality management*, *6*, 57-78.

Nyasha, S., Odhiambo, N. M., & Asongu, S. A. (2021). The impact of tourism development on economic growth in Sub-Saharan Africa. *The European Journal of Development Research*, *33*(6), 1514-1535.

Pritchard, A., Morgan, N., Ateljevic, I., & Harris, C. (2007). Editors' introduction: Tourism, gender, embodiment and experience. In A. Pritchard, N. Morgan, I. Ateljevic, & C. Harris (Eds.), Tourism and gender: Embodiment, sensuality and experience (pp. 1–12). Wallingford: CABI.

Pritchard, A., & Morgan, N. (2016). Gender. In J. Jafari, & H. Xiao (Eds.). Encyclopedia of tourism, Springer. Retrieved from: https://link.springer.com/referenceworkentry/10.1007%2F978-3-319-01384-8_261

Putra, I. G. N. E., Dendup, T., & Januraga, P. P. (2021). The roles of women empowerment on attitude for safer sex negotiation among Indonesian married women. *Women & Health*, *61*(1), 95-108.

Raihan, A., Muhtasim, D. A., Pavel, M. I., Faruk, O., & Rahman, M. (2022). Dynamic impacts of economic growth, renewable energy use, urbanization, and tourism on carbon dioxide emissions in Argentina. *Environmental Processes, 9*, 38.

Raihan, A., & Tuspekova, A. (2022a). Nexus between emission reduction factors and anthropogenic carbon emissions in India. *Anthropocene Science, 1*, 295-310.

Raihan, A., & Tuspekova, A. (2022b). Dynamic impacts of economic growth, energy use, urbanization, tourism, agricultural value-added, and forested area on carbon dioxide emissions in Brazil. *Journal of Environmental Studies and Sciences*, 12, 794-814.

Raihan A., Tuspekova A. (2022c) Dynamic impacts of economic growth, renewable energy use, urbanization, industrialization, tourism, agriculture, and forests on carbon emissions in Turkey. *Carbon Research, 1*, 20.

Raihan A., Tuspekova A. (2022d) Towards sustainability: dynamic nexus between carbon emission and its

determining factors in Mexico. *Energy Nexus, 8*, 100148.

Raihan, A., & Tuspekova, A. (2022e). The nexus between economic growth, energy use, urbanization, tourism, and carbon dioxide emissions: New insights from Singapore. *Sustainability Analytics and Modeling, 2*, 100009.

Raihan, A., Tuspekova, A. (2022f) Toward a sustainable environment: nexus between economic growth, renewable energy use, forested area, and carbon emissions in Malaysia. *Resources, Conservation & Recycling Advances, 15*, 200096.

Raihan, A., Tuspekova, A. (2022g) Nexus between energy use, industrialization, forest area, and carbon dioxide emissions: New insights from Russia. *Journal of Environmental Science and Economics, 1*(4), 1-11.

Rinaldi, A., & Salerno, I. (2020). The tourism gender gap and its potential impact on the development of the emerging countries. *Quality & Quantity*, *54*(5), 1465-1477.

Swain, M. (1993). Women producers of ethnic arts. *Annals of Tourism Research,* 20(1), 32–51.

Tambunan, T. (2009). Women entrepreneurship in Asian developing countries: Their development and main constraints. *Journal of development and Agricultural Economics*, *1*(2), 027-040

Tanaka, S. and Muzones, M. (2016). Female Labor Force Participation in Asia: Key Trends, Constraints, and Opportunities. *ADB Briefs,* Asian Development Bank.

Truong, D., Giao, N., & Ly, L. (2020). Factors affecting the role of women in the economic development of rural household families in Vietnam: A case study in Trieu Son district Thanh Hoa province. *Accounting*, *6*(3), 267-272.

UNWTO (2017). *UNWTO/GTERC Annual Report on Asia Tourism Trends,* World Tourism Organization and Global Tourism Economy Research Centre, UNWTO, Madrid. https://doi.org/10.18111/9789284419111

UNWTO (2019). *Global Report on Women in Tourism – Second Edition*, UNWTO, Madrid. https://doi.org/10.18111/9789284420384.

Voumik, L. C., Islam, M. J., Raihan, A. (2022) Electricity production sources and CO_2 emission in OECD countries: static and dynamic panel analysis. *Global Sustainability Research, 1*(2), 12-21.

WTTC (2020). *Economic Impact Reports*. Available at: https://wttc.org/Research/Economic-Impact#:~:text=In%202020%2C%2062%20million%20jobs,to%20334%20million%20in%202019

Yang, E. C. L., Yang, M. J. H., & Khoo-Lattimore, C. (2019). The meanings of solo travel for Asian women. *Tourism Review, 74*(5), 1047-1057.

Zhang, J., & Zhang, Y. (2020). Tourism and gender equality: An Asian perspective. *Annals of Tourism Research*, *85*, 103067.

RESEARCH ARTICLE

To Study the Reaction of the Investors in Trading Behaviour in Bursa Malaysia Based on KLSE Market Index Performance

Yeoh Wee Win

School of Business, INTI International College, Penang Malaysia

Abstract

The investor's behaviour had always raised eyebrows on the behaviour towards the trading activities within the stock market exchange. As the major secondary market of the trading activities of the stock investments, it is understood that it is importance to understand the behaviour of the investors as higher trading activities in the stock market exchange will promote better stability of the stock market. The study is aimed to explore the potential reach of the investors in trading behaviour in Bursa Malaysia with reference to the performance of the KLSE market index. The previous study had suggested that the better stock market performance will provide the investors with higher confidence in the stock performance which will motivate the higher trading volume in the market. With this, the methodology of the quantitative research had studied the historical data for the past 20 years to understand the behaviour and pattern between the movement of the KLSE market index growth against the trading volume growth within the Bursa Malaysia. The outcome of the study provides ethe evidence that suggest there is no relevance of the correlation observed between the KLSE market index growth and the trading volume growth as well as there is no significant relationship detected between the two variables. This had been a significant contribution based on the outcome of the study which put forward further suggestion on the future research area for the benefits of academic.

Keywords: market index; trading volume; KLSE market index; investor's behavioural

Introduction

Within the field of investment finance, the research had concentrated mostly on the patterns of behavior of individual investors. Investment finance focuses on the patterns of behavior that shape an individual's approach to the strategic use of capital. There has been a strong correlation between economic growth and stock market performance; when the economy is doing well, stock prices tend to rise, and vice versa. To back up this claim, consider that investors benefit from a positive feedback loop consisting of a rise in investment growth and a rise in economic prosperity (Iqbal & Riaz, 2015). As a result of investors' increased confidence in the stock market's future success, the stock market as a whole has been experiencing increased trading activity (He et al., 2020).

A good illustration of the damage that can be done to investor confidence is the Great Depression-era stock market crash of 2008, which occurred after investors had lost a lot of money as a result of the Great Recession (Sheta, Ahmed & Faris, 2015). This proved that investors' faith in the stock market was being impacted by the state of the economy. Because of the belief that a recession will lead to a drop in stock market performance, investor sentiment and

behavior tend to adopt a more cautious tack during this time (Batrinca, Hesse & Treleaven, 2018). Due to the high level of uncertainty, which can result in a high level of exposure to potential loss, investors are typically advised to decrease their desire to invest in the stock market. The result is a decrease in the investor's risk tolerance and an increase in their comfort level with engaging in high-volume trading in an effort to mitigate portfolio volatility (He et al., 2020).

This was fundamental for research into the financial markets, where supply and demand for secondary investments sometimes serve as a key impetus behind the kind of trading that boosts a stock's value on the stock exchange (Chiah & Zhong, 2020). This is due to the fact that stocks with a lot of trading volume often receive a boost that helps them attain their full potential. That is to say, an increase in the amount of stock market transactions will lead to an increase in the synergy between economic growth and stock market performance (Choi, 2019). This study was inspired by the need for more in-depth research on the validity of the relationship between trading volume and the movement of stock prices within a stock market, as well as by the fact that there is currently a dearth of such evidence to support this investment concept. In order to determine the importance of this research's aims, it will make use of the

market index maintained by the Kuala Lumpur Stock Exchange (KLSE).

Literature Review

The concept of rational expectations theory is shown through an example in which a change in the environment prompts a forecast of future changes in macroeconomics and investment growth potential (Widyarti, Wahyudi & Hersugondo, 2021). The risk-averse investors tend to display their conservative side in decision making in investment choice, leading to the expectations drawn on the investors to avoid risky investment in risk times, which may be studied in close relation to the rational expectations theory. It is hypothesized in the current study that investors will become more risk-averse and cut back on their stock market trading activity if the market has recently seen poor performance. This theory is in line with previous research on investors' reactions to market shifts (Batrinca, Hesse & Treleaven, 2018). This would mean that investors' decisions about whether or not to put money into the stock market would be driven by the ups and downs of the market index and the performance of individual stocks. When the stock market as a whole performs better, investors will have more faith in the further rise of stock prices, which should translate to more trading and investing activity on their part (He et al., 2020).

According to Choi (2019), market indices have "been the indicated for economists and financial experts to reference to in order to comprehend the pattern and performance of the stock market over a given period of time." Business value and performance typically follow the economic situation in a country, therefore boom and recession in the economy will become the reason for the rise and fall in the stock market, as emphasized by Tapa & Hussin (2016). For instance, the recent Covid-19 had observed the major fall in the economy recording one of the words recessions in the history where the negative impact was highly felt in the stock market in many countries where the stock market observe the sharp fall in the market indices indicating a significant pitfall for the stock performance in the stock market (Chiah & Zhong, 2020). As a result, investors are likely to pull back from a variety of stock market investments in an effort to limit their exposure to the danger of losing their initial capital.

Souza, Barbedo, and Araujo (2018) pointed out that investors' stock market trading behavior can be inferred from the volume of trades, with investors more likely to participate in the market if its present expansion sends a strong positive signal to them. In making investment decisions, investors increasingly look to market indices for direction and reference; a rising market index gives the appearance that the stock market is growing, drawing in more investors to the secondary market. According to Al-Ajmi (2017), rising stock market activity is a sign that investors are optimistic about the prospects for future

growth and returns on their stock holdings. Investors are subject to the whims of the stock market's indices, which rise and fall as a signal to buy or sell in the present market (Iqbal & Riaz, 2015).

There are evidences supplied from past findings that point to the potential of a strong relationship between the market index and the amount of trading in the stock market, which can be found by referencing the prior study. The following hypotheses were generated to highlight the anticipated findings for the current investigation; they will be put to the test in the study's findings and conclusions.

H0: There is no positive relationship between the market index performance against the trading behaviour for the investors.

H1: There is positive relationship between the market index performance against the trading behaviour for the investors.

Methodology

Adopting a quantitative study approach, with quantitative analysis centered on the observation of data input of numerical data acting as the unit of study, is at the heart of this investigation's methodology. In the field of economics and finance, where numerical measurement is typically used to enter data, quantitative studies are frequently conducted since such analyses are more suited to examining the data for patterns and trends that may indicate the presence of a substantial effect (Apuke, 2017). When it comes to making conclusions, the quantitative method of analysis is defined as providing more objective findings that will serve as actual evidence for the study, leaving no room for question or scenarios under which the research could be rejected by other opinions (Sharela, 2016). The current study will use a deductive reasoning technique, where the results will be used as a benchmark for testing hypotheses in order to determine the study's outcome using hypotheses derived from the study's findings (Cooper & Schindler, 2014). This research will be the first to use a longitudinal methodology, as it was produced using data input based on a timeframe stretching from 2001 to 2022 and is intended to shed light on the general pattern and trend observed both during prosperous and less prosperous economic times (Apuke, 2017).

The historical data for the market index of the Kuala Lumpur Stock Exchange (KLSE) will be obtained from the secondary data market, where the data had been collected from the publically available source in the web platform like Yahoo Finance. The financial crisis of 2008 and the current Covid-19 issue will both be accounted for in the extracted data, which will be based on a monthly basis with reference to the chronology from 2001 to 2022. The considerable and high activity in the stock market among global market indices were undoubtedly a driving factor in making the

decision to focus on the Malaysian stock market as the preferred option for the target audience.

To continue the quantitative investigation, SPSS will be used as the primary instrument for producing the statistical output required for the quantitative analysis. The statistical series will serve as the empirical proof that demonstrates the study's results and draws conclusions about the study's goals (Saunders, Lewis & Thornhill, 2015). Prior to evaluating the correlation analysis and the regression analysis that will be used to assess the study's hypotheses, the reliability test will serve as a standard to ensure the consistency and validity of the market data input (Sekaran & Bougie, 2016). This study will then go on to describe the study's findings in further detail, taking into account the anticipated result based on the aforementioned literature review.

Data Analysis

Table 1: Summary of Analysis (NYSE Against Vol_NYSE)

	KLSE Growth	*Trading Volume Growth*
KLSE Growth		0.001797885
Trading Volume Growth	0.001797885	

The Table 1 had demonstrated the result for the correlation analysis between the KLSE growth and the trading volume growth in the stock market exchange. The correlation analysis had provided the result where the Pearson Correlation Coefficient had been extremely low recording at 0.001797885 which is almost near to zero indicating that there is no significant correlation detected between the two variables. The lack of suggestion on the strength of the positive correlation through the Pearson Correlation Coefficient lead to the interpretation that there is no correlation exist between the KLSE growth and the trading volume growth.

Table 2: Summary of Analysis (NASQAD Against Vol_NASQAD)

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.0039	0.0024	1.6113	0.1085
Trading Volume Growth	0.0002	0.0081	0.0270	0.9785

The Table 2 had been testing for the regression analysis for the study where the KLSE market index growth will be set as the independent variable against the trading volume growth in the stock market exchange in KLSE. The result for the regression model had observed that the relationship of the two variables where the p-value as reference to Table 2 had recorded at 0.9785 which is way higher than the tolerance level of 0.05. With this, there is sufficient evidence to suggest the lack of presence of the significant relationship between the KLSE market index growth and the trading volume growth indicating that the increase or decrease in the trading volume in the stock market will not be influenced by the fact of the movement observed in the KLSE market

index. This would translate the meaning where the investors' behaviour on the trading volume will be on its own independent which is not determine by the favourable and unfavourable of he KLSE market index performance.

Based on the outcome in the findings and results of the current study, the empirical evidence had indicated that there is no relevance correlation being detected between the two variables where both the KLSE market index growth and trading volume growth shared no relevance correlation between the movement of the two variables. In addition, the regression analysis had provided the extended evidence indicating that there is no suggestion of the significant relationship presence between the KLSE market index growth and trading volume growth. This had been reflected on the opposite findings as derived from the previous study where the outcome had showed the disagreement against the initial hypothesis as drawn in H1 as developed from the literature review of the research. With this, the alternate hypothesis for the H1 will be rejected where the null hypothesis in H0 will be accepted for this research.

H0: *There is no positive relationship between the market index performance against the trading behaviour for the investors.*

H1: *There is positive relationship between the market index performance against the trading behaviour for the investors.*

The outcome of the study had certainly come out a bit unexpected from the reference with the previous study where the expected findings failed to find the agreement and alignment with the empirical evidence achieved from this current study. The initial understanding drawn from the similar study had provide the suggestion that the performance of the market index will provide the confidence towards the investment opportunity where the increase in confidence within the investors will create the likelihood for higher trading activities within the stock market exchange. This is because that the growth of the market index in stock market exchange will provide the positive signal to the investors to become more optimistic for the investment return. With this, the trading activities will observe the higher volume of trading in the stock market as a result from the positive expectations from the investors. However, the current outcome of the study had observed no positive correlation which disagree from the initial study from the previous research expectations. This could be contributed by the fact where the stock market performance will not affect the investor's behaviour in the trading behaviour. The other factors like the risk tolerance and economic condition could become the alternative factors that could appear to be more significant to influence the trading volume for the investors. Besides, the outcome of the research had suggested no significant relationship between the KLSE market index growth against the trading volume growth in Bursa

Malaysia. This showed totally no relevance for the two variables to come in influence which indicate that the confidence of the investors does not lie on the market index performance. The investors may likely to assess the potential return of the investment based on the individual stocks rather than the whole stock market performance as a whole. Therefore, the outcome of this study had achieved the empirical evidence to show no positive relationship presence in the KLSE market index growth against the trading volume growth.

Conclusion

The outcome of this research was to present the significant in the study where the study provided the perspective of the new knowledge being developed within the area of study for the behavioral investment. The findings have been supplying new insight for the academic study, reflecting the advancement in the field of study for current and future scholars to refer to on the current findings. Furthermore, the current study's findings and results create doors for the area of study to further examine potential areas of expertise that are directed from the current findings and results of the study producing new prospects for the world of academic research. Furthermore, the study's key findings will be a fantastic reference for investors to comprehend the present norm of investor behavior to understand the anticipated action of investors based on the success of the market index. This will allow investors to refer to the study to determine the next step in their investment plan and decision-making in order to avoid making unnecessary errors that could damage their potential return on investment.

The current study may not have attained the anticipated outcome in comparison to the prior study, but it does provide a suggestion for a future study to be undertaken within the area of expertise. To begin, the current study had solely focused on the Malaysian market index as the reference of study, but the vast range of stocks in both KLSE market indexes could have an impact on the current conclusions. As a result, future research can replicate the existing methodology to analyze different market indices from different nations, providing new insight as well as validation on the current empirical evidence of this study. Furthermore, the study on investor behavior may not necessarily be reflected in the trading volume or activities of the investors but may be driven by other human characteristics like as risk tolerance, income level, investment experience, and so on. As a result, a future study should investigate using a questionnaire design approach to determine the potential significant difference in their personal traits in influencing the behavior of investors toward market investment prospects.

References

Al-Ajmi, A. (2017). 'Trading volume and volatility in the Boursa Kuwait', *THE BRITISH ACCOUNTING REVIEW*, 10, pp. 1-15.

Apuke, O.D. (2017). 'Quantitative Research Methods A Synopsis Approach', *Arabian Journal of Business and Management Review (Kuwait Chapter)*, 6(10).

Batrinca, B., Hesse, C.W. & Treleaven, P.C. (2018). 'Examining drivers of trading volume in European markets', *International Journal of Finance & Economics*, 23(2), pp. 134-154.

Chiah, M. & Zhong, A. (2020). 'Trading from home: The impact of COVID-19 on trading volume around the world', *Finance Research Letters*, 37.

Choi, H.M. (2019). 'Market uncertainty and trading volume around earnings announcements', *Finance Research Letters*, 30, pp. 14-22.

Cooper, D. & Schindler, P. (2014). *Business Research Methods*, 12th edn, McGraw-Hill/Irwin. Boston.

He, F., Chen, B., Meng, X., Xiong, X. & Zhang, W. (2020). 'Price discovery and spillover dynamics in the Chinese stock index futures market: a natural experiment on trading volume restriction', *Quantitative Finance*, 20(12), pp. 2067-2083.

Iqbal, H. & Riaz, T. (2015). 'THE EMPIRICAL RELATIONSHIP BETWEEN STOCKS RETURNS, TRADING VOLUME AND VOLATILITY: EVIDENCE FROM STOCK MARKET OF UNITED KINGDOM', *Research Journal of Finance and Accounting,* 6(13), pp. 180-192.

Saunders, M., Lewis, P. & Thornhill, A. (2015). 'Research Methods for business students', *Pearson Education Limited*, 7th edn, pp. 246-298.

Sekaran, U. & Bougie, R. (2016). *Research Methods for Business: A Skill-Building Approach*, 7th edn, Wiley, New York.

Sharela, B.F. (2016). 'Qualitative and Quantitative Case Study Research Method on Social Science: Accounting Perspective', *International Journal of Economics and Management Engineering*, 10(12), pp. 3849-3854.

Sheta, A.F., Ahmed, S.E.M. & Faris, H. (2015). 'A Comparison between Regression, Artificial Neural Networks and Support Vector Machines for Predicting Stock Market Index', *International Journal of Advanced Research in Artificial Intelligence*, 4(7), pp. 55-63.

Souza, H.E.D., Barbedo, C.H.D.S. & Araujo, G.S. (2018). 'Does investor attention affect trading volume in the Brazilian stock market?', *Research in International Business and Finance*, 44, pp. 480-487.

Tapa, A. & Hussin, M. (2016). 'The Relationship between Stock Return and Trading Volume in Malaysian ACE Market', *International Journal of Economics and Financial Issues*, 6(7).

Widyarti, E.T., Wahyudi, S. & Hersugondo, H. (2021). 'Map of Changes in Abnormal Return and Trading Volume Activity: Reviewing the Effect of Ramadhan in Indonesia', *Universal Journal of Accounting and Finance,* 9(5), pp. 1093-1102

RESEARCH ARTICLE

Unveiling the black swan of the Real Risk-Returns Nexus: Evidence from Pakistan Stock Exchange

Mohammad Azam[1], Ghlama Haddad[2], Naveed Naveed[3], Arshad Iqbal[4]

[1]Department of Management Sciences, National University of Modern Languages, Peshawar Campus, Pakistan
[2]Higher institute of Management, LaREMFiQ, University of Sousse, Tunisie
[3]Qurtuba University of Science & Information Technology, Peshawar Campus, Pakistan
[4]Brains Post Graduate College, Peshawar, Pakistan

Corresponding author: Mohammad Azam; email: azam.ims@hotmail.com

Abstract
The risk-free rates are widely used as benchmark to measure excess stocks returns or excess market returns and contribute a significant role in Asset Pricing Models. The purpose of this study is to scrutinize the risk and real excess portfolio returns using inflation adjusted risk-free rates, a unique measuring technique with a primary focus on the momentum augmented Fama-French five-factor model, utilising monthly data for 1994-2022 from the Pakistan Stock Exchange. Using OLS regression technique, the findings reveal that except profitability, the market, size, value, momentum and investment move largely correlated with excess portfolio stocks returns. The Gibbons, Ross & Shanken test confirms that the momentum augmented Fama-French five-factor model outperforms in the market.

Keywords: Real-excess portfolio returns; Momentum augmented six-factor model; Asset Pricing Models; GRS test; Pakistan Stock Exchange

Introduction

The assessment of prices in financial markets is the dominating field of applied economics. Thus, it is susceptible to demand and supply in stock markets. The significance of the stock market cannot be ignored in the study of finance and economics which contributes a major part in the economy of a country (Umar, Ji, Mirza, & Rahat, 2021). In micro-perspective, it smoothen the process of fund-flow from savers to investors and makes their decision-making process convenient regarding investment and financing activities. The decision of investors while investing in stock market securities make them hyperconscious due to higher associated risk which compel them to utilize better tools and techniques for evaluating equity securities before constructing portfolios with the intention to diversify and hedge for beating the market and earning excess realized gains (Majeed, & Yan, 2022). Similarly, investors assume a standard benchmark for comparing the excess yields from their investment. Moreover, practitioners and portfolio managers consider risk-free rate as benchmark for comparing the excess portfolio and market returns.
The risk-free rates widely used as benchmark to measure excess stocks returns or excess market returns contribute a significant role in Asset Pricing Models (APMs). The

practitioners and academicians used multiple proxies of short or long term Government securities (Mukherji, 2011) such as Government bond market provides base for originating yields of other financial securities as standard and also assumes as proxy for risk-free investment (Rathnasingha & Dayarathne, 2021). Moreover, the CAPM equilibrium model is based on the Government treasury bills rates which assume surplus returns over risk-free rates. Therefore, the APMs postulate as baseline standard for measuring excess returns.
Since last few decades, there are various theoretical and empirical justified APMs revealed that these APMs contribute statistically significant nexus between factors (risk-premiums) and average portfolio stock returns in micro-level while imperative support to the economic development in macro-level, in order to explain the mechanism of stock prices determination and flow-of-funds respectively in developed and emerging stock markets.
In macro-perspective, the prior literature highlighted the substantial resulting and progressive nexus between asset pricing models (APMs) and economic development. As, the APMs evaluate stock prices which in response accelerate the decision-making process and confidence of investors in the stock market to convert savings into investments (Weston, 1973) which strengthen the

financial sector development that is a significant component of economic development (Umaret al., 2020; Umar et al., 2021). Besides, financial sector development (FSD) ultimately influence the economic growth, while conversely reduces the chances of financial crisis (Suet al., 2021; Suet al., 2020; Umar et al., 2021). Moreover, FSD proliferates investments in the economy which improve productivity, similarly, increases purchasing power and prosperity that conversely alleviates poverty (Jianget al., 2021).

Lower (rather than negative) inflation diminishes the threat of economic recession by allowing the labour market to respond more quickly during a downturn, and it also mitigates the risk that monetary policy may fail to stabilise the economy due to a liquidity-trap. Due to low inflation, the real salaries would be higher, as well as the savings. As a result, this explains why economists prefer a low and stable inflation rate presently. It will encourage investment, boost exports and avert an economic boom. On the negative side, it causes low aggregate demand and economic growth, as well as the potential risk of recession, high unemployment and slows production (Hong, 2021).

The economic theory demonstrates that inflation influences the investment mechanism and capabilities of investors. Siegel and Thaler (1997) argued that Fisher (1930), the pioneer of neoclassical economics, proposed the theory of interest which put down foundation for modern theory of intertemporal choice which explains how the current decisions influence by the potential opportunities or substitutions accessible in the future. There are four features associated with individual income such as its magnitude, time, consumption and risk. Conversely, inflation is a curse which impacts adversely the income of individuals. The individual investors expect the returns from their investments regardless of inflation factors which infer inappropriate and what Fisher termed real returns.

In fact, in emerging economies such as Pakistan, where about 35 percent of the population lives on less than \$2 per day, inflation may be a double-edged sword, causing investors to fall into poverty (Idrees & Baig, 2017; Ullahet al., 2020) such as 26.10% is recorded for Jul-Aug 2021-2022 [1] which is an alarming situation for capital market investors and portfolio managers which need to evaluate from the inflation perspectives which demonstrates the research gap to be considered in emerging economy of Pakistan.

Therefore, this study assumes inflation adjusted expected real returns in order to explore the nexus between various risk-premiums and real stock returns after eradicating the inflation risk. In the horserace of anomalies, such as

macroeconomic variables, labour income and future consumption, this study endeavor to assume real excess returns in merging stock market. Based on the background information, this study focuses on the following research objectives: Firstly, to examine the impact of inflation-adjusted as risk-free rates in APMs using emerging equity market data, then, to compare various APMs and factors including inflation-adjusted market, size, value, momentum, profitability and investment risk premiums in PSX and finally to find out the most appropriate asset pricing model among various APMs using GRS test.

Literature Review

A plethora of prior literature has underlined the inflation rate inverse nexus with stock returns. Similarly, Stone (1974) in his two-factor model proposed change in interest rate augmented CAPM. Jareño (2008) proposed an alternative five-factor model by augmenting changes in real interest rates and shocks in expected inflation with FF3FM.

Over the past decades, the APMs have experienced a tremendous growth in academic research. Therefore a plethora of theoretical and empirical research studies has been investigated various augmented anomalies to Capital Asset Pricing Model (CAPM), sometimes called market model (Ewald et al., 2021; Haddad & Hellara, 2019), and has been buttressed to investigate the efficient predictability explanatory power of the specification. Among these studies (Banz, 1981) proposed size pattern (Bhandari, 1988) leverage pattern (Haddad & Hellara, 2019) liquidity-augmented model (Basu, 1983) earnings to price ratio (Fama & French, 1993) jointly recommended size and B|M as anomalies of CAPM which was later on recognized as benchmark for investors and portfolio managers around the globe. Fama and French (2016) argued that FF3FM describes all anomalies but not momentum. Carhart (1997) used another anomaly as momentum which was augmented with FF3FM and became familiar as (Carhart, 1997) four-factor model (C4FM). Carhart claimed that momentum factor augmented with FF3FM comparatively proved successfully its contribution to the explanatory power of the model. After long time, Fama and French (2015) proposed further two-anomalies named profitability and investment which is thoroughly investigated but still there no convincing conclusion regarding profitability and investment patters performance particularly in emerging equity market. Fama & French (2018) claimed value-factor redundancy when simultaneously regressed with profitability and investment.

In financial economics, the asset pricing models (APMs) predominantly assume risk-free rate as benchmark to measure excess stock, portfolio and market returns based

---

[1] https://www.pbs.gov.pk/sites/default/files/press_releases/2022/CPI_Press_Release_September_2022.pdf

on theories support the Capital Asset Pricing Model (CAPM) since 1960s. Moreover, the CAPM also supports to recognize risk-premia well (Ewaldet al., 2021). Although, the substantial empirical studies using excess portfolio returns using stock returns minus risk-free rate (mostly assumed as Government Treasury Bills rates) with the assumption that investors will get excess over risk-free. However, the economic theory supports that Treasury bills rate includes inflation plus time-value of money (Goetzmannet al., 2014). This study considers real stock returns, therefore, deducts inflation rate from average stock returns by following the theory of real interest rate to investigate whether adjusting for inflation the asset pricing models (APMs) yield statistically and economically substantial excess returns in emerging market of Pakistan.

There is a plethora of studies relied extensively on inflation as independent variable and regressed with stock returns to examine its long and short term association in various equity markets. Inflation has long-run inverse nexus with equity returns (Geethaet al., 2011; Saleemet al., 2013; Shahet al., 2020; Tripathi & Kumar, 2014). Mukherji (2011) examined the risk-free rates of CAPM using multiple proxies. The short and long-term T-bills and bonds are scrutinized using monthly mean real returns and inflation risks US data for 1926-2007. The S&P 500 index is used as market real returns. Moreover, they used inflation and market returns as independent variables while real stocks return as dependent variable. The short, intermediate and long-term Government securities are used for analysis. Their results reveal that T-bills are not having market risk for one and five-year duration using univariate and multivariate regressions. Treasury securities, convincingly, entail significant inflation risk.

Choice of the Risk-Free Rate

A number of studies have used various proxies like risk-free rates to analyse APMs around the world, as follows:

Table 1: Proxy used for Risk-free rate

Author(s)	Proxy for Risk-free rate
Ansari (2000)	Commercial Banks' term deposits Interest Rate.
Deb, Banerjee, and Chakrabarti (2007)	Govt. Securities having more than 5 years maturity.
Dilidüzgün, Yılmaz, and Selçuk (2020)	Government securities of 10-years maturity yields.
Prathama, Sugiarto, Ugut, and Hulu (2020)	Govt. 10 years Zero coupon bonds' yields.
Stowe, Robinson, Pinto, and McLeavey (2007)	Govt. bonds having 10-20 years maturity yields.
Fama and French (1993, 2015)	Govt. Treasury Bills Rates (Short-term).

Table 1 demonstrates the proxy used as risk-free rate around the globe. Although, in CAPM theory, the treasury-bills rates are assumed as risk-free returns (as benchmark) but investors yield adversely influenced by the inflation that is a common phenomenon exists everywhere which investors need to be compensated therefore. This study assumes the inflation rates as risk-free rate.

Methodology and Models Specification

Methodology

It has been critically claimed that a number of remarkable empirical APMs are inadequate since they do not create portfolios based on size and B|M ratio (Lewellen, Nagel, & Shanken, 2010). They further argued that higher R-square and low pricing errors are not strong supportive evidences to be concluded regarding the standard model. Therefore, this study constructed 25 mimicking portfolios as suggested by (Fama & French, 1993; 2015; Azam, 2021) based on market-cap and B|M ratio using 521 financial and non-financial firms enlisted on PSX. Moreover, coefficients and associated t-statistics significance are assumed to explain the nexus with portfolio average stocks returns in the market.

Models Specification:

This study empirically investigates various APMs using the following measurements specifications:

Mimicking Size-B|M ratio Stocks Portfolio Returns

The returns from stocks are calculated for each stock:

$$R_{pt}= \ln(P_t/P_{t-1}) \quad (1)$$

Where, Rpt is the portfolio stocks returns, p indicates portfolio, t indicates time (months). ln is natural log, Pt is Closing price of this month and P_{t-1} is the Closing price of previous month.

Capital Asset Pricing Model (CAPM)

$$R_{pt} - Inf_{CPI} = \alpha + \beta_m(R_m - Inf_{CPI}) + \varepsilon_i \quad (2)$$

In which, R_{pt} is expected excess return from portfolio. Inf_{CPI}, is Inflation rate (used as proxy). R_m is the expected return from market. β_m is the sensitivities or factor loading of market factor.

Table 2: 25 Equally-weighted Portfolios constructed based on Size and B|M Ratio by following (Fama & French, 1993; 2015)

PF	L_B|M	2	3	4	H_B|M	PF	L_B|M	2	3	4	H_B|M
Small	SL	S2	S3	S4	SH	**Small**	SBM1	SBM2	SBM3	SBM4	SBM5
2	2L	22	23	24	2H	**2**	SBM6	SBM7	SBM8	SBM9	SBM10
3	3L	32	33	34	3H	**3**	SBM11	SBM12	SBM13	SBM14	SBM15
4	4L	42	43	44	4H	**4**	SBM16	SBM17	SBM18	SBM19	SBM20
Big	BL	B2	B3	B4	BH	**Big**	SBM21	SBM22	SBM23	SBM24	SBM25

Notes: Table 2 shows equally-weighted 25excess portfolios which are constructed based on size-B|M ratio. SL denotes the Small size-stocks and Low B|M ratio stocks, similarly BH denotes the Big size-stocks and High B|M ratio stocks portfolios. On the right hand, the names of these portfolio such as Size and B|M ratio 01, and so on.

Fama & French (1993) three-factor model (henceforth FF3FM)

$$R_{pt} - Inf_{CPI} = \alpha + \beta_m(R_m - Inf_{CPI}) + \beta_s(SmB) + \beta_v(HmL) + \varepsilon_i (3)$$

In which, (SmB) is the small market-cap stocks portfolio minus big market-cap stocks portfolios. Similarly, (HmL) is the value firms (having high B|M ratio stocks portfolio) minus growth firms (having low B|M ratio portfolio). β_m, β_s, and β_v, are the coefficients of market, size and value factors respectively.

Carhart (1997) four-factor model (henceforth C4FM)

$$R_{pt} - R_f = R_f + \beta_m(R_m - R_f) + \beta_s(SmB) + \beta_v(HmL) + \beta_w(WmL) + \varepsilon_i (4)$$

In which, WML is the Winner (portfolios having positive higher returns for lag 2 years) minus Losers (portfolios having positive higher returns for lag 2 years' firms returns) known as Momentum factor. β_w is the coefficients of momentum factor. Momentum factor is augmented with FF3FM as equation (3).

Fama & French (2015) five-factor model (henceforth FF5FM)

$$R_{pt} - Inf_{CPI} = \alpha + \beta_m(R_m - Inf_{CPI}) + \beta_s(SmB) + \beta_v(HmL) + \beta_p(RmW) + \beta_i(CmA) + \varepsilon_i (5)$$

In which, (RmW) is the stocks having robust profitability portfolio minus stocks having weak profitability portfolio. Similarly, (CmA) is the conservative stocks portfolio (having higher assets) minus aggressive stocks portfolio (having lower assets). β_p and β_i, are the coefficients of profitability and investment factors respectively.

Momentum augmented Fama & French (2015) five-factor model (henceforth M-FF5FM)

$$R_{pt} - Inf_{CPI} = \alpha + \beta_m(R_m - Inf_{CPI}) + \beta_s(SmB) + \beta_v(HmL) + \beta_p(RmW) + \beta_i(CmA) + \beta_w(WmL) + \varepsilon_i (6)$$

GRS (Gibbons, Ross & Shanken, 1989) Test

$$GRS = \left(\frac{T}{N}\right)\left(\frac{T-N-L}{T-L-1}\right)\left[\frac{\hat{\alpha}'\widehat{\Sigma}\hat{\alpha}^{-1}}{1+\bar{\mu}!\,\widehat{\Omega}^{-1}\hat{\mu}}\right] \sim F(N, T - N - L) \ (7)$$

Where,
$\hat{\alpha}$ = N x 1 estimated constant term vector.
$\widehat{\Sigma}$ = Stochastic terms unbiased covariance matrix.
$\bar{\mu}$ = L x 1 factor portfolio average matrix.
$\widehat{\Omega}$ = Factor portfolio unbiased covariance matrix.
T = No. of observations.
N = No. of regression equations.
L = No. of factors in the regression.

Using the above equation, this study examines the GRS-F test based on the following hypothesis: H_0: $\alpha_i = 0$ i: 1, 2, 3… N, where, the GRS-F test denotes that all alpha coefficients are equal to zero (α=0) while H_1: $\alpha_i \neq 0$ i: 1, 2, 3… N, where, the GRS-F test denotes that all alpha coefficients are not equal to zero ($\alpha\neq0$).

Gibbons, Ross, and Shanken (1989) employed this specification with a view to investigate the variations in the intercepts of portfolios. It measures the conditional efficiency of a particular portfolio based on the risk-free rates if the risk-free rates variate positively. It further examines the authentic and appropriately explaining specification based on absolutely average alpha (AAA) among various APMs.

Descriptive Statistics

Table 3: Descriptive Statistics of 25 Value-weighted Portfolios constructed based on dual-sorted Size and B|M Ratio by following (Fama & French, 1993; 2015; Azam, 2021)

Mean	L_B|M	2	3	4	H_B|M	Max	L_B|M	2	3	4	H_B|M
Small	-0.0192	-0.0176	-0.0170	-0.0177	-0.0225	Small	0.257	0.295	0.312	0.263	0.309
2	-0.0162	-0.0156	-0.0115	-0.0158	-0.0207	2	0.407	0.249	0.243	0.268	0.248
3	-0.0181	-0.0124	-0.0125	-0.0146	-0.0118	3	0.260	0.367	0.188	0.225	0.246
4	-0.0173	-0.0148	-0.0148	-0.0127	-0.0124	4	0.187	0.189	0.157	0.226	0.214
Big	-0.0166	-0.0149	-0.0122	-0.0108	-0.0108	Big	0.182	0.169	0.176	0.337	0.219
Std. Dev.	**L_B|M**	**2**	**3**	**4**	**H_B|M**	**Min**	**L_B|M**	**2**	**3**	**4**	**H_B|M**
Small	0.065	0.075	0.068	0.082	0.067	Small	-0.208	-0.353	-0.270	-0.277	-0.271
2	0.077	0.069	0.071	0.072	0.072	2	-0.324	-0.233	-0.227	-0.341	-0.263
3	0.071	0.069	0.062	0.065	0.063	3	-0.332	-0.237	-0.249	-0.201	-0.217
4	0.065	0.063	0.061	0.069	0.067	4	-0.286	-0.233	-0.200	-0.318	-0.263
Big	0.077	0.065	0.059	0.069	0.065	Big	-0.421	-0.367	-0.392	-0.319	-0.249

Notes: Table 1 shows the descriptive statistics for 25 value-weighted inflation adjusted 25 excess portfolios which are constructed based on Size and B|M ratio following Fama & French (1994; 2015). It consists of average monthly returns, standard deviation (SD), Maximum and minimum excess portfolio returns.

Table 3 illustrates the descriptive statistics of 25 value-weighted inflation adjusted portfolios (returns minus inflation) using monthly data from Jan-1994 through Dec-2022. The small market-cap and high B|M ratio excess portfolio demonstrates -0.0225 average real returns with standard deviation of 0.067 while the big market-cap and low B|M ratio excess portfolio demonstrates -0.0166 average real returns with standard deviation of 0.077. Although, Table-1 shows negative average portfolios returns but inversely, small market-cap firms and high B|M ratio portfolio yield lower real returns (-0.0225) and portfolio consists of big market-cap and low B|M ratio yield higher excess real returns (-0.0166). On the other hand, small market-cap firms and low B|M ratio portfolio yield lower real returns (-0.0192) with standard deviation of (0.065) and portfolio consists of big market-cap and high B|M ratio yield higher excess real returns (-0.0108

with standard deviation of 0.065). On average, the small 10 portfolios exhibit -0.01738 excess real returns with average standard deviation of 0.0718 while the big 10 portfolios exhibit -0.01373 excess real returns with average standard deviation of 0.066. Theoretically, the portfolio of small market-cap firms should yield more returns than big market-cap firms but the findings demonstrates contradictory results as big market-cap shows negative but higher returns. Moreover, on average, the 10 portfolios consist of Low-B|M ratios exhibit -0.01627 returns having standard deviation of 0.0696 while the High-B|M ratio exhibit -0.01498 returns having standard deviation of 0.0691 which exhibit theoretically supportive results as high B|M ratio (value) firms outperform low B|M ratio (growth) firms.

Table 4: Correlation Matrix

Factor	RmInf	SMB	HML	RMW	CMA	WML
RmInf	1					
SMB	-0.0475	1				
HML	0.025	0.0423	1			
RMW	0.0154	-0.022	-0.2532	1		
CMA	-0.0034	0.077	0.2495	0.1168	1	
WML	-0.0935	0.2302	-0.2486	0.0906	0.2692	1

Notes: Table 4 summarizes the correlation matrix between independent variables including market-inflation adjusted premium, size-premium, value-premium, profitability-premium, investment premium and momentum premium.

Table 4 demonstrates the correlation matrix between independent (RHS) variables. Grobys and Huhta-Halkola (2019) argue that inverse correlation between two patterns have the potential of yielding higher expected returns by

constructing diversified portfolio. There exists inverse correlation between inflation adjusted market returns and size pattern, investment and momentum. Similarly, size with profitability; value with profitability and momentum

also demonstrate negative nexus between each other. As the maximum value shows between investment and momentum pattern (0.2692) but positive which indicates that there is no chance of multicollinearity problem while employing time-series OLS regression.

Average Annual Returns for Factors (Independent Variables)

Table 5 demonstrates the inflation adjusted market, size, value, profitability, investment and momentum annual returns based on each year.

Table 5: Annual inflation-adjusted market and other factors average returns:

Year	RmInf	SMB	HML	RMW	CMA	WML
1994	0.042269	-0.00277	-0.00019	-0.00038	0.000227	-0.0001
1995	-0.01449	-0.00137	-0.00304	0.002521	-8.4E-05	-0.00046
1996	-0.03179	0.006434	-0.00126	0.000613	-0.00028	0.007555
1997	-0.01475	-0.00011	0.000316	0.001458	-0.00062	0.007773
1998	0.0358	0.00608	0.000883	0.00164	-0.00065	0.002219
1999	-0.03389	0.001592	-0.00054	0.001826	-0.00107	0.009978
2000	0.014341	-0.00181	-0.00221	0.002513	-0.00316	0.002524
2001	-0.00894	-9.2E-05	0.01135	-0.00764	0.007936	0.015829
2002	0.01062	-0.0038	-0.00191	0.005107	-0.00212	0.008712
2003	0.042654	-0.01028	-0.0012	0.001957	0.005261	0.013487
2004	0.030411	-0.01563	0.003192	-0.00456	0.005391	0.013545
2005	0.014535	0.002757	0.001805	-0.00403	-0.00051	0.014087
2006	0.014779	-0.00802	-0.00497	0.001088	-0.00388	0.007644
2007	-0.00277	-0.01078	-0.00365	0.002658	0.001512	0.00297
2008	0.007646	-0.02454	0.001028	0.003611	-0.00474	0.00472
2009	-0.04254	0.015383	-0.00696	0.004433	0.000605	0.017581
2010	0.016327	-0.01129	-0.0078	0.011856	0.00503	0.010655
2011	0.002837	-0.01489	0.002404	0.002116	-0.00034	0.020201
2012	-0.00854	-0.00131	0.001988	-0.00137	0.002523	0.013178
2013	0.035225	-0.00144	-0.00386	0.006164	0.004748	0.014668
2014	0.03462	0.005388	0.007941	0.006205	0.008211	0.013425
2015	0.043964	-0.01669	-0.00486	0.006156	0.007464	0.018428
2016	0.029422	-0.0135	0.002313	0.002177	0.003807	0.006989
2017	0.014057	-0.00624	-0.00221	-0.00502	0.00287	0.013038
2018	-0.0217	-0.00223	-0.01152	0.015283	0.001547	0.012584
2019	-0.00286	-0.00303	-0.00865	0.003681	0.002463	0.016534
2020	0.005098	0.014612	-0.00512	-0.00104	-0.00111	0.01531

Notes: The annual average inflation-adjusted market returns, size, value, profitability, investment and momentum factors for the time-span of 27 years from Jan-1994 through Dec-2020 using average annual stocks returns.

Figure 1: Graphical presentation of Treasury Bills and Consumer Price Index (CPI):
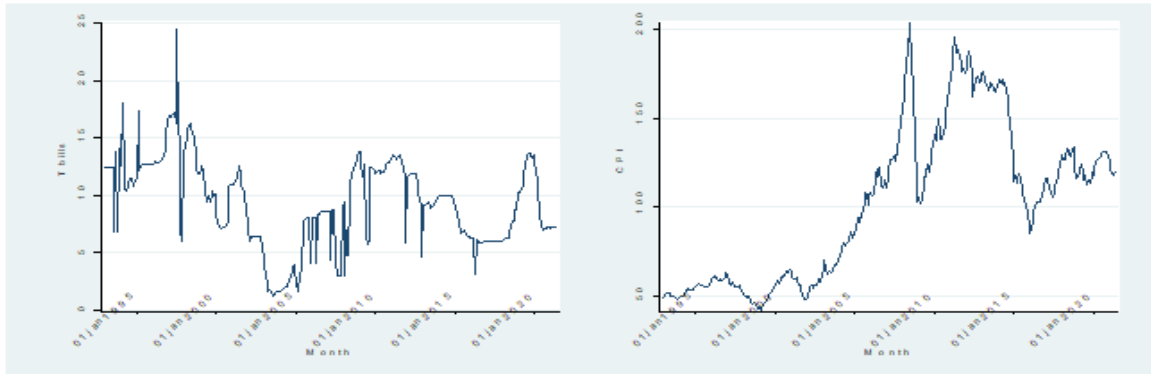

Figure 1 plots the graphical presentation of Government 3-months Treasury Bills and monthly Consumer Price Index (CPI) from Jan-1994 through Dec-2020. The graphics show how both influence the investors returns by representing the fluctuation of both the graphs.

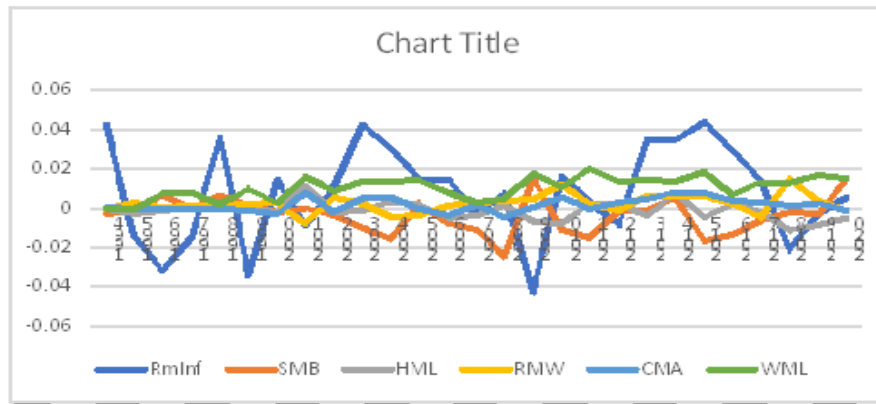**Figure 2: Graphical presentation of RmInf, SMB, HML, RMW, CMA and WML:**

Figure 1 depicts the Govt. 3-months Treasury Bills Rate and monthly Consumer Price index for 1994-2020. On the other hand, Figure 2 plots the annual average returns for inflation-adjusted market, size, value, profitability, investment and momentum factors for time-span 1994-2022. The annual average inflation-adjusted market returns illustrate more fluctuations as the graphical trend depicts volatility for the whole time-span. The size pattern shows high volatility in 2008-2009 which demonstrates that investors switched their investment to small firms during financial crises to save their investment. The profitability patter shows slight fluctuations in 2017-2018 while other factors exhibit almost normal behaviour for the sample period.

Empirical Results

In this study, we empirically analyze the nexus of various factors with excess inflation-adjusted portfolio returns. Based on the methodology described above, the study first investigated traditional CAPM model while employing time-series simple OLS regression using inflation adjusted 25 equal-weighted excess returns on LHS as dependent variables and inflation adjusted excess market returns on RHS as independent variable.

Factor Spanning / Redundancy Tests

As Fama and French (2018) comment on the significance of RHS tests (factor spanning test) and argue that it justifies the contribution of additional factor to be included in the analysis. This approach is proposed by (Huberman & Kandel, 1987) as the mean-variance

spanning which infers whether one factor can be explained with the support of other factors. It examines the viability of combination of other factors to access whether factor is redundant or not. In case, one factor is captured by remaining factors, it is useless to be the part of the model (Fama & French, 2016).

Table 6: Factor Spanning Tests

VARIABLES	(1) RmInf	(2) SMB	(3) HML	(4) RMW	(5) CMA	(6) WML
RmInf	.	-0.010	0.001	0.004	0.003	-0.024
	(.)	(-0.483)	(0.048)	(0.379)	(0.340)	(-1.524)
SMB	-0.071	.	0.051*	-0.007	-0.007	0.185***
	(-0.483)	(.)	(1.794)	(-0.280)	(-0.314)	(4.464)
HML	0.014	0.186*	.	-0.263***	0.306***	-0.517***
	(0.048)	(1.794)	(.)	(-5.498)	(7.406)	(-6.770)
RMW	0.116	-0.032	-0.314***	.	0.173***	-0.057
	(0.379)	(-0.280)	(-5.498)	(.)	(3.615)	(-0.640)
CMA	0.117	-0.040	0.458***	0.217***	.	0.636***
	(0.340)	(-0.314)	(7.406)	(3.615)	(.)	(6.812)
WML	-0.286	0.302***	-0.232***	-0.021	0.191***	.
	(-1.524)	(4.464)	(-6.770)	(-0.640)	(6.812)	(.)
Constant	0.010*	-0.006***	0.001	0.002*	-0.000	0.010***
	(1.890)	(-3.256)	(0.866)	(1.855)	(-0.351)	(7.009)
R-squared	0.010	0.065	0.247	0.101	0.211	0.233

t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Notes: Table 6 demonstrates the factor spanning tests using all independent variables (factors). Each factor is used as dependent variable while other factors as independent variables for testing redundancy test.

As Fama and French (2018) comment on the significance of RHS tests (factor spanning test) and argue that it justifies the contribution of additional factor to be included in the analysis. This approach is proposed by (Huberman & Kandel, 1987) as the mean-variance spanning which infers whether one factor can be explained with the support of other factors. It examines the viability of combination of other factors to access

whether factor is redundant or not. In case, one factor is captured by remaining factors, it is useless to be the part of the model (Fama & French, 2016).

Capital Asset Pricing Model (CAPM) Regression Results

Table 7: Results & performance of traditional CAPM using inflation adjusted value-weighted portfolios

Alpha	L_B|M	2	3	4	H_B|M	T-value	L_B|M	2	3	4	H_B|M
Small	-0.020***	-0.019***	-0.018***	-0.019***	-0.023***	Small	-5.774	-4.465	-4.766	-4.181	-6.336
2	-0.017***	-0.017***	-0.012***	-0.017***	-0.022***	2	-4.007	-4.503	-3.042	-4.209	-5.551
3	-0.019***	-0.014***	-0.014***	-0.016***	-0.013***	3	-4.923	-3.579	-4.009	-4.380	-3.738
4	-0.018***	-0.016***	-0.016***	-0.014***	-0.013***	4	-5.249	-4.652	-4.704	-3.558	-3.587
Big	-0.018***	-0.016***	-0.014***	-0.012***	-0.012***	Big	-4.245	-4.548	-4.217	-3.229	-3.462
RmInf	**L_B|M**	**2**	**3**	**4**	**H_B|M**	**T-value**	**L_B|M**	**2**	**3**	**4**	**H_B|M**
Small	0.153***	0.116**	0.113***	0.147***	0.118***	Small	3.811	2.447	2.652	2.858	2.814
2	0.110**	0.159***	0.066	0.124***	0.157***	2	2.258	3.744	1.455	2.727	3.507
3	0.132***	0.144***	0.133***	0.135***	0.127***	3	2.982	3.353	3.454	3.322	3.266
4	0.154***	0.140***	0.127***	0.123***	0.109***	4	3.866	3.599	3.328	2.853	2.607
Big	0.164***	0.141***	0.165***	0.159***	0.163***	Big	3.441	3.510	4.532	3.716	4.083
Adj. R2	**L_B|M**	**2**	**3**	**4**	**H_B|M**	**F-value**	**L_B|M**	**2**	**3**	**4**	**H_B|M**
Small	0.043	0.018	0.021	0.025	0.024	Small	14.45	5.91	6.98	8.12	7.88
2	0.016	0.042	0.007	0.023	0.037	2	5.06	13.93	2.06	7.38	12.43
3	0.027	0.034	0.036	0.033	0.032	3	8.83	11.15	11.82	10.95	10.57
4	0.044	0.039	0.033	0.025	0.021	4	14.97	12.86	10.98	8.28	6.73
Big	0.035	0.037	0.060	0.041	0.049	Big	11.94	12.20	20.42	13.65	16.51

Notes: Table 7 depicts the findings of CAPM using inflation adjusted value-weighted portfolios including intercept, coefficient and adjusted R-square results.

Table 7 demonstrates the results of CAPM which shows that 22 out of 25 (22/25) portfolios present statistically strongly significant coefficient results at the probability of 0.001% similar to (Azam & Naveed, 2022). The 2 portfolios (4L and B2) show statistically moderately significant results at the probability of 0.01% while only one portfolio (43) which posits statistically insignificant coefficient result. The results conclude that inflation adjusted market excess returns explains the inflation adjusted excess portfolio returns using financial and non-financial firms enlisted on PSX for the time period 1994-2022.

Table 7 indicates the findings of inflation adjusted CAPM which are extracted from employing OLS simple-regression estimation. The findings demonstrate highly statistically significant and positive results as all market inflation adjusted factor coefficients show significant values except one portfolios (23, $\beta = 0.066$, t-value =

1.455). The findings support the theory and establish significant and positive nexus with inflation adjusted real excess portfolio returns. The adjusted R-squares range from 0.007 to 0.049 for portfolio 23 and BH respectively. The overall results of the model based on F-statistics show significant findings except portfolio 23 (F = 2.06). Fama and French (2015) calculate the average absolute alpha (intercept) coefficient (henceforth AAAC) for evaluating the model's validity. The AAAC of CAPM is -0.01636 (1.64 percent), indicating that the monthly yields have a 1.64 percent pricing errors, according to (Lohano & Kashif, 2018). These inverse nexus identify overvalued portfolios and determines the invalidity of CAPM (Lohano & Kashif, 2018).

Fama and French (1993) three-factor model Regression Results

Table 8: Results & performance of inflation-adjusted FF3FM using value-weighted portfolios

Alpha	H-B|M	4	3	2	L-B|M	T-Value	H-B|M	4	3	2	L-B|M
Small	-0.020***	-0.017***	-0.015***	-0.014***	-0.014***	Small	-5.339	-5.139	-4.842	-3.791	-4.212
2	-0.018***	-0.016***	-0.017***	-0.015***	-0.015***	2	-5.341	-4.734	-5.183	-3.965	-4.100
3	-0.018***	-0.012***	-0.013***	-0.017***	-0.013***	3	-4.713	-3.268	-3.867	-4.579	-3.638
4	-0.013***	-0.015***	-0.010**	-0.016***	-0.021***	4	-3.367	-4.044	-2.551	-3.978	-5.372
Big	-0.018***	-0.014***	-0.016***	-0.016***	-0.022***	Big	-5.282	-3.852	-4.380	-3.717	-6.022
RmInf	**H-B|M**	**4**	**3**	**2**	**L-B|M**	**T-Value**	**H-B|M**	**4**	**3**	**2**	**L-B|M**
Small	0.142***	0.125***	0.152***	0.150***	0.151***	Small	3.378	3.366	4.431	3.598	3.965
2	0.146***	0.130***	0.118***	0.122***	0.101**	2	3.761	3.490	3.159	2.840	2.462
3	0.126***	0.144***	0.133***	0.133***	0.130***	3	2.941	3.366	3.417	3.251	3.326
4	0.116***	0.164***	0.074*	0.129***	0.163***	4	2.605	3.926	1.683	2.859	3.662
Big	0.158***	0.122***	0.121***	0.164***	0.129***	Big	4.125	2.922	2.885	3.416	3.160
SMB	**H-B|M**	**4**	**3**	**2**	**L-B|M**	**T-Value**	**H-B|M**	**4**	**3**	**2**	**L-B|M**
Small	-0.966***	-0.598***	-0.558***	-0.479***	-0.605***	Small	-8.669	-6.066	-6.123	-4.329	-5.981
2	-0.262**	-0.275***	-0.441***	-0.249**	-0.446***	2	-2.539	-2.783	-4.453	-2.184	-4.081
3	-0.034	0.132	0.021	-0.180*	0.120	3	-0.298	1.162	0.206	-1.659	1.156
4	0.650***	0.362***	0.525***	0.284**	0.259**	4	5.491	3.269	4.512	2.365	2.190
Big	0.453***	0.703***	0.439***	0.907***	0.532***	Big	4.444	6.355	3.946	7.107	4.902
HML	**H-B|M**	**4**	**3**	**2**	**L-B|M**	**T-Value**	**H-B|M**	**4**	**3**	**2**	**L-B|M**
Small	1.017***	0.861***	0.532***	-0.194	-0.010	Small	5.351	5.122	3.429	-1.027	-0.057
2	0.722***	0.868***	0.126	-0.386**	-0.139	2	4.100	5.145	0.750	-1.990	-0.745
3	0.971***	0.495**	0.156	-0.175	-0.167	3	4.998	2.555	0.888	-0.949	-0.945
4	1.120***	0.484**	0.179	-0.108	-0.129	4	5.552	2.567	0.900	-0.526	-0.639
Big	0.616***	1.356***	0.068	-0.039	-0.119	Big	3.545	7.187	0.360	-0.177	-0.644
Adj-R2	**H-B|M**	**4**	**3**	**2**	**L-B|M**	**F-Value**	**H-B|M**	**4**	**3**	**2**	**L-B|M**
Small	0.2572	0.1812	0.1731	0.0899	0.1372	Small	38.28	24.82	23.54	11.63	18.12
2	0.0983	0.1200	0.0819	0.0436	0.0630	2	12.74	15.68	10.60	5.91	8.24
3	0.0891	0.0492	0.0292	0.0356	0.0294	3	11.53	6.57	4.24	4.97	4.26
4	0.1735	0.0851	0.0610	0.0309	0.0433	4	23.61	11.02	8.00	4.43	5.87
Big	0.1276	0.2408	0.0591	0.1503	0.0843	Big	16.75	35.14	7.77	20.04	10.91

Table 8 demonstrates the FF3FM results which are extracted from employing OLS multiple-regression estimations. The inflation adjusted performance of value-weighted real returns is used to justify the inflation-adjusted market returns, size and value risk patterns in PSX. The t-values are shown on right hand-side.

Table 8 predicts the findings of inflation adjusted excess portfolio regressed on market, size and value risk premiums using FF3FM which demonstrate highly statistically significant but positive results for 23/25 mimicking portfolios while 2 portfolios (2L and 43) show moderately and weakly respectively but significant nexus with portfolio returns having t-value greater than 2. On the other hand, size factor shows mixed results as 12/25 portfolios show negative while 13/25 show positive nexus with inflation adjusted excess portfolio returns.

Table 8 exhibits time-series OLS multiple regression results extracted from FF3FM using the Inflation adjusted real-excess portfolio monthly returns data. The outcomes demonstrate supportive results to the theory as all three-factors show statistically significant nexus with real-excess portfolio returns. The real market excess returns show highly significant and positive relationship with inflation adjusted real excess portfolio returns (IAREPR). The corresponding t-statistics also display statistically acceptable range values for all 25 portfolios. Similarly, size-pattern (SMB) displays statistically significant

relationship with excess returns as all small market-cap stocks portfolios show positive and highly statistically significant values while big market-cap stocks portfolios exhibit statistically significant but negative nexus with inflation-adjusted excess portfolios returns which designates the existence of the size-pattern in the market. Moreover, value-pattern (HML) also shows statistically highly significant results in line with the theory that high B|M ratio stocks portfolios (HBMSP) outperform low B|M ratio (LBMSP) stocks portfolios. The findings confirm the theory as HBMSP demonstrate statistically highly significant and positive nexus while LBMSP show almost insignificant and negative nexus with IAREPR which confirms the existence of value factor in the market. Moreover, the t-statistics of all HBMSP show greater than 2 which also confirm the existence of value-pattern in the market. The overall results of the model reveal that FF3FM is appropriate model for the PSX to explain average inflation adjusted excess portfolio returns. Moreover, the alpha values of all 25 portfolios shows statistically significant but inverse nexus. The AAAC of FF3FM is -0.0158 (1.58 percent), indicating that the monthly yields have a 1.58 percent pricing errors, according to (Lohano & Kashif, 2018). These inverse nexus identify overvalued portfolios and determines the invalidity of FF3FM (Lohano & Kashif, 2018).

Carhart (1997) four-factor model Regression Results

Table 9: Results & performance of inflation-adjusted C4FM using value-weighted portfolios

Alpha	H-B|M	4	3	2	L-B|M	T-value	H-B|M	4	3	2	L-B|M
Small	-0.013***	-0.012***	-0.010***	-0.012***	-0.013***	Small	-3.387	-3.581	-3.252	-3.056	-3.501
2	-0.015***	-0.014***	-0.017***	-0.016***	-0.015***	2	-4.125	-4.080	-4.752	-3.820	-3.826
3	-0.013***	-0.014***	-0.016***	-0.017***	-0.010**	3	-3.177	-3.335	-4.261	-4.349	-2.570
4	-0.012***	-0.015***	-0.010**	-0.014***	-0.014***	4	-2.894	-3.852	-2.373	-3.154	-3.421
Big	-0.015***	-0.012***	-0.019***	-0.010**	-0.017***	Big	-4.053	-3.045	-4.830	-2.266	-4.388
RmInf	H-B|M	4	3	2	L-B|M	T-value	H-B|M	4	3	2	L-B|M
Small	0.126***	0.115***	0.143***	0.146***	0.148***	Small	3.093	3.157	4.230	3.509	3.885
2	0.139***	0.128***	0.117***	0.122***	0.102**	2	3.587	3.421	3.143	2.840	2.467
3	0.115***	0.147***	0.138***	0.134***	0.123***	3	2.719	3.428	3.568	3.267	3.173
4	0.114**	0.165***	0.074*	0.124***	0.147***	4	2.551	3.937	1.691	2.747	3.382
Big	0.151***	0.117***	0.128***	0.152***	0.118***	Big	3.960	2.814	3.053	3.202	2.933
SMB	H-B|M	4	3	2	L-B|M	T-value	H-B|M	4	3	2	L-B|M
Small	-0.839***	-0.511***	-0.474***	-0.441***	-0.574***	Small	-7.523	-5.112	-5.147	-3.870	-5.509
2	-0.201*	-0.253**	-0.435***	-0.262**	-0.446***	2	-1.899	-2.475	-4.261	-2.230	-3.953
3	0.066	0.109	-0.024	-0.186*	0.181*	3	0.573	0.933	-0.229	-1.662	1.699
4	0.669***	0.355***	0.527***	0.331***	0.394***	4	5.482	3.105	4.382	2.676	3.326
Big	0.516***	0.746***	0.383***	1.015***	0.629***	Big	4.947	6.551	3.354	7.842	5.726
HML	H-B|M	4	3	2	L-B|M	T-value	H-B|M	4	3	2	L-B|M
Small	0.782***	0.702***	0.380**	-0.263	-0.066	Small	4.094	4.099	2.407	-1.345	-0.367
2	0.608***	0.826***	0.117	-0.363*	-0.138	2	3.360	4.727	0.669	-1.802	-0.715
3	0.788***	0.537***	0.240	-0.163	-0.278	3	3.982	2.673	1.321	-0.854	-1.526
4	1.084***	0.497**	0.177	-0.193	-0.377*	4	5.183	2.540	0.858	-0.912	-1.860
Big	0.500***	1.278***	0.171	-0.237	-0.297	Big	2.802	6.553	0.874	-1.070	-1.579
WML	H-B|M	4	3	2	L-B|M	T-value	H-B|M	4	3	2	L-B|M
Small	-0.609***	-0.415***	-0.396***	-0.179	-0.145	Small	-4.611	-3.502	-3.624	-1.329	-1.177
2	-0.293**	-0.108	-0.025	0.062	0.001	2	-2.342	-0.894	-0.204	0.444	0.008
3	-0.476***	0.108	0.217*	0.030	-0.288**	3	-3.478	0.777	1.727	0.227	-2.284
4	-0.093	0.033	-0.006	-0.221	-0.644***	4	-0.643	0.245	-0.041	-1.513	-4.587
Big	-0.299**	-0.202	0.266**	-0.516***	-0.462***	Big	-2.424	-1.498	1.968	-3.364	-3.553
Adj. R²	H-B|M	4	3	2	L-B|M	F-value	H-B|M	4	3	2	L-B|M
Small	0.310	0.219	0.213	0.103	0.149	Small	35.83	22.33	21.60	9.18	13.95
2	0.122	0.130	0.091	0.053	0.072	2	11.05	11.95	7.94	4.47	6.16
3	0.131	0.060	0.047	0.045	0.054	3	11.97	5.07	3.95	3.73	4.54
4	0.182	0.094	0.070	0.047	0.110	4	17.78	8.25	5.98	3.91	9.93
Big	0.151	0.253	0.079	0.187	0.127	Big	14.22	27.02	6.85	18.34	11.63

Notes: Table 9 depicts the findings of C4FM using inflation adjusted value-weighted portfolios including intercept, coefficient and adjusted R-square results.

Table 9 summarizes the Carhart (1997) four-factor model findings. The inflation-adjusted market pattern demonstrates statistically significant for all portfolios showing inconsistency with (Azam & Naveed, 2022). The t-values also indicate significance for the associated coefficients. The size pattern also exhibits statistically significant results and supports the theory which indicates

that portfolios having small market-caps outperform portfolios having big market-caps. The all-small market-cap firms' portfolios demonstrate highly statistically significant and positive nexus with inflation adjusted excess portfolio returns (IAEPR). Conversely, all big market-cap firms' portfolios exhibit statistically significant but inverse relationship with IAEPR which support the theory of size factor. The value pattern also supports the theory as value-portfolios (higher B|M ratio) demonstrate statistically significant and positive coefficients while growth-portfolios (lower B|M ratio) show inverse but statistically insignificant results except two portfolios (42 and 2L having β = -0.363 and -0.377 respectively). The momentum pattern shows mix and tenuous results as 12 out of 25 show significant coefficients but inverse nexus with IAEPR. The adjusted R-square values indicate more influential impact on IAEPR for high B|M ratio and small market-cap portfolios. Moreover, the alpha values of all 25 portfolios shows statistically significant but inverse nexus similar to CAPM and FF3FM. The AAAC of C4FM is -0.0138 (1.38 percent), indicating that the monthly yields have a 1.38 percent pricing errors, according to (Lohano & Kashif, 2018). These inverse nexus identify overvalued portfolios and determines the invalidity of C4FM (Lohano & Kashif, 2018).

Fama & French (2015) five-factor model Regression Results

Table 10 summarizes the estimation results of FF5FM using OLS regression technique. Similar to FF3FM and C4FM, the inflation-adjusted market demonstrates highly statistically significant coefficients for all portfolios. The t-value ranges from 1.676 to 4.498. The size and value-patterns demonstrate almost similar and statistically significant results as C4FM supporting with theories. Moreover, profitability pattern shows 16 out of 25 coefficients statistically significant impact on IAEPR. Conversely, the investment pattern confirms statistically insignificant findings except three portfolios (34, 33 and 42 with β = 0.526, 0.667 and 0.435 respectively). The F-values ranges from 3.15 to 25.07 which indicate declining situation as compare to FF3FM and C4FM findings. Moreover, the alpha values of all 25 portfolios shows statistically significant but inverse nexus similar to CAPM, FF3FM and C4FM. The AAAC of FF5FM is -0.0154 (1.54 percent), indicating that the monthly yields have a 1.54 percent pricing errors, according to (Lohano & Kashif, 2018). These inverse nexus identify overvalued portfolios and determines the invalidity of FF5FM (Lohano & Kashif, 2018).

Table 10: Estimated results of Fama & French (2015) five-factor model

Alpha	H-B|M	4	3	2	L-B|M	T-value	H-B|M	4	3	2	L-B|M
Small	-0.018***	-0.016***	-0.014***	-0.015***	-0.014***	Small	-4.897	-4.817	-4.566	-3.980	-3.984
2	-0.018***	-0.015***	-0.017***	-0.015***	-0.014***	2	-5.132	-4.590	-5.162	-3.907	-3.944
3	-0.017***	-0.013***	-0.014***	-0.017***	-0.012***	3	-4.517	-3.349	-4.030	-4.731	-3.357
4	-0.012***	-0.016***	-0.010**	-0.015***	-0.020***	4	-3.086	-4.191	-2.591	-3.779	-5.030
Big	-0.019***	-0.013***	-0.015***	-0.016***	-0.020***	Big	-5.471	-3.620	-4.085	-3.674	-5.703
RmInf	**H-B|M**	**4**	**3**	**2**	**L-B|M**	**T-value**	**H-B|M**	**4**	**3**	**2**	**L-B|M**
Small	0.143***	0.127***	0.154***	0.150***	0.154***	Small	3.445	3.457	4.498	3.608	4.055
2	0.147***	0.133***	0.120***	0.123***	0.105**	2	3.785	3.610	3.228	2.879	2.589
3	0.129***	0.146***	0.135***	0.133***	0.131***	3	3.031	3.436	3.528	3.259	3.371
4	0.119***	0.164***	0.073*	0.132***	0.163***	4	2.689	3.938	1.676	2.933	3.666
Big	0.158***	0.125***	0.124***	0.166***	0.133***	Big	4.129	3.041	3.011	3.486	3.374
SMB	**H-B|M**	**4**	**3**	**2**	**L-B|M**	**T-value**	**H-B|M**	**4**	**3**	**2**	**L-B|M**
Small	-0.963***	-0.600***	-0.559***	-0.486***	-0.611***	Small	-8.712	-6.110	-6.147	-4.386	-6.056
2	-0.266**	-0.290***	-0.454***	-0.266**	-0.463***	2	-2.568	-2.958	-4.602	-2.350	-4.293
3	-0.046	0.113	-0.003	-0.188*	0.125	3	-0.402	0.998	-0.027	-1.734	1.202
4	0.643***	0.351***	0.532***	0.275**	0.267**	4	5.467	3.169	4.556	2.294	2.253
Big	0.443***	0.691***	0.429***	0.889***	0.517***	Big	4.350	6.311	3.902	6.992	4.915
HML	**H-B|M**	**4**	**3**	**2**	**L-B|M**	**T-value**	**H-B|M**	**4**	**3**	**2**	**L-B|M**
Small	0.952***	0.778***	0.469***	-0.219	-0.121	Small	4.697	4.321	2.813	-1.079	-0.652
2	0.656***	0.679***	-0.018	-0.572***	-0.366*	2	3.457	3.782	-0.101	-2.751	-1.850
3	0.801***	0.313	-0.068	-0.221	-0.178	3	3.855	1.509	-0.365	-1.112	-0.935
4	0.974***	0.415**	0.258	-0.257	-0.113	4	4.516	2.044	1.206	-1.173	-0.520
Big	0.568***	1.163***	-0.122	-0.239	-0.378*	Big	3.036	5.792	-0.604	-1.025	-1.960
RMW	**H-B|M**	**4**	**3**	**2**	**L-B|M**	**T-value**	**H-B|M**	**4**	**3**	**2**	**L-B|M**
Small	-0.567**	-0.488**	-0.359*	0.140	-0.476**	Small	-2.415	-2.341	-1.860	0.596	-2.221
2	-0.295	-0.606***	-0.363*	-0.469*	-0.746***	2	-1.344	-2.912	-1.731	-1.948	-3.258
3	-0.614**	-0.364	-0.433**	0.067	-0.268	3	-2.552	-1.516	-1.999	0.291	-1.217
4	-0.651***	0.008	0.248	-0.570**	-0.241	4	-2.609	0.035	1.000	-2.241	-0.957
Big	0.093	-0.723***	-0.785***	-0.528*	-1.068***	Big	0.430	-3.110	-3.368	-1.955	-4.781

CMA	H-B|M	4	3	2	L-B|M	T-value	H-B|M	4	3	2	L-B|M
Small	-0.264	-0.084	-0.054	0.272	0.062	**Small**	-1.070	-0.386	-0.268	1.097	0.277
2	0.023	0.311	0.345	0.435*	0.360	**2**	0.098	1.421	1.566	1.720	1.494
3	0.213	0.526**	0.667***	0.295	-0.220	**3**	0.840	2.081	2.931	1.220	-0.950
4	0.056	0.349	-0.139	0.158	-0.328	**4**	0.212	1.411	-0.534	0.591	-1.239
Big	0.333	0.214	0.137	0.450	0.189	**Big**	1.463	0.875	0.557	1.586	0.802
Adj. R²	H-B|M	4	3	2	L-B|M	F-value	H-B|M	4	3	2	L-B|M
Small	0.283	0.204	0.191	0.104	0.158	**Small**	25.07	16.32	14.98	7.36	11.96
2	0.112	0.153	0.103	0.069	0.104	**2**	8.00	11.47	7.33	4.72	7.37
3	0.116	0.074	0.070	0.050	0.047	**3**	8.35	5.12	4.77	3.34	3.15
4	0.199	0.099	0.073	0.055	0.061	**4**	15.76	7.03	5.01	3.69	4.13
Big	0.143	0.270	0.100	0.172	0.154	**Big**	10.61	23.55	7.06	13.22	11.54

Notes: Table 10 depicts the findings of FF5FM using inflation adjusted value-weighted portfolios including intercept, coefficient and adjusted R-square results. The right side shows T-values and F-values for 25 portfolios.

Momentum augmented Fama & French (2015) five-factor model Regression Results

Table 11 shows momentum augmented FF5FM using time-series OLS regression approach. The findings show that market-factor demonstrates statistically significant nexus with average inflation adjusted excess portfolio returns showing inconsistency with (Azam & Naveed, 2022). Only one portfolio shows weak significant results (portfolio 23, β = 0.074 with t-states = 1.678). The t-values except portfolio 23, ranges from 2.542 to 4.266 which indicates that market pattern contributes statistically significant nexus with portfolio returns in the market. Similarly, the size-pattern demonstrates statistically significant and positive nexus with IAEPR for small market-cap stocks portfolios while the big market-cap stocks portfolios show significant but negative relationship with IAEPR which indicates that size-factor exists in the market. Likewise, value-pattern shows statistically significant nexus with IAEPR as portfolios having high B|M ratios except one portfolio (34, having β = 0.321, with t-states = 1.449) all portfolios show positive significant values. On the contrary, portfolios having low B|M ratios exhibit negative but significant results except portfolios (BL, 32 and 3L having t-states = -1.056, -0.238 and -0.321 respectively) which designates the value-pattern significant contribution in the market.

The profitability pattern determines mix and tenuous results in terms of magnitude as except five portfolios

(SH, 24, 23, B2 and 32), all portfolios show negative relationship with IAEPR. Moreover, 16 out of 25 portfolios show statistically significant results while only 9 portfolios show insignificant results. On the contrary, investment pattern displays poor results in explaining the IAEPR in the market. In addition, the sixth factor is momentum which demonstrates better performance as the results show 14 significant estimated coefficients. The high B|M stocks portfolios show positively significant results for 6 out of 10 portfolios while the low B|M stocks portfolios show significant results for 6 out of 10 portfolios but show negative magnitudes which confirms the value stocks momentum excess portfolio returns. In addition, the adjusted R-square also significant growth as compare to previous explained models. Furthermore, the evidence of F-values also indicate that momentum augmented FF5FM produces better results as compare to other baseline models presented above in the study. Based on F-value, the overall portfolios show statistically significant results except three portfolios (42, 22 and 3L with F-value = 3.92, 3.61 and 3.33) respectively. Moreover, the alpha values of all 25 portfolios shows statistically significant but inverse nexus similar to CAPM, FF3FM, C4FM and FF5FM. The AAAC of MFF5FM is -0.01312 (1.31 percent), indicating that the monthly yields have a 1.31 percent pricing errors, according to (Lohano & Kashif, 2018). These inverse nexus identify overvalued portfolios and determines the invalidity of MFF5FM (Lohano & Kashif, 2018).

Table 11: Estimates for Momentum adjusted FF5FM

Alpha	H-B|M	4	3	2	L-B|M	T-value	H-B|M	4	3	2	L-B|M
Small	-0.012***	-0.012***	-0.010***	-0.012***	-0.012***	**Small**	-3.142	-3.341	-3.045	-3.076	-3.279
2	-0.015***	-0.013***	-0.016***	-0.015***	-0.014***	**2**	-3.960	-3.809	-4.562	-3.615	-3.535
3	-0.012***	-0.013***	-0.015***	-0.017***	-0.009**	**3**	-2.914	-3.165	-4.062	-4.335	-2.439
4	-0.011***	-0.015***	-0.010**	-0.013***	-0.014***	**4**	-2.650	-3.816	-2.460	-2.924	-3.291
Big	-0.015***	-0.011***	-0.018***	-0.009**	-0.015***	**Big**	-4.060	-2.752	-4.571	-2.045	-4.030
RmInf	H-B|M	4	3	2	L-B|M	T-value	H-B|M	4	3	2	L-B|M
Small	0.128***	0.117***	0.143***	0.144***	0.150***	**Small**	3.166	3.216	4.266	3.456	3.940
2	0.139***	0.129***	0.117***	0.122***	0.103**	**2**	3.598	3.488	3.153	2.857	2.542
3	0.115***	0.146***	0.138***	0.132***	0.125***	**3**	2.762	3.427	3.583	3.224	3.208
4	0.116***	0.163***	0.074*	0.125***	0.147***	**4**	2.623	3.896	1.678	2.788	3.395
Big	0.148***	0.119***	0.131***	0.150***	0.120***	**Big**	3.911	2.891	3.187	3.218	3.109

SMB	H-B|M	4	3	2	L-B|M	T-value	H-B|M	4	3	2	L-B|M
Small	-0.845***	-0.516***	-0.477***	-0.435***	-0.579***	**Small**	-7.634	-5.190	-5.194	-3.824	-5.578
2	-0.202*	-0.256**	-0.436***	-0.264**	-0.452***	**2**	-1.915	-2.542	-4.286	-2.254	-4.060
3	0.064	0.110	-0.024	-0.182	0.177*	**3**	0.559	0.942	-0.226	-1.624	1.659
4	0.662***	0.359***	0.528***	0.327***	0.391***	**4**	5.461	3.138	4.388	2.656	3.299
Big	0.523***	0.740***	0.373***	1.017***	0.620***	**Big**	5.051	6.587	3.310	7.966	5.857
HML	**H-B|M**	**4**	**3**	**2**	**L-B|M**	**T-value**	**H-B|M**	**4**	**3**	**2**	**L-B|M**
Small	0.626***	0.546***	0.243	-0.361*	-0.208	**Small**	2.978	2.892	1.395	-1.668	-1.056
2	0.481**	0.587***	-0.068	-0.579***	-0.397*	**2**	2.398	3.065	-0.354	-2.606	-1.878
3	0.500**	0.321	-0.010	-0.238	-0.321	**3**	2.305	1.449	-0.051	-1.122	-1.587
4	0.920***	0.394*	0.268	-0.401*	-0.457**	**4**	3.996	1.816	1.169	-1.716	-2.026
Big	0.348*	1.027***	0.033	-0.593**	-0.662***	**Big**	1.769	4.809	0.153	-2.445	-3.292
RMW	**H-B|M**	**4**	**3**	**2**	**L-B|M**	**T-value**	**H-B|M**	**4**	**3**	**2**	**L-B|M**
Small	-0.598***	-0.510**	-0.381**	0.127	-0.484**	**Small**	-2.621	-2.490	-2.011	0.541	-2.261
2	-0.312	-0.615***	-0.367*	-0.470*	-0.749***	**2**	-1.431	-2.957	-1.752	-1.947	-3.265
3	-0.643***	-0.364	-0.427**	0.065	-0.282	**3**	-2.732	-1.510	-1.972	0.283	-1.285
4	-0.657***	0.006	0.249	-0.584**	-0.274	**4**	-2.626	0.026	1.001	-2.302	-1.118
Big	0.072	-0.736***	-0.771***	-0.562**	-1.096***	**Big**	0.337	-3.176	-3.319	-2.133	-5.017
CMA	**H-B|M**	**4**	**3**	**2**	**L-B|M**	**T-value**	**H-B|M**	**4**	**3**	**2**	**L-B|M**
Small	0.133	0.198	0.220	0.443*	0.169	**Small**	0.518	0.860	1.037	1.684	0.704
2	0.235	0.424*	0.406*	0.444	0.397	**2**	0.960	1.817	1.725	1.642	1.545
3	0.579**	0.516*	0.596**	0.316	-0.046	**3**	2.195	1.910	2.454	1.223	-0.188
4	0.120	0.375	-0.150	0.332	0.091	**4**	0.429	1.417	-0.540	1.169	0.331
Big	0.600**	0.380	-0.051	0.881***	0.534**	**Big**	2.506	1.460	-0.197	2.984	2.182
WML	**H-B|M**	**4**	**3**	**2**	**L-B|M**	**T-value**	**H-B|M**	**4**	**3**	**2**	**L-B|M**
Small	-0.621***	-0.441***	-0.430***	-0.269*	-0.167	**Small**	-4.437	-3.514	-3.700	-1.868	-1.273
2	-0.332**	-0.176	-0.095	-0.014	-0.059	**2**	-2.483	-1.385	-0.741	-0.094	-0.420
3	-0.574***	0.016	0.111	-0.033	-0.272**	**3**	-3.979	0.106	0.832	-0.234	-2.023
4	-0.101	-0.040	0.018	-0.273*	-0.655***	**4**	-0.661	-0.277	0.116	-1.755	-4.366
Big	-0.418***	-0.259*	0.294**	-0.675***	-0.541***	**Big**	-3.194	-1.823	2.066	-4.179	-4.043
Adj. R²	**H-B|M**	**4**	**3**	**2**	**L-B|M**	**F-value**	**H-B|M**	**4**	**3**	**2**	**L-B|M**
Small	0.324	0.234	0.224	0.114	0.163	**Small**	25.40	16.14	15.26	6.76	10.25
2	0.129	0.158	0.105	0.069	0.104	**2**	7.80	9.90	6.19	3.92	6.15
3	0.158	0.074	0.072	0.050	0.059	**3**	9.92	4.25	4.08	2.79	3.33
4	0.200	0.100	0.073	0.064	0.114	**4**	13.18	5.86	4.16	3.61	6.81
Big	0.170	0.278	0.112	0.215	0.195	**Big**	10.80	20.32	6.66	14.50	12.80

Notes: Table 11 depicts the findings of momentum adjusted FF5FM using inflation adjusted value-weighted portfolios including intercept, coefficient and adjusted R-square results. The right side shows T-values for individual factor and F-value for 25 portfolios.

Table 12 demonstrate the conclusive results for factor statistically significance in the model. It summarises that out of total 25 portfolios, the number of factors show significant findings using standard APMs. The main market factor (RmInf) shows highly statistically significant results with p-value < 0.05 in all the models. Similarly, size pattern (SMB) shows 21 out of 25 portfolios statistically significant results like (Azam & Naveed, 2021). Moreover, the value pattern (HML) which is assumed redundant in FF5FM internationally also shows stable results and interestingly better performance by augmenting momentum with FF5FM, such as 16 portfolios show significant results while FF5FM shows 13 significant portfolio results. The momentum pattern also shows significant determinant in both models such as C4FM and M-FF5FM, which progressively increase the investment pattern (CMA) significance in the M-FF5FM but inversely influence the profitability pattern (RMW).

In conclusion, this study presents strong evidence based on statistically significance of factors out of 25 portfolios in the model which can be concluded as follows:

Table 12: Factor wise Conclusive Significance Results

FACTOR	CAPM	FF3FM	C4FM	FF5FM	M-FF5FM
RmInf.	24	25	25	25	25
SMB	NA	21	22	21	21
HML	NA	12	13	13	16
WML	NA	NA	12	NA	16
RMW	NA	NA	NA	16	9
CMA	NA	NA	NA	3	14

Notes: Table 12 summarises the factors performance in the models used, out of overall 25 portfolios such as 24 out of 25 portfolios show significant results for inflation-adjusted market-pattern using CAPM. NA stands for not applied.

GRS Test Results

For further robustness of APMs, this study employed GRS test to examine and discover which APM explains better the average portfolio stocks returns based on inflation-adjusted specification in PSX. GRS detects the appropriate model based on 'mean-variance efficiency of portfolio returns (Brownet al., 2021).

Table 13: Estimates of GRS test

Model	Mean Alpha	Mean SE	Mean R2	Mean adj. R2	GRS F-test	GRS p-value
CAPM	-0.016321	0.003752	0.032019	0.029013	2.698162	0.000039
FF3FM	-0.015826	0.003631	0.109683	0.101336	2.497770	0.000152
C4FM	-0.013792	0.003883	0.123946	0.112961	1.779121	0.013954
FF5FM	-0.015412	0.003651	0.126527	0.112793	2.300666	0.000565
M-FF5FM	-0.013061	0.003873	0.142310	0.126076	1.713144	0.020262

Notes: Table 13 shows the GRS test results based on asset pricing models which consists of five models. The results show mean alpha, mean standard errors, mean R-square, mean adjusted R-square, GRS F-test and GRS p-value for all models.

Table 13 reports the estimates of (Gibbons et al., 1989) test which hypothesize the sum of intercept should be equal to zero to choose the appropriate model for the market. The findings examine the absolute average alpha (AAA) which indicates how well the combination of factors in the model explains the average portfolio excess returns and the results suggests momentum-augmented FF5FM (AAA = 0.013061, GRS F-test = 1.713144) outperform the remaining baseline models in PSX. This validates that augmenting the number of factors in the CAPM produces appropriate outcomes in the Pakistani equity market. Furthermore, the second suitable model suggested by GRS test is C4FM (AAA = 0.013792, GRS F-test = 1.779121) appropriate in explaining the average portfolio stocks returns in PSX.

Conclusion

The stock market primarily contributes to a country's economic growth by allowing funds to flow smoothly from savers to investors, thereby maintaining the economic cycle and allowing the economy to grow at a steady pace. Asset pricing models have gained considerable popularity, as it is associated with the determination of stock prices volatility in the capital markets. To determine the stock prices, CAPM theory postulates excess returns with respect to surplus over risk-free rates. Based on Fisher (1930) 'theory of interest', this study postulates a novel measurement approach for real excess returns by using inflation adjusted risk-free rates rather than treasury bills rates to calculate both excess portfolios and market returns.

This study presents strong evidence that the momentum augmented (Fama & French, 2015) five-factor model (MFF5FM) equilibrium condition holds in the market. This demonstrates that increasing the number of factors in the APM produces appropriate outcomes in the PSX. Furthermore, the factors such as market, size, and value move largely correlated with excess portfolio stocks prices. Researchers and academicians can use the baseline and momentum augmented FF5FM findings of the study to better comprehend the nexus of risk and returns over a broad stock pattern. Potential investors are given more information about the PSX investment patterns, which is backed up by real-world statistics, before making a decision.

Conclusively, the market portfolios consecutively offer systematic risk premiums in the market. After assuming this study, policy makers can establish investment-friendly policies for domestic as well as foreign investors who are potential investors in future. More importantly, the baseline and momentum augmented FF5FM findings can assist researchers and academicians in understanding the nexus of risk and returns of PSX through a broad stock pattern. Before making a decision, potential investors are provided further information about the PSX investment patterns backed up by real-world data.

The future potential studies in the similar discipline may be feasible if they investigate Covid-19 era as suggested by (Azam & Azeem, 2021); augmenting Human-Capital as additional factor with nested APMs as suggested by (Azam, 2022a); using GDP-Growth as macroeconomic additional mediating variable proposed by (Azam & Naveed, 2021); recently used Tobin-q as additional factor augmented with APMs advocated by (Azam, 2022b); using Leverage as added factor for further robustness of results as recommended by (Azam & Ilyas, 2011) in their studies. Moreover, employing developed and datasets from different nations, it is feasible to use macroeconomic variables and a variety of statistical and econometrical approaches for further robustness.

Conflict of interest: The authors declare no conflict of interest

References

Ansari, Valeed A. (2000). Capital asset pricing model: should we stop using it? *Vikalpa, 25*(1), 55-64.

Azam, M., & Azeem, N. (2021). Does COVID-19 Affect Stock Market Volatility?. International Journal of Business and Management Sciences, 2(2), 57-66.

Azam, M., & Naveed (2022). The CAPM Revisited Using Structural Equation Model: Mediating Role of GDP-Growth in Pakistan Stock Exchange. Journal of Managerial Sciences, 16(1), 93-108.

Azam, M. (2022a). Selectivity and Market-Timing Performance of Mutual Funds Using Human-Capital Augmented Various Asset-Pricing Models: Evidence from Pakistan. International Journal of Management Research and Emerging Sciences, 12(3).

Azam, M. (2022b). An empirical investigation of Tobin's-Q augmented various Asset Pricing Models: Evidence from Pakistan. Journal of Social Sciences and Management Studies, 1(4), 1–22. https://doi.org/10.56556/jssms.v1i4.293

Azam, M., & Ilyas, J. (2011). An empirical comparison of CAPM and Fama-French Model: A case study of KSE. Interdisciplinary Journal of Contemporary Research in Business, 2(12), 415-426.

Azam, M., & Naveed (2021). Multidimensional Liquidity (Liu, 2006) and Momentum (Carhart, 1997) augmented Fama & French (2015) five-factor model: Evidence from Pakistan. International Journal of Business and Management Sciences, 2(3), 108-130.

Banz, Rolf W. (1981). The relationship between return and market value of common stocks. *Journal of financial Economics, 9*(1), 3-18.

Basu, Sanjoy. (1983). The relationship between earnings' yield, market value and return for NYSE common stocks: Further evidence. *Journal of financial Economics, 12*(1), 129-156.

Bhandari, Laxmi Chand. (1988). Debt/equity ratio and expected common stock returns: Empirical evidence. *The Journal of Finance, 43*(2), 507-528.

Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of Finance, 52*(1), 57-82.

Deb, Soumya Guha, Banerjee, Ashok, & Chakrabarti, BB. (2007). Market timing and stock selection ability of mutual funds in India: an empirical investigation. *Vikalpa, 32*(2), 39-52.

Dilidüzgün, Menevşe Özdemir, Yılmaz, Ayşe Altıok, & Selçuk, Elif Akben. (2020). Spread Determinants in Corporate Bond Pricing: The Effect of Market and Liquidity Risks. *Panoeconomicus*, 1-23.

Ewald, Christian-Oliver, Haugom, Erik, Kanthan, Leslie, Lien, Gudbrand, Salehi, Pariya, & Størdal, Ståle. (2021). Salmon futures and the Fish Pool market in the context of the CAPM and a three-factor model. *Aquaculture Economics & Management*, 1-21.

Fama, & French. (1993). Common risk factors in the returns on stocks and bonds. *Journal of financial Economics, 33*, 3-56.

Fama, & French. (2015). A five-factor asset pricing model. *Journal of financial Economics, 116*(1), 1-22. doi: 10.1016/j.jfineco.2014.10.010

Fama, & French. (2016). Dissecting anomalies with a five-factor model. *The Review of Financial Studies, 29*(1), 69-103.

Fama, & French. (2018). Choosing factors. *Journal of financial Economics, 128*(2), 234-252.

Fisher, Irving. (1930). *Theory of interest: as determined by impatience to spend income and opportunity to invest it*: Augustusm Kelly Publishers, Clifton.

Geetha, Caroline, Mohidin, Rosle, Chandran, Vivin Vincent, & Chong, Victoria. (2011). The relationship between inflation and stock market: Evidence from Malaysia, United States and China. *International journal of economics and management sciences, 1*(2), 1-16.

Gibbons, Michael R, Ross, Stephen A, & Shanken, Jay. (1989). A test of the efficiency of a given portfolio. *Econometrica: Journal of the Econometric Society*, 1121-1152.

Goetzmann, William N, Brown, Stephen J, Gruber, Martin J, & Elton, Edwin J. (2014). Modern portfolio theory and investment analysis. *John Wiley & Sons, 237*.

Grobys, Klaus, & Huhta-Halkola, Topi. (2019). Combining value and momentum: evidence from the Nordic equity market. *Applied Economics, 51*(26), 2872-2884.

Haddad G., Hellara S. (2019). Liquidity Impact on Assets Pricing in the Context of Fama and French Model. *International Journal of Financial Innovation in Banking (IJFIB)*, Vol 2, N° 4, 355-374.

Huberman, Gur, & Kandel, Shmuel. (1987). Mean-variance spanning. *The Journal of Finance, 42*(4), 873-888.

Idrees, Muhammad, & Baig, Munib. (2017). An Empirical Analysis of Multidimensional Poverty in Pakistan. *FWU Journal of Social Sciences, 11*(1).

Jareño, Francisco. (2008). Spanish stock market sensitivity to real interest and inflation rates: an extension of the Stone two-factor model with factors of the Fama and French three-factor model. *Applied Economics, 40*(24), 3159-3171.

Jiang, Chun, Zhang, Yadi, Razi, Ummara, & Kamran, Hafiz Waqas. (2021). The asymmetric effect of COVID-19 outbreak, commodities prices and policy uncertainty on financial development in China: evidence from QARDL approach. *Economic research-Ekonomska istraživanja*, 1-20.

Lewellen, Jonathan, Nagel, Stefan, & Shanken, Jay. (2010). A skeptical appraisal of asset pricing tests. *Journal of financial Economics, 96*(2), 175-194.

Majeed, M. A., & Yan, C. (2022). Financial statement comparability and stock liquidity: evidence from China. *Applied Economics*, 1-18.

Mukherji, Sandip. (2011). The capital asset pricing model's risk-free rate. *The International Journal of Business and Finance Research, 5*(2), 75-83.

Prathama, R, Sugiarto, S, Ugut, G, & Hulu, E. (2020). Pricing model for Indonesia government bond. *Accounting, 6*(6), 1083-1092.

Rathnasingha, Dewundara Liyanage PM, & Dayarathne, Kangara Pathirannehelage NS. (2021). Constructing the Yield Curve for Sri Lankas Government Bond Market. *International Journal of Business and Economic Affairs, 6*(1), 56-69.

Saleem, Faiza, Zafar, Laraib, & Rafique, Bisma. (2013). Long run relationship between inflation and stock return: evidence from Pakistan. *Academic Research International, 4*(2), 407.

Shah, RU, Saleem, K, & Malik, F. (2020). Short Run and Long Run Association of Macro-Economic Indicators with Stock Market: Evidence from Pakistan Stock Market. *Global Social Sciences Review, 1*, 36-43.

Siegel, Jeremy J, & Thaler, Richard H. (1997). Anomalies: The equity premium puzzle. *Journal of economic perspectives, 11*(1), 191-200.

Stone, Bernell K. (1974). Systematic interest-rate risk in a two-index model of returns. *Journal of Financial and Quantitative Analysis, 9*(5), 709-721.

Stowe, John D, Robinson, Thomas R, Pinto, Jerald E, & McLeavey, Dennis W. (2007). *Equity asset valuation* (Vol. 4): John Wiley & Sons.

Su, Chi-Wei, Huang, Shi-Wen, Qin, Meng, & Umar, Muhammad. (2021). Does crude oil price stimulate economic policy uncertainty in BRICS? *Pacific-Basin Finance Journal, 66*, 101519.

Su, Chi-Wei, Qin, Meng, Tao, Ran, & Umar, Muhammad. (2020). Financial implications of fourth industrial revolution: Can bitcoin improve prospects of energy investment? *Technological Forecasting and Social Change, 158*, 120178.

Tripathi, Vanita, & Kumar, Arnav. (2014). Relationship between Inflation and stock returns–evidence

from BRICS markets using Panel Co integration Test. *International Journal of Accounting and Financial Reporting, 4*(2), 647-658.

Ullah, A., Pinglu, C., Ullah, S., Aslam, N., & Zaman, M. (2020). Role of Microfinance in Poverty Alleviation in the Least Developed Area of Pakistan. *Asian Economic and Financial Review, 10*(12), 1430-1452.

Umar, Muhammad, Ji, Xiangfeng, Kirikkaleli, Dervis, & Xu, Qinghui. (2020). COP21 Roadmap: Do innovation, financial development, and transportation infrastructure matter for environmental sustainability in China? *Journal of environmental management, 271*, 111026.

Umar, Muhammad, Ji, Xiangfeng, Mirza, Nawazish, & Rahat, Birjees. (2021). The impact of resource curse on banking efficiency: Evidence from twelve oil producing countries. *Resources Policy, 72*, 102080.

Weston, J Fred. (1973). Investment decisions using the capital asset pricing model. *Financial Management*, 25-33.

Abbreviations list

AAA	Absolutely average alpha
APMs	Asset pricing models
CAPM	Capital Asset Pricing Model
C4FM	Carhart (1997) four-factor model
FF3FM	Fama & French (1993) three-factor model
FF5FM	Fama & French (1993) five-factor model
FSD	Financial sector development
GRS	Gibbons, Ross & Shanken (1989) test
HBMSP	High B|M ratio stocks portfolios
IAREPR	Inflation adjusted real excess portfolio returns
LBMSP	Low B|M ratio stocks portfolios
MFF5FM	Momentum augmented FF5FM
PSX	Pakistan Stock Exchange