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In the Name of God, the Compassionate, the Merciful

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Structure of second page until the end of manuscript is as follow:

- *Introduction* Some paragraphs contain explaining the problem, literature review, object (purpose), importance and necessity of it.
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- *Results* including the findings compare it with the findings of previous and interpretation of compliance or inconsistency of findings with research findings and theories.

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Editor's Note

I am pleased to announce that the Ferdowsi University of Mashhad is publishing Iranian Journal of Accounting, Auditing & Finance (IJAAF). On behalf of the board of the IJAAF and my co-editors, I am glad to present the Volume 1, Issue 1 of the journal in December 2017; the journal will publish four issues in a year. The board includes experts in the fields of accounting, finance and auditing, all of whom have proven track records of achievement in their respective disciplines. Covering various fields of accounting, *IJAAF* publishes research papers, review papers and practitioner oriented articles that address significant issues as well as those that focus on Asia in particular. Coverage includes but is not limited to:

- Financial accounting
- Managerial accounting
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- Taxation
- Accounting information systems
- Accounting education

Perspectives or viewpoints arising from regional, national or international focus, a private or public sector information need, or a market-perspective are greatly welcomed. Manuscripts that present viewpoints should address issues of wide interest among accounting scholars internationally and those in Asia in particular.

Yours faithfully,
Mahdi Moradi
Editor in Chief

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RESEARCH ARTICLE

Microfinance Banks' Investment Portfolio and Standard of Living in Nigeria: an Empirical Study

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Abstract

There are two important missions of microfinance banks, financial and social. The social mission has brought to the fore the role of microfinance credit, investment, and other activities in improving the social well-being of the people. Thus, this study aims to examine the effect of the investment activity of microfinance banks on the standard of living in Nigeria between 1992 and 2018 using annual time series data. Based on Autoregressive Distributed Lag (ARDL) model and in the company of cointegrating regression techniques as robustness checks, this study finds evidence of a long-run relationship between standard of living and microfinance investment portfolio, with the lagged value of the latter having a significant negative effect on per capita income (a proxy for standard of living) in the long-run but the significant positive association was confirmed in the short run. The study concludes that microfinance banks' investment activity is only a short term means of raising the standard of living in Nigeria, for in the long run, rather than raising, it reduces the standard of living in Nigeria significantly. Therefore, it is recommended that microfinance banks' activity be directed towards financially profitable ventures and more socially rewarding outlets capable of improving the social well-being of the people, thereby helping raise the standard of living in Nigeria.

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1. Introduction

Behind the activities of man is the desire for a better life. This better life which reflects in the form of standard of living, is a function of one's income level generated from trade, business, employment etc. According to Okafor (2016), the standard of living, which is inversely related to poverty, is the degree of comfort, wealth, material goods and necessities of life available to a particular socio-economic class of people. Standard of living also means the ability of an individual to assess basic necessities of life with no difficulty (Akpunonu, Nkechukwu and Okonkwo. 2017). The level of per capita income is a key index of the standard of living of a country. Other indicators include good housing, employment class, poverty reduction, quality of education, literacy level, quality food, quality and availability of social amenities (Akpunonu et al. 2017).

Microfinance banks have been considered friendly institutions available to the poor in that they provide the poor with the needed credit (Okafor, 2016). Thus, microfinance entails providing financial services to the economically active poor and low-income earners and their micro-businesses (Kasali et al., 2015; Mustapha, Yusuf and Abdullahi. 2019). Microfinance could be formal, informal or semi-formal. A typical example of formal microfinance is the microfinance bank (MFB), an incorporated entity holding a valid banking licence to practice microfinance banking business; it has two main missions, financial and social. The former mission is concerned with making enough profits to satisfy the financial needs of its teeming stakeholders. The latter (social mission) is concerned with improving the social-economic lives of the people through raising the standard of living, alleviating poverty, human capacity building, raising social security etc.

Microfinance formally has its origin traced to the Grameen Bank, which, in 1976, Muhammad Yunus founded on the outskirts of Chittagong University campus, Jobra, Bangladesh. Other countries of the world, including Nigeria, have their non-formal microfinance in the form of microcredit; formal microfinance institutions began in Nigeria in 2005 with the launch of the Microfinance Bank Policy by the Central Bank of Nigeria (CBN). These banks are established to cater to the economically active poor people's needs by providing them with savings, payment, credit, capacity building, and other services to improve their socio-economic lives, thus reducing poverty by raising their standard of living. This suggests that poverty reduction and standard of living are at the heart of microfinance. Therefore, Mustapha, Yusuf and Abdullahi (2019) argue that microfinance is an innovative financial arrangement designed to attract the poor as either borrowers or savers. Furthermore, credit availability has been considered one source to fight poverty, which helps improve the quality of living and, consequently, the standard of living (Okafor, 2016).

Apart from microcredit, another activity of microfinance banks is an investment. Microfinance banks also get involved in permissible investment portfolios to fulfil their double bottom lines of financial profitability and social mission accomplishment. Empirically, most previous studies posit that microfinance institutions have registered their positive impact on poverty alleviation or standard of living elevation through microcredit. In the same vein, some calibre of studies focused on the microfinance bank-growth nexus (Eigbiremolen and Anaduaka (2014); Ayodele and Arogundade (2014); Sultan and Masih (2016); Apere (2016); Jude and Emori (2017); Ezeanyeji et al. (2020). A review of past studies also exposes a lack of emphasis on microfinance banks' investment portfolios and their effect on people's standard of living. Most past studies have confirmed the positive role of Islamic banks (Tabash and Dhankar (2013), Tabash and Dhankar (2014), Osmanovica, Kb and Stojanovic (2020)); microfinance banks (Eigbiremolen and Anaduaka (2014)), investment (Chidoko and Sachirarwe (2015), Apere (2016), Sultan and Masih (2016), Apere (2016)); foreign direct investment (Ek (2007), Chigbu et al. (2015), Alabi (2019), Babarinde (2020)); on economic growth. However, the extent to which the investment portfolio of microfinance banks impacts the living

standard of people is largely less explored by previous studies.

Microfinance banks have dual missions the social mission of poverty alleviation and the financial mission of financial returns to stakeholders. The former mission has received less consideration in post empirical investigations than the latter, especially when microfinance banks' investment portfolio is used as a performance yardstick. Therefore, this current study attempts to fill the lacuna by empirically investigating whether microfinance banks' investment portfolio positively or negatively impacts the standard of living in Nigeria from 1992 to 2018. This study is situated within the Autoregressive Distributed Lag(ARDL) model while three cointegration regression techniques, namely, Fully Modified Ordinary Least Squares (FMOLS), Dynamic Ordinary Least Squares(DOLS) and Canonical Cointegrating Regression (CCR) techniques serve the purposes of robustness checks.

Therefore, the main aim of this study is to evaluate the impact of microfinance banks' investment portfolios on the standard of living in Nigeria. The specific objectives of the study are to: determine the impact of microfinance banks' investment activity on the standard of living in Nigeria; examine the impact of microfinance bank loans and credit on the standard of living in Nigeria; and evaluate the impact of microfinance banks' deposit liabilities on the standard of living in Nigeria.

This current study contributes to microfinance-standard of living literature by providing empirical evidence on both long-run and short-run impacts of microfinance banks' investment portfolios on Nigeria's standard of living. Thus, this study also establishes evidence of a long-run relationship between standard of living and microfinance investment portfolio, with the latter having a significant negative effect on the standard of living in the long run, but significant positive nexus was confirmed between the duo in the short run. It is also documented in this study that microfinance banks' investment activity is only a short term means of raising the standard of living in Nigeria, for in the long run, rather than raising, it reduces the standard of living in Nigeria significantly.

In this paper, in addition to this introduction, section two is on review of related literature on microfinance banks and the standard of living nexus. The study's methodology is described in section three. Section four reports and discusses empirical data analyses, and finally, section five focuses on the conclusion and recommendations of the study.

2. Literature Review

Standard of living has been explained in literature along three broad lines of thought: standard of living as the utility of life (Pigou, 1952); standard of living as economic provision or opulence; and standard of living conceptualized as a type of freedom. To Pigou (1952), the standard of living is equated with economic welfare, the standard of real income and material prosperity. According to the opulence view of Deutsch and Silber (1999), the standard of living refers to the quantity and quality of goods and services that the individual is free to use. The third strand of conceptualization of standard of living led by Sen (1984) considers the standard of living as the freedom to carry out something and the ability to live comfortably well. This current study aligns with Pigou's view of the standard of living, which relates standard of living to real income, a term considered to be relatively much more measurable. Hence, the economic dimension of living standard, which is in the form of the portion of real income in the economy that an individual has as his or her own share, can be said to indicate his share of the country's economic welfare.

Microfinance provides micro-credit and other financial services and products to the economically active poor and small and medium scale business enterprises. A microfinance bank has been defined as any company licensed by the CBN to provide financial services such as savings and deposits, loans, domestic fund transfers, and other financial and nonfinancial services to microfinance clients (CBN, 2020).

According to CBN (2020), the permissible activities of microfinance banks in Nigeria are: acceptance of various types of deposits; provision of credit, housing micro loans, payment services banking services, and ancillary services; issuance of debentures; acting as a collecting banker in respect of money or banking instruments; acting as agent for the provision of mobile banking, micro insurance and other approved services; appointment of agents to provide financial services on its behalf; provision of loan disbursement services for the delivery of the credit programme of government, agencies, groups and individual; maintenance and operation of various types of account with other banks in Nigeria; investment in suitably approved money market instruments; operation of micro leasing facilities, microfinance related hire purchase and arrangement of consortium lending; participation in CBN Intervention Fund and funds other sources; provision of microfinance related guarantees for its customers; financing agricultural inputs; investment in cottage industries and income generating projects; provision of professional advice to low-income persons; issuance of domestic commercial paper; provision of financial and technical assistance and training to microenterprises; and any other CBN-approved permissible activities.

However, there are certain financial services that MFBs are not permitted to venture into. These services and activities include foreign currency transactions (except foreign currency borrowings); international commercial papers; international corporate finance; international electronic funds transfer; clearinghouse activities; a collection of third party cheques and other instruments to clear through correspondent banks; dealing in land for speculative purposes; dealing in real estate (except for its use as office accommodation); provision of any facility for speculative purposes; leasing, renting, and sale/purchase of assets of any kind with related parties and/or significant shareholders; financing of any illegal activities; and any activity that falls outside the permissible by the CBN (CBN, 2020).

There are four kinds of MFBs available in Nigeria: Tier 1 Unit MFB, Tier 2 Unit MFB, State Microfinance Bank, and National Microfinance Bank. CBN (2020) described that Tier 1 Unit MFB is a unit MFB with urban authorization and operates in the banked and high-density areas and is allowed to open not more than four branches outside the head office within five contiguous Local Governments Areas (LGAs). Furthermore, the author describes Tier 2 Unit MFB as a unit MFB with a rural authorization that operates only in the rural, unbanked or underbanked areas and is permitted by CBN to open one branch outside the head office within the same LGA. Furthermore, a State Microfinance Bank, as described as CBN, is an MFB permitted to operate in one state or the Federal Capital Territory (FCT) and can open branches within the same State or the FCT, but such bank is not permitted to open more than two branches in the same Local Government Area unless it has established at least one branch or cash centre in every LGA of the State. A National Microfinance Bank is authorized to operate in more than one state, including the FCT (CBN, 2020).

The Microfinance Policy, Regulatory and Supervisory Framework, which CBN issued on December 15, 2005, to guide microfinance initiatives in Nigeria and this Policy Guideline has been reviewed in 2011, 2013 and recently in 2020. According to the 2020 revised Policy, the minimum capital based for MFBs in Nigeria for Tier 1 unit, Tier 2, State and National MFBs are ₦200,000,000 (Two Hundred Million Naira), ₦50,000,000 (Fifty Million Naira), ₦1,000,000,000 (One Billion Naira) and ₦5,000,000,000 (Five Billion Naira) respectively.

Microfinance is considered a channel for poverty alleviation considering its ability to empower the poor via providing access to microcredit needed by the economic actively poor to improve their productive base and enhance income growth (Weiss and Montgomery, 2005). Microfinance banks' potential to influence living standards is primarily situated within the financial intermediation framework. This notion is based on the premise that when economically active poor (the primary client of microfinance institutions) are empowered economically through the supply and transfer of

surplus investible funds, micro-credits, from the lender (surplus unit) to the borrower (deficit unit), the productive and capital base of the poor are improved, and ultimately their economic fortune and welfare are improved. Financial intermediation can be described as the exchange process and an indirect finance arrangement that entails the channelization of surplus financial resources (funds) existing in the surplus sector of the economy to the deficit sector of the economy for trade and investment through the instrumentality of financial intermediaries (banks and non-bank financial institutions). Accordingly, Allen and Santomero (1998) argue that banks have promoted financial intermediation by taking household deposits and making loans to economic agents requiring capital. The authors note that the traditional financial intermediation theory focuses on the real-world market features of transaction costs and asymmetric information.

The extent to which microfinance bank activities have impacted the living standard of people and/or poverty reduction has been examined empirically by some scholars, among whom are Weerasinghe and Dedunu (2017), who investigated the role of microfinance in the standard of living in Kurunegala District, Sri Lanka. The study found a significant positive relationship between microcredit, advisory support, saving and living standard of the poor in the country. In another study, Žiaková and Verner (2015) also report that microfinance positively affects poverty reduction in Jordan. Furthermore, Lopatta and Tchikov (2017) examined the relationship between microfinance and economic development using transnational data. The scholars find a bidirectional causality between both microfinance institutions' social and financial performance and economic development. Similarly, Ali et al. (2015) posit that through the vehicle of investment, microfinance enhances the economic development in West Punjab. Furthermore, Karsch and Deek (2019) also conclude that small micro-financing facilitates Palestine's economic growth and stability. However, Maîtrot and Niño-Zarazúa (2017) also posit that microfinance facilitates changes in the financial life of the poor in the short run. The scholars found inclusive evidence of microfinance as an effective tool for poverty alleviation.

Furthermore, from Uddin and Hossain's (2020) impact of microfinance services on poverty reduction in Bangladesh, the authors reveal that micro-credit, savings, micro-insurance, and training influence poverty reduction in Bangladesh. Ayam et al. (2020) also confirm the positive role of microfinance in women's empowerment and standard of living in La-Nkwantanang Madina municipality, Ghana. The study further explains that access to micro-credits increased participants' incomes and savings, improved their standard of living and increased their participation in decision making within the family. Shaikha et al. (2016) also examined the impact of microfinance on poverty in South Asian Association for Regional Co-operation (SAARC) member countries. The study found significant negative associations of microfinance loans with the poverty headcount ratio and the poverty gap. The study also found that microfinance loans positively affect education, health, and living standard in the selected countries.

Moreover, Fayyaz and Khan (2021) also indicate that microfinance initiatives have a significant positive impact on enhancing the quality of life, personal empowerment, and familial harmony of the female borrowers in Pakistan. Imtiaz et al. (2014) examined the effect of micro-financing on small businesses and poverty reduction in District Faisalabad, Pakistan. The study concludes that micro-financing facilitates poverty alleviation in Pakistan. Ingabire and Ogoi (2021) submit that through the empowerment of the poor and facilitation of start-ups, growth and expansion of micro and small businesses, microfinance loan has encouraged asset building, job creation, poverty reduction and improved standard of living in Rwanda Ssembajjwe and Ncwadi (2020) investigated the role of microfinance on poverty alleviation in Uganda. The study concludes that microfinance institutions play a significant role in poverty alleviation through the interplay of loan sizes, family employment, gross income, and education. Muharremi and Madani (2021) explored microfinance services' impact

on Albania's rural creditors. The study indicates that microfinance operations have improved living standards in Albania. Chowdhury et al. (2021) evaluated the economic and social impact of microfinance programs in Bangladesh. The study reveals that microfinance programs facilitated poverty alleviation, income generation, and savings. From the review of international literature above, it is seen that most studies emphasized the micro-credit function of microfinance institutions with evidence of the same promoting standard of living/poverty reduction in different countries.

Several studies have also been carried out in Nigeria, focusing on poverty and its relationship with microfinance activities. For instance, Idowu and Salami (2011) determined the impact of microfinance banks on hairdressers' living standards in Ogbomoso North Local Government Area, Oyo State, Nigeria. The study established a significant relationship between microfinance bank efforts and the standard of living of hairdressers in the area. Kasali et al. (2015) also analysed the effect of microfinance on poverty alleviation in Nigeria and found that microfinance tends to reduce poverty in Nigeria but is not as efficient as in other countries of the world. Furthermore, Mustapha, Yusuf and Abdullahi (2019) surveyed the impact of Rima MFB on income and poverty in Goronyo LGA, Sokoto State, Nigeria. It was shown that through the instrumentality of agricultural input credit facilities, the MFB helped reduce poverty in terms of depth and severity. In the same vein, Alani and Sani (2014) investigated the effects of MFBs on rural dwellers in Kogi state. The authors reveal that MFBs can improve the lives of the economically active poor in the area. Imoisi and Opara (2014) also show a positive relationship between microfinance and the improved standard of living of the recipients of these microcredits in Edo State, Nigeria. In a related study, Audu and Achegbulu (2011) concluded that microfinance has the potential to reduce material poverty in Nigeria.

In their study, Aigbokhan and Asemota (2011) also found evidence of significant positive effects of access to microfinance on poverty reduction and social capital formation in Edo and Delta States, Nigeria. Agbaeze and Onwuka (2014) determined the effect of micro-credit on poverty alleviation in Enugu East LGA of Nigeria. The study results show that access to micro-credit has a positive but not significant impact on poverty alleviation among the rural populace. However, in his study, Okafor (2016) found no significant positive association between microfinance banks and living standards in Nigeria. Moreover, Murad and Idewele (2017) show that microfinance investment has a significant positive impact on economic performance in Nigeria in the long run but negative non-significant in the short run. Idowu and Oyeleye (2012) examined the impact of microfinance banks on poverty alleviation in Oyo State, Nigeria. The results revealed that microfinance banks have positively and significantly impacted their living standards. Obayagbona's (2018) study reveals that microfinance assets and loan-to-deposit ratio have significant effects on poverty alleviation in Nigeria, while microfinance gross earnings and microfinance bank loans have a significant negative impact on poverty alleviation in the country. Aliyu et al. (2021) also submit that access to microfinance and financial literacy positively and significantly influences the poverty reduction of Muslim women entrepreneurs in Bauchi state, Nigeria.

Oduwa (2021) show that microfinance banks play a key role in the economic empowerment of beneficiaries in the Egor Local Government Area of Edo State, Nigeria. Uyang et al. (2021) assert that a significant association exists between access to credit facilities and poverty alleviation in terms of improved income among the people of Cross River State, Nigeria. Furthermore, Ihenetu (2021) examined microfinance bank lending and poverty reduction in Nigeria. The study observes that microfinance bank lending had a significant long-run effect on poverty reduction in Nigeria but in the short run. Cole and Akintola (2021) also indicate a positive relationship between microfinance bank credit and economic growth in Nigeria. Fapetu, Adegoriola and Azeez (2021) assessed the impact of microfinance banks on poverty reduction in Nigeria. The study shows that microfinance banks' loans positively and significantly impact poverty. Idolor and Imhanlahimi (2017) surveyed the

impact of microfinance banks on poverty in Edo State, Nigeria. The study establishes that microfinance banks have very minimal presence in rural communities, hence their minimal impact. In another study, Bamidele and Danlami (2021) also proved that access to microcredit institutions in the study area positively impacts poverty reduction. Nwakoby and Okanya (2021) argue that microfinance banks have impacted poverty alleviation, increasing people's living standards in Nigeria.

In a related study, Tabash and Dhankar (2014) examined the link between Islamic finance and economic growth in Qatar and found a long-run, positive and significant relationship between Islamic banks' financing and economic growth. Similarly, a strong positive association was established between Islamic banks' financing and economic growth in the UAE by Osmanovica, Kb and Stojanovic (2020). Furthermore, Tabash and Dhankar (2013) established a long-run positive and significant correlation between Islamic banks' financing and economic growth in Bahrain. These show that Islamic financing constitutes a viable instrument of countries' economic growth that taps from the goldmine of opportunities and facilities available in that place.

In an attempt to improve people's standard of living, countries consider the option of foreign direct investment (FDI). In his study, Akinmulegun (2012) found no significant relation between FDI and the standard of living in Nigeria. This is unlike Babarinde (2020) in Nigeria and Ek (2007) in China, who show that FDI has a significant positive effect on the countries' economic growth. Similarly, Chidoko and Sachirarwe (2015) also discovered that investment positively affects economic growth in Zimbabwe.

In summary, the empirical review reveals that predominant extant empirical studies focused on the credit functions of microfinance institutions and their role in economic growth/poverty reduction. Quite a number of empirical evidence supports the positive role of MFI in poverty reduction and the growth of the economy. However, some pockets of evidence still exist on the negative role. While most studies focused on poverty reduction, they only investigated the long-run impact of MFI on poverty reduction. Unlike the previous study, this current study is handy by examining both the long-run and short-run impacts of MFB on the standard of living in Nigeria. This study is situated within the ARDL model, while three cointegrating regression techniques, FMOLS, DOLS and CCR, constitute robustness checks.

1. Research Methodology

This research applied the Nigerian data set, secondary in nature, annual in frequency, for 1992 to 2018 obtained from the World Bank's World Development Indicators (WDI) and Central Bank of Nigeria (CBN)'s statistical bulletin. Using a time-series approach, the Autoregressive Distributed Lag (ARDL) was applied to determine the role of microfinance bank investment activity in the standard of living in Nigeria. Preliminary tests of the augmented Dickey-Fuller(ADF) unit root and Phillips-Perron (PP) unit root tests, and Johansen cointegration tests, were carried out before estimating the ARDL model. After that, models diagnostics (namely, normality, heteroscedasticity, serial correlation, model specification, and parameter stability tests) and three cointegrating regression techniques (Fully Modified Ordinary Least Squares, Dynamic Ordinary Least Squares, and Canonical Cointegrating Regression) were employed as robustness checks of the long-run ARDL estimates.

The variables of the study are described in Table 1. In the table, except SOL, all other variables are explanatory variables.

Table 1. Variables Description

Variable	Definition and Measurement	Source
SOL	The Standard of living is captured by GDP per capita. It is the ratio of GDP to the total population.	WDI
MFBIA	Microfinance investment activity is the total amount of investment of microfinance banks as presented in their Statement of Financial Position (SOFP).	CBN
MFBL	Microfinance bank loans and credit granted to their customers, as presented in their SOFP.	CBN
MFBD	Microfinance banks deposit liabilities, as presented in their SOFP.	CBN
TGEX	Total government expenditure-the amount of money in billion Naira expended by the Nigerian government within the economy. It is a control variable for the government sector.	CBN
INFR	The inflation rate is the consumer price index, annual per cent changes. It is used to control macroeconomic stability.	WDI

Source: Author's compilation from the literature review.

3.1. Model specification

Drawing from the work of Okafor (2016) on microfinance and the standard of living in Nigeria, this current study focuses on microfinance investment activities vis-à-vis their impacts on the standard of living in Nigeria. Thus, the standard of living is expressed as a function of microfinance bank investment, accompanied by other relevant explanatory variables, namely, microfinance bank loans, microfinance bank deposits, total government expenditure and inflation rate. The linear function of the stated relation is specified in equation (1) below.

$$SOL = MFBIA + MFBL + MFBD + TGEX + INFR \quad (1)$$

Econometrically, the linear equation specified in (1) is stated in equation (2), thus

$$SOL_t = MFBIA_t + MFBL_t + MFBD_t + TGEX_t + INFR_t + e_t \quad (2)$$

The ARDL model is specified in equation (3) below.

$$\begin{aligned}\Delta SOL_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, \Delta SOL_{t-1} + \sum_{i=0}^{n} \beta_{2i}\, \Delta MFBIA_{t-i} + \sum_{i=0}^{n} \beta_{3i}\, \Delta MFBL_{t-i} + \sum_{i=0}^{n} \beta_{4i}\, \Delta MFBD_{t-i} \\ + \sum_{i=0}^{n} \beta_{5i}\, \Delta TGEX_{t-1} + \sum_{i=0}^{n} \beta_{6i}\, \Delta INFR_{t-1} + \Psi_1 SOL_{t-1} + \Psi_2 MFBIA_{t-1} + \Psi_3 MFBL_{t-1} \\ + \Psi_4 MFBD_{t-1} + \Psi_5 TGEX_{t-1} + \Psi_6 INFR_{t-1} + \Psi_7 ECT_t \\ + \mu_t \end{aligned} \quad (3)$$

Where;

Δ =first difference operator;
β_0 = the drift component;
μ_t = the error term;
β_1 - β_6 = the parameters of the short-run dynamics of the model;
Ψ_1 -Ψ_6 = the parameters of the long-run relationship;
Ψ_7 =the coefficient of the error correction term(ECT).

Theoretically, MFBIA, MFBL, MFBD, and TGEX, are expected to be positively signed with SOL, while INFR is expected to be negative.

4. Results and Discussions

4.1. Unit Root Test

The unit root properties of the time series data are examined prior to the actual estimation of the ARDL model. This is necessary to avoid the incursion of the problem of spurious regression. The augmented Dickey-Fuller (ADF) and Phillips-Peron (PP) unit root test results in Table 2 show that none of the variables is stationary at level, but they all became stationary after the first differences.

This implies that all the variables are integrated into the order one.

Table 2. Unit Root Tests

Variable		ADF Unit Root Test				PP Unit Root Test		
		I	T& I	I(d)		I	T& I	I(d)
SOL	Level	2.248 [0.999]	-1.160 [0.897]	I(1)	level	3.788 [1.000]	-1.157 [0.898]	I(1)
	Δ	-2.062 [0.260]	-3.542* [0.058]		Δ	-1.953 [0.304]	-3.879** [0.028]	
MFBIA	Level	0.671 [0.989]	-0.984 [0.929]	I(1)	level	0.671 [0.989]	-0.984 [0.929]	I(1)
	Δ	-4.602*** [0.001]	-5.148*** [0.001]		Δ	-4.601*** [0.001]	-5.149*** [0.001]	
MFBL	Level	2.429 [0.999]	0.239 [0.996]	I(1)	level	2.335 [0.999]	-0.260 [0.987]	I(1)
	Δ	-1.746 [0.395]	-5.415*** [0.001]		Δ	-4.419*** [0.002]	-9.952*** [0.000]	
MFBD	Level	3.735 [1.000]	0.317 [0.997]	I(1)	level	4.966 [1.000]	-0.533 [0.974]	I(1)
	Δ	-6.706*** [0.000]	-6.400*** [0.000]		Δ	-6.719*** [0.000]	-18.348*** [0.000]	
TGEX	Level	2.418 [0.999]	-0.580 [0.971]	I(1)	level	2.665 [1.000]	-0.434 [0.980]	I(1)
	Δ	-1.462 [0.534]	-4.917*** [0.003]		Δ	-3.843*** [0.007]	-4.972*** [0.002]	
INFR	Level	-1.979 [0.293]	-2.001 [0.573]	I(1)	level	-2.002 [0.283]	-2.001 [0.573]	I(1)
	Δ	-4.885*** [0.000]	-5.022*** [0.002]		Δ	-4.912*** [0.000]	-6.124*** [0.000]	

Source: Author's computation.

Note: [] represents p-value; Δ denotes first difference; I=intercept; T&I= Trend and Intercept.

4.2. Cointegration Tests

Johansen and F-Bounds tests are applied as tests of cointegration among the variables. Two versions of the Johansen's test (the trace and Max-eigenvalue) statistics reject the null hypothesis of no cointegration, favouring two co-integrating equations between the variables at the 0.05 level (see Table 3). This is because the respective calculated value exceeds the critical value at a 5% significance level. This suggests a cointegrating relationship between the variables. The F-Bounds test further buttressed this position (reported in Table 4).

Table 3. Johansen Cointegration Tests

Unrestricted Cointegration Rank: Trace Test					Maximum Eigenvalue		
Hypothesized		Trace	0.05		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**	Statistic	Critical Value	Prob.**
None	0.984	194.105*	95.753	0.000	103.639*	40.077	0.000
At most 1	0.851	90.466*	69.818	0.000	47.605*	33.876	0.000
At most 2	0.619	42.860	47.856	0.136	24.174	27.584	0.128
At most 3	0.376	18.685	29.797	0.515	11.804	21.131	0.567
At most 4	0.229	6.881	15.494	0.591	6.505	14.264	0.549
At most 5	0.014	0.375	3.841	0.539	0.375	3.841	0.539

* denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values

Source: Author's computation.

The null hypothesis of the relationship of the level in the Bounds test is rejected since the calculated F-statistics (26.548) exceeds the upper bound values at the three ideal levels of significance (4.15,

3.38, 3.00). This suggests a long-run relationship between standard of living and microfinance investment activity in Nigeria in the period under review.

Table 4. F-Bounds Cointegration Test

Test Statistic	**F-statistic**	**26.5485**	**K**	**5**
Critical Values		Level of Significance	Lower Bounds I(0)	Upper Bounds I(1)
		10%	2.08	3.00
		5%	2.39	3.38
		1%	3.06	4.15

Source: Author's computation.

4.3. ARDL Model Estimation

4.3.1. ARDL Long Run Estimates

The ARDL model results in Table 5 indicate the regression line intercept of ₦7981.374. The value is positive but non-statistically significant, with a very high P-value of 0.204. This shows that the per capita GDP in Nigeria will be constant at ₦7981.374 per annum when all the other variables are assumed unchanged. Microfinance investment activity in level form is positively signed (0.036) but not statistically related (0.202) to the standard of living, but its 1-year lagged value (-0.062) and p-value (0.080) show that microfinance bank investment activity (MFBIA (-1)) has a negative and statistically significant relationship with the standard of living in the long run. This implies that rather than raising the standard of living, microfinance investment activity hampers the standard of living in Nigeria at 6.23%. The microfinance loan (MFBL) coefficient is negative (-0.573) but statistically significant with a P-value of 0.007. This suggests that microfinance loans have a powerful negative connection with living standards in Nigeria in the long run. In other words, an inverse relationship exists between MFBL and SOL, such that a unit increase in microfinance loans to citizens will result in about an ₦0.57K decrease in per capita GDP in Nigeria in the long-run *ceteris paribus*. Microfinance deposits in both their current and 1-year lagged form (MFBD and MFBD (-1)) have positive coefficients (0.511 and 0.594) and p-values of 0.069 and 0.033, respectively. This implies that microfinance deposit promotes a standard of living in Nigeria. Government expenditure and inflation rate are positively and negatively signed with a coefficient of 2.176 and -21.774, respectively, but neither exerts significant influence on living standards in Nigeria in the long run.

Table 5. ARDL Model Estimation Results

Dependent Variable: SOL				
Model: ARDL(1, 1, 0, 1, 0, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
SOL(-1)	0.933	0.080	11.659	0.000***
MFBIA	0.036	0.027	1.325	0.202
MFBIA(-1)	-0.062	0.033	-1.856	0.080*
MFBL	-0.573	0.189	-3.026	0.007***
MFBD	0.511	0.264	1.938	0.069*
MFBD(-1)	0.594	0.256	2.319	0.033**
GEX	2.176	7.476	0.291	0.774
INFR	-21.774	137.359	-0.158	0.875
C	7981.374	6047.989	1.319	0.204
F-statistic	1497.803			0.000***
R-squared (R^2)	0.998			
Adjusted R^2	0.997			
Durbin-Watson	2.070			

Source: Author's computation.
Note: ***, **, and * denote statistically significant at 1%, 5% and 10%.

Generally, in the long run, microfinance investment activity, microfinance loans, and microfinance deposits are significant determinants of the standard of living, with the first two endangering living standards but the last variable exerting a positive impact on living standards in Nigeria.

The Durbin-Watson (D.W) statistics of the ARDL model (in Table 5) is 2.07, and this is approximately 2; thus, we can conclude that there is an absence of serial correlation associated with the regression result. The F-statistics (1497.803) and an associated p-value (0.000) imply that the f-statistics is statistically significant at 1%. We can thus conclude that the overall fitness of the model is good and of high predictive power. The R-squared (0.998) shows that 99% of the variation in the dependent variable (standard of living) in the ARDL model is explained jointly by the explanatory variables.

4.3.2. ARDL Short Run and ECM Estimates

Table 6 shows that microfinance bank investment activity (MFBIA) has a coefficient of 0.036 and a p-value of 0.068. This suggests that microfinance bank investment activity has a statistically significant and positive relationship with living standards in the short run. Similarly, a microfinance bank deposit is positively signed (0.511) and is statistically significant (0.000) at 1%. This suggests that microfinance bank deposit spurs the standard of living in Nigeria in the short run. The error correction term (ECT) is correctly signed (with a coefficient of -0.066) and statistically significant at 1%. The model adjusts any disturbance to restore long-run equilibrium among the variables at 6.63% per annum.

Table 6. ARDL Short Run and Error Correction Regression

Dependent Variable: D(SOL)				
Model: ARDL(1, 1, 0, 1, 0, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(MFBIA)	0.036	0.018	1.943	0.068*
D(MFBD)	0.511	0.110	4.615	0.000***
ECT	-0.066	0.004	-15.856	0.000***
R^2	0.813			
Adjusted R^2	0.796			
Durbin-Watson	2.070			

Source: Author's computation.
Note: *** and * denote statistically significant at 1% and 5%.

4.4. ARDL Model Post Estimation Diagnostics

A. Normality Test

The Jacque-Berra normality statistics (4.516) with its p-value (0.104) (as shown in Figure 1) leads to the non-rejection of the normality hypothesis. This confirms the normality of the estimated ARDL model.

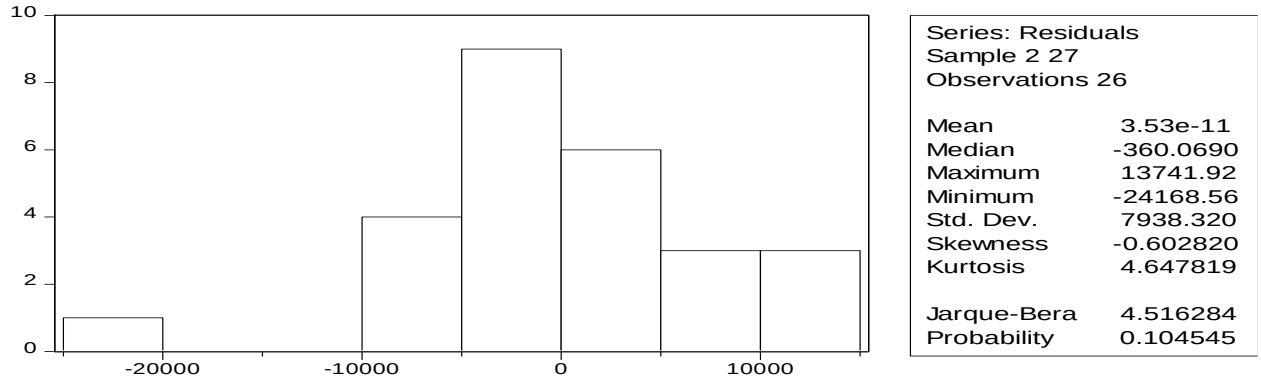

Figure 1. Normality-Histogram Test
Source: Author's design.

B. Heteroscedasticity Test

The Breusch-Pagan-Godfrey heteroscedasticity test (reported in Table 7) shows that F-statistic (1.231), Chi-square statistic (9.540) and scaled explained SS (7.439) have their p-values (0.339, 0.298 and 0.490) exceeding the ideal (1%, 5% and 10%). This led to the non-rejection of the hypothesis of no heteroscedasticity. This implies that the ARDL model is homoscedastic.

Table 7. Breusch-Pagan-Godfrey Heteroscedasticity Test

F-statistic	1.231	Prob. F(8,17)	0.339
Obs*R-squared	9.540	Prob. Chi-Square(8)	0.298
Scaled explained SS	7.439	Prob. Chi-Square(8)	0.490

Source: Author's computation.

C. Serial Correlation Tests

Table 8 reports the Breusch-Godfrey serial correlation LM test with F-statistic (0.464) and Chi-square statistic (1.515) having very high p-value (0.637 and 0.468). Therefore, the hypothesis of the absence of serial correlation is not rejected. It can be concluded that there is zero autocorrelation among the variables in the ARDL model.

Table 8. Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.464	Prob. F(2,15)	0.637
Obs*R-squared	1.515	Prob. Chi-Square(2)	0.468

Source: Author's computation.

D. Model Misspecification Error Test

In Table 9, the Ramsey Regression Equation Specification Error Test (RESET) test with t-statistic (0.815) and F-statistic (0.665) having high p-values of 0.426 each. Hence, the hypothesis of the absence of model misspecification error is not rejected, implying that the estimated ARDL model functional form is correctly specified.

Table 9. Ramsey RESET Test

	Value	Df	Probability
t-statistic	0.815	16	0.426
F-statistic	0.665	(1, 16)	0.426

Source: Author's computation.

E. Model Parameter Stability Test

The result of the model parameter stability test using the cumulative sum of recursive (CUSUM) residuals technique is depicted in Figure 2. The plot of the test in the graph lies within the 5% critical upper and lower bounds. This implies that the ARDL model parameters are relatively stable over time. Hence, its estimates are regarded as basically reliable, *ceteris paribus.*

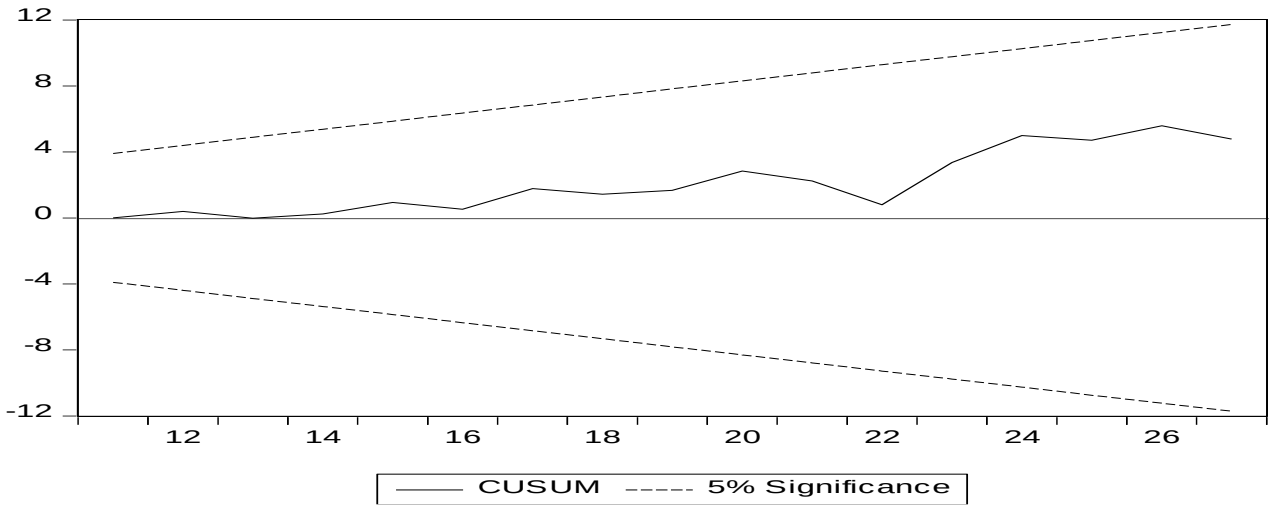

Figure 2. CUSUM Stability Test
Source: Author's design.

4.5. Model Robustness Checks

This study applied three cointegrating regression estimators, namely, FMOLS, DOLS and CCR, as robustness checks of the long-run estimates of the ARDL model. The results of the three cointegrating regression models (reported in Table 10) indicate that the current value of microfinance banks' investment activity, though positive, does not have a significant long-run impact on living standards in Nigeria. This further reinforces the non-significant but positive relationship between the current value of microfinance banks' investment activity and the standard of living in Nigeria, as shown by the ARDL long-run estimates (see Table 5).

Table 10. Model Robustness Checks

Dependent Variable: SOL						
	FMOLS Estimates		**DOLS Estimates**		**CCR Estimates**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
MFIV	0.072	0.187	0.030	0.650	0.062	0.296
MFL	-0.355	0.438	-0.442	0.456	-0.490	0.378
MFD	0.820	0.228	1.502	0.197	1.222	0.271
GEX	70.855	0.000***	66.211	0.002***	64.598	0.000***
INFR	-235.038	0.495	-162.633	0.655	-255.141	0.473
C	14651.16	0.291	16706.63	0.302	16924.68	0.265
R-squared (R^2)	0.984	R-squared (R^2)	0.994	R-squared (R^2)	0.983	
Adj. R^2	0.980	Adjusted R^2	0.990	Adjusted R^2	0.979	

Source: Author's computation.

5. Conclusion

Drawing on annualized time-series data obtained from the Central Bank of Nigeria's statistical bulletin and World Development Indicators, we empirically evaluated the impact of microfinance

bank investment portfolios on the standard of living in Nigeria from 1992 to 2018.

The study shows that in the long run, microfinance investment activity, microfinance loans, and microfinance deposits are significant determinants of the standard of living, with the first two endangering living standards but the last variable exerting a positive impact on living standards in the country. However, in the short run, a microfinance bank investment portfolio has a statistically significant and positive relationship with the standard of living in Nigeria. Similarly, microfinance bank deposit spurs the standard of living in Nigeria in the short run. The error correction term (ECT) reveals that the model adjusts any disturbance to restore long-run equilibrium among the variables at 6.63% per annum.

Therefore, this study concludes that microfinance banks' investment activity is only a short term means of raising the standard of living in Nigeria, for in the long run, rather than increasing the living standards, microfinance banks' investment activity significantly reduces the standard of living in the long run in Nigeria. Therefore, in raising the standard of living in Nigeria, rather than using microfinance banks' investment approach, the microcredit approach should be embraced as most other studies reveal the positive nexus between it and economic growth and development and, by extension, standard of living. This may not be unconnected with the notion that most investment on the face of the Statement of Financial Position of these MFBs is mostly financially profit-oriented rather than socially beneficial. Suppose these investments made by MFBs will make the desired impact in the long run. In that case, there is a need for government and organized private sector and international donor organizations to partner with MFBs in assisting them in investing in portfolios designed to help them fulfil their social mission and attain their financial objectives.

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RESEARCH ARTICLE

Religion, Cultural Elements and the Stock Price Crash Risk: a Test of Alternative and Complementary Theory

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Abstract

As one of the most critical issues widely discussed in financial studies, the stock price crash is affected by different factors. Despite the importance of this issue for shareholders and investors, the behavioral characteristics of managers responsible for preparing financial statements have not been considered recently. Among those characteristics, the religion and culture of management have been mentioned in this research. Accordingly, the study examines the effect of managers' religion (replacement or complementary effect) and culture on the stock price crash risk in companies listed consistently on the stock exchange until the end of 2019. Therefore, in order to measure the stock price crash risk, two criteria consisting of negative skewness of stock return and down-to-up volatility have been applied. Hofstede's (2001) questionnaire was used to measure culture, and Li and Cai (2016) model was used to measure religion. Then, the results were analyzed by using multivariate regression models. Findings indicate that among the dimensions of culture, the uncertainty avoidance dimension has a negative effect. The dimension of individualism positively affects the stock price crash risk. The dimensions, including power distance and masculinity, do not affect the stock price crash risk. The negative impact of uncertainty avoidance means that conservative risk-averse managers do not make decisions in uncertain conditions. Because they are less inclined to accumulate bad news, they might reduce the stock price crash risk. On the other hand, the positive effect of individualism on the stock price crash risk shows that individualistic managers who do not consult with others about their decisions and insist on their wrong decisions ignore the negative consequences of harmful investments with excessive trust in their decisions and lead to the accumulation of losses in the company and consequently increasing stock price crash risk. The results also show religion's negative and significant effect on the stock price crash risk. Religion reduces the risk of falling stock prices by reducing opportunism and agency problems. In addition, according to the complementarity theory, the sensitivity analysis results show that corporate governance exacerbates the negative relationship between religion and stock price crash risk of companies.

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1. Introduction

The stock price crash risk shows the possibility of a sudden and sharp decline in stock prices, which indicates asymmetry in risk characteristics and is, therefore, an effective factor for investors' decision-making and risk management (Dang et al., 2017). The risk of falling stock price is an adverse event defined as severe negative stock returns. Such an event leads to a significant loss in investors' wealth and a decrease in investors' confidence in the capital market. The question of what factors make stock prices fall has attracted the attention of many researchers in recent years.

Some studies show that the negative fluctuations of stock price refer to the managers' behaviors in over-investing, which leads to high volatility and sharp price declines (Chen, Hong, and Stein, 2001; Hong and Stein, 2003). North (1990) and Williamson (2000) show that culture influences managers' behavior. Chui, Titman and Wei (2010) and Ferris, Jayaraman and Sabherwal (2013) confirm it. They state that individualism, a cultural dimension, positively affects the stock price crash risk.

On the other hand, regulatory mechanisms can also reduce the risk of a stock price crash in capital markets. Wei (2002) focuses significantly on the impact of the ethics and spirituality foundation in capital markets. They believe that the role of informal institutions (external oversight) in corporate governance cannot be ignored and is playing a more important role than expected. Chen et al. (2013) believe that religion, as an essential part of the informal environment, influences the people's belief in that country. Religion provides the basis for increasing production and subsequently improving the economy by creating suitable conditions (Chen et al., 2013).

The influence of economics on religious teachings is topic Western scholars have also considered. "Participation in religious denominations can reduce the risk of individuals by creating a good reputation and thus have a positive effect on efficiency and the optimal allocation of resources", Adam Smith states in his book titled "The Wealth of Nations". Also, as an extra-legal tool in exchanges, it reduces uncertainty and improves efficiency. Religious man, in economic activities, observes honesty, does not neglect his work and always strives to increase his productivity.

Religion is an important part of the organizational environment that significantly affects people's behavior. Callen and Fang (2013) were the first researchers who examined the impact of religion on stock price risk in the United States. But, it should be mentioned that Iran's religious environment is much different from that of the United States. Iranians pay more attention to the religious performance of the company; Therefore, the effect of religion on the stock price crash risk in Iran is predicted to be stronger than in the United States. Beliefs and public opinion, especially people's culture, can be reasons for this difference. On the other hand, the Iranian people are more involved in religious practices and choose a religion with a specific consensus. Another reason is the inherent difference between foreign religions and Iranian religious tendencies. Li and Cai (2016) examined the effect of religion on the risk of stock price decreases in China. They reveal that religion has an effective effect on reducing the risk of stock price falls. They state that religion significantly affects the stock price crash risk only when the quality of corporate governance and the legal environment are high. In fact, regarding Iran's religious and cultural environment, this study seeks to investigate the impact of religion and culture on the stock price crash risk.

2. Theoretical Framework and Literature Review

2.1. Culture and the Stock Price Crash Risk

Some previous studies point to stock price crashes due to investors' behavior in trading which leads to volatility and a sharp decline in prices (Chen, Hong and Stein, 2001; Hong and Stein, 2003). The fact that culture influences people's behavior is often overlooked. The culture affects how people analyze their attitudes, but it will also affect their decision-making (Williamson, 2000). There is no exception for managers in this rule. According to Hofstede's (2001) study, culture includes four

dimensions: uncertainty avoidance, power distance, individualism, and masculinity. People who have the characteristic of uncertainty avoidance are mainly trying to avoid unusual situations and avoid risk. These people are conservative and do not make decisions in situations of uncertainty. Managers with a culture of uncertainty avoidance avoid investing in high-risk projects and invest in high-reliability projects. On the other hand, because they are less tolerant of ambiguity, they are less inclined to accumulate bad news, reducing the stock price crash risk (Chen et al. 2015). The power distance is the other dimension of culture, which indicates the extent of individuals' participation in a society's decision-making. When the power distance is large, subordinates do not have an intimate relationship with managers, and conversely, when the power distance is short, subordinates have a close relationship with managers and participate in decision-making.

Another dimension of culture is individualism. Managers with a culture of individualism focus on internal characteristics like their own abilities and separate themselves from others. Dang et al. (2017) show a positive relationship between individualism and the stock price crash risk. It can be concluded that individualistic managers insist on their wrong decisions and always have too much confidence in their ability to invest in projects, which may ignore their negative feedback (Malmendier, Tate and Yan, 2011). Ahmed and Duellman (2013) show that over-confidence managers may overestimate the future returns of their firms' investments, delay the loss recognition and usually useless conservative accounting. Dang et al. (2017) also believe that individualism causes managers to hide bad news, ultimately leading to a stock price crash.

Another dimension of culture is masculinity. In patriarchal societies and organizations, the social role of individuals varies according to their gender. Powerful and violent roles and the emphasis on financial success are attributed to men. Some researchers conclude that by increasing masculinity in Iranian companies, their level of secrecy has decreased. In fact, according to their research, men are less likely to conceal company news and information; Therefore, it is predicted that managers who are patriarchal tend to accumulate bad news less, and as a result, it can be expected that with the increase in the level of masculinity in Iran, the stock price crash risk will decrease.

2.2. Religion and the Stock Price Crash Risk

Religion can be defined as the acceptance of all or part of religious beliefs, ethics, and rules so that a religious person considers himself obliged to follow and observe the previous-mentioned set. Religion as a kind of worldview is not only a criterion and judgement of individual and collective human behaviors, but also it is effective in shaping human behaviors. Since religion emphasizes the importance of moral behavior and forbids any abuse and opportunism, it can be a deterrent to the opportunistic behaviors of managers and their unwillingness to expose the company's bad news (Li and Cai, 2016; Callen and Fang, 2013). Xu et al. (2013) argue that managerial opportunism enables managers to hide bad news, and when negative accumulated information reaches a critical threshold, it suddenly enters the stock market and leads to a fall in stock prices.

Dyreng et al. (2012), El Ghoul et al. (2012) and Dang et al. (2017), and Chen et al. (2013) accordingly examine the impact of religion on information disclosure, stock prices, and earnings management. According to Callen and Fang's (2013) research, companies with firmer religious beliefs have lower stock price crash risk levels. Based on studies in the financial literature, the main reason for the stock price crash risk is the agency problem. According to the current theoretical literature, religion prevents the accumulation of bad news in two ways and consequently reduces the stock price crash risk of the company. Li and Cai (2016) claim that religious managers are more likely to institutionalize religious and moral norms in the company than other managers; therefore, they try to hide and distort company information less. Javers (2011) argue that since the rewards of managers depend on the reported profit and the disclosure of bad news also affects the company's profitability,

the potential costs of violating religious and social norms (e.g. loss of credibility, emotional damages and other social anomalies) in environments with a high level of religiosity due to the existing social norms in the environment of these companies prevent the accumulation of bad news by these managers. Thus, it is argued that the stock price crash risk in companies with religious directors is much lower than in other companies.

2.3. Literature review

ElMassah and Abou-El-Sood (2021) examine Islamic banking in culture regarding the role of gender and religion in an emerging market. Their purpose was to investigate the determinants of bank selection, especially in the multicultural Islamic banking sector. Results show that general consumer awareness significantly affects the choice of Islamic banking products. The positive effect of awareness is more significant for Muslim consumers than non-Muslims. Interestingly, social incentives and banking characteristics have little effect on Muslim and non-Muslim banking selections. Montenegro (2017) examines the religiosity and quality of financial reporting in Portugal. Her research shows a significant negative relationship between religiosity and earnings management of accruals and companies in areas with a higher level of religiosity and less involved in earnings management. She also argues that religiosity, along with other external monitoring methods, can be a mechanism for reducing aggressive accounting practices. Li, Wang and Wang (2017) examine the effect of institutional ownership on the relationship between social trust and the stock price crash risk in the Chinese capital market. Their research findings show a significant negative relationship between social trust and the stock price crash risk. In addition, when the model runs with institutional ownership as a mediator, the relationship between social trust and the stock price crash risk will be weaker. Dang et al. (2017) examine the relationship between culture and stock price crash risk. Their findings indicate firms' individualism is associated with higher stock price crash risk. They argue that individualism increases the stock price crash risk as a culture. Li and Cai (2016) investigate whether religion affects firm crash risk. They provide evidence that a manager's religiosity is significantly associated with reducing the problems of earnings management and risk management and finally leads to reducing the risk of stock prices crash. The results also show that the effects of religiosity are more pronounced with a higher quality of corporate governance mechanisms and reduce the stock price crash risk in Chinese companies. Du et al. (2015) investigate the relationship between religiosity and earnings management. They find that the significant negative association between religiosity and profit management is less pronounced for companies closer to Chinese regulatory centers. Chen et al. (2013) examine discretional accruals as the proxies for corporate governance and accounting misconduct and provide evidence representing a significant negative relationship between manager's religiosity and accounting misconduct and discretionary accruals.

According to the literature review, the conceptual model of this research is shown in Figure 1.

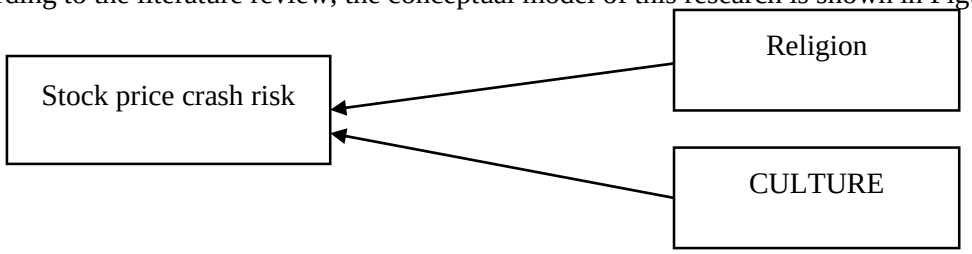

Figure 1. The conceptual model

According to the theoretical frameworks and literature, the research hypotheses are formulated as follows:

Hypothesis 1: There is a significant relationship between the dimensions of culture and the stock price crash risk.

Hypothesis 2: There is a significant relationship between religion and the stock price crash risk.

3. Research Methodology

This paper is causal-correlational, and in terms of methodology, it is quasi-experimental and retrospective in the realm of positive accounting studies carried out with real information. This paper is practical in terms of nature and objectives. The required data for the study are collected based on their types from different resources. The primary and raw information and data for hypothesis testing were collected using the information bank of the Tehran Stock Exchange, including Tadbir Pardaz compact disc, Rah Avard-e Novin, and the Codal website. The data relating to culture variables were also collected by distributing a questionnaire to the financial managers of companies. The statistical research population includes all companies listed consistently on the stock exchange from the beginning until the end of 2019. In order to extract a balanced panel of complete information, only companies with the following characteristics have been chosen as the sample.

1- In order to increase comparability, their fiscal year should be ended on March 31st.
2- They have not changed their activity or fiscal year during that relevant year.
3- They should not be in the "investment and financial intermediation" category.
4- The interruption period of transactions in these companies should not be more than three months.

After applying the aforementioned restrictions, 112 companies are selected as the research sample. Furthermore, the questionnaire is sent to the financial managers of considering companies. Finally, after many follow-ups, 64 questionnaires were completed and used as the final sample for analysis. The final analysis of the collected data is analyzed by using "Eviews econometrics software" and "SPSS software".

3.1. Variables and models

The variables in this study are as follows:

3.1.1. Dependent variable

The dependent variable is the stock price crash risk which is measured according to the research by Li, Wang and Wang (2017), Cao, Xia, and Chan (2016), and Li and Cai (2016), which use two measures: the first one is the negative stock skew (NCSKEW), which is calculated through Equation (1):

$$NCSKEW_{it} = -[n(n-1)^{\frac{3}{2}} \sum Wi,\theta\ 3] / [(n-1)(n-2)(\sum Wi,\theta\ 2)^{\frac{3}{2}}] \quad (1)$$

Where:

$W_{i,\theta}$: Company specific monthly return i in months θ and n: the number of monthly returns observed during the fiscal year. In this model, the higher the negative skewness coefficient, the more exposed the company to the stock price crash. The firm-specific monthly return is denoted by $W_{i,\theta}$ is equal to the natural logarithm of 1 plus the remaining number $\varepsilon_{i,\theta}$ calculated in Equation (2):

$$W_{i,\theta} = \ln(1+\varepsilon_{i,\theta}) \quad (2)$$

In the above equation:

$\varepsilon_{i,\theta}$: The residual return on Company i is in month θ, which is calculated from the residual values obtained from the estimation of the following model:

$$r_{i,\theta} = \alpha + \beta_{1i}\ r_{m,\theta-2} + \beta_{2i}\ r_{m,\theta-1} + \beta_{3i}\ r_{m,\theta} + \beta_{4i}\ r_{m,\theta+1} + \beta_{5i}\ r_{m,\theta+2} + \varepsilon_{i,\theta} \quad (3)$$

In the above equation:

$r_{i,\theta}$: return on shares of the company i in month θ, and $r_{m,t}$: Market returns in the month θ. To

calculate the monthly market return, the beginning of the month index is deducted from the end of the month index and the result is divided by the beginning of the month index. The second risk criterion for a stock price crash is down-to-up volatility (DUVOL), measured by calculating the average return of companies. The data are divided into two categories: below and above the average, and each category's standard deviation is calculated separately. Equation (4) is then used to calculate the bottom-up fluctuations:

$$DUVOL_{i,t} = log\ log\ \left(\frac{Down_{i,t}}{Up_{i,t}}\right) \quad (4)$$

wherein:

$Down_{i,t}$: Criterion deviation of observations below average, $Up_{i,t}$: The standard deviation of the observations is greater than the average for the specific return of company i in year t.

3.1.2. Independent variables

Culture: One of the independent variables in the current study is culture, which is measured by Hofstede's (2001) Cultural Attitudes Questionnaire. The questionnaire consists of 4 dimensions: avoiding uncertainty with 5 items, power distance with 6 items, individualism with 5 items, and masculinity/feminism with 9 items. They are on a 5-point Likert-type scale with response levels (completely Disagree, Disagree, Neither Agree nor Disagree, Agree and Strongly Agree). In order to check the validity, the questionnaire is provided to experts and specialists in a related field based on their opinion. In addition, to evaluate the reliability and stability test of the questionnaire, Cronbach's alpha is calculated by using SPSS software. Cronbach's alpha coefficient for each item considered in "culture" in Table (1) shows that the questionnaire has sufficient and desirable reliability.

Table 1. Cronbach's alpha and number of questionnaire items

Items	Number of Items	Cronbach's alpha	Reference
uncertainty avoidance	5	8550.	Hofstede (2001)
power distance	6	9080.	Hofstede (2001)
Individualism	5	8500.	Hofstede (2001)
Masculinity	9	8550.	Hofstede (2001)

Religion: Another independent variable in this study is religion. It is regulated according to the theory of social norms predicting that they affect the behavior of individuals. The theory of social norms predicts that religious norms will influence the religiosity of managers in a local geographical area because the religious, social norms of local people are an important environmental element in which managers live and work. Religious norms in society play an important role in individuals' adherence to a social norm.

Managers of companies with high levels of religiosity located in areas of religious space have a higher level of religiosity than those in this area. In this study, according to the research of Du (2013), Du et al. (2014) and Li and Cai (2016), using the distance between the companies registered in the registry office with religious mosques, we investigate the extent of religious issues influence on stock price crash risk. The method of measuring religion in this study is first to determine the longitude and latitude of registered companies using Google Earth, then measure each company's geographical location according to their distance from the surrounding mosques, and finally lead to a measure of length. The latitude of the company and then the distance of each company with the places containing religious activities is checked based on the longitude and latitude (the length of the partial arc across the surface of the earth). In general, the religion index will be measured using the specified distances between the company's headquarters and the surrounding mosques within a radius of 100 km from

the address of the registered companies. This means that the greater the distance, the less managers are influenced by religion and according to Li and Cai's (2016) research, the shorter the distance of mosques located within a radius of 100 km around the company, the greater the religiosity of managers. In other words, the managers pay more attention to religious issues. Therefore, based on Li and Cai's (2016) study, the following equations are proposed:

$$cos\ cos\ \theta\ = sin\ sin\ lat_r\ \times sin\ sin\ lat_f\ + cos\ cos\ lat_r\ \times cos\ cos\ lat_f\ \times cos\ cos\ (lon_r - lon_f) \quad (5)$$

$$rad = (40075.04/360) \times (180/\pi) \quad (6)$$

$$d = rad \times (\frac{\pi}{2} - arctang\left(\frac{coscos\ \theta}{\sqrt{1-cos^2\theta}}\right) \quad (7)$$

Where (d) is the distance between the registered address of the company and the mosques around the company and lon_r , lat_r, lat_f lon_f are the longitude and latitude of geographical distances, respectively.

3.1.3. Control variables

In this study, some of the most important variables identified as factors affecting the stock price crash risk based on previous studies were considered as control variables, which are as follows:

Firm Size: Large companies are motivated to reduce their capital costs by increasing the quality of financial reporting and the information disclosure process to raise the funds they need. Therefore, large companies are less likely to accumulate and not disclose bad news, preventing the sudden entry of bad news into the market and reducing the stock price crash risk (Kim, Li and Zhang, 2011). Thus, this variable is used as a control variable. This study measures firm size by the logarithm of total firm assets (Li and Cai, 2016).

Financial Leverage: Khan and Watts (2009) and Cao, Xia, and Chan (2016) argue that there is more likely to sue in leverage companies, which may increase the likelihood of stock prices crashing. Accordingly, in the current study, financial leverage is considered a control variable, calculated by dividing the total debt by the book value of the company's total assets (Li and Cai, 2016).

Growth Opportunities: Companies with high growth opportunities have volatile stock returns and are more likely to experience large losses, increasing the likelihood of stock price crashes (Khan and Watts, 2009). Therefore, in this study, the ratio of market value to the book value of equity is considered a measure of growth opportunities and another control variable (Li and Cai, 2016).

Equity Rate of Return: In terms of profitability, profitable companies are expected to experience a lower risk of stock price crashes (Hutton, Marcus and Tehranian, 2009; Li and Cai, 2016). Therefore, in the current study, the return on equity is entered in the model as a measure of profitability and another control variable calculated by dividing net profit by the book value of equity.

Heterogeneity of Investors: The difference between the average random turnover of stocks during this year and last year is calculated. It is obtained by dividing the monthly trading volume by the total number of stocks issued during the month. This variable is used in the studies of Hong and Stein (2003), Cao, Xia, and Chan (2016) and Li and Cai (2016) as a potential factor influencing the stock price crash risk and the control variable.

3.2. Regression model

In order to test the research hypotheses, the following multivariate regression models discussed in Li and Cai (2016) and Dang et al. (2017) studies are used as follows:

Model No. (1): To test the first research hypothesis (effect of culture on stock price crash risk)

$CRASH_i = \beta_0 + \beta_1\ CULTURE_i + \beta_2\ SIZE_i + \beta_3\ LEV_i + \beta_4\ GWTH_i + \beta_5 ROE_i + \beta_6 DTURN_i + \varepsilon_i$

Model No. (2): To test the second research hypothesis (the effect of religion on the stock price

crash risk)

$$CRASH_i = \beta_0 + \beta_1 RELIGION_i + \beta_2 SIZE_i + \beta_3 LEV_i + \beta_4 GWTH_i + \beta_5 ROE_i + \beta_6 DTURN_i + \varepsilon_i$$

Where:

"CRASH" is each of two criteria for stock price crash risk; "CULTUREi" is the Index of Cultural Dimensions; "RELIGION" is religion (manager religiosity); "SIZE" is the firm size; "LEV" is corporate financial leverage; "GWTH" is growth opportunities; "ROE" is the rate of return on equity; "DTURN" is the investor heterogeneity, and "ε" is part of the regression model error.

Since these two criteria of negative stock skew coefficient (NCSKEW) and bottom-up fluctuations (DUVOL) are used to measure the stock price crash risk, the models mentioned above are estimated for each of the two criteria of stock price crash risk separately.

4. Research Findings

4.1. Demographics of respondents

In order to get acquainted with the characteristics of the statistical sample, the demographic profile of the respondents is presented in Table 2. The results show that all sample companies have a male manager; Also, most executives in companies have between 40 and 50 years old. Regarding the work experience of managers, about 30% of managers are less than 10 years and 70% of them have more than 10 years of experience.

Table 2. Demographic profile of the respondents

Demographic profile		Number of Respondents (N=64)	Percentage (%)
Gender	**Male**	**64**	**100**
Age	Less than 30 years old	4	6
	Between 30-40 years old	21	33
	Between 40-50 years old	30	47
	More than 50 years old	9	14
Work Experience	Less than 10 years	19	30
	Between 10-20 years	28	44
	More than 20 years	17	26
Professional Qualification	Bachelors	23	36
	Master	36	56
	PhD	5	8

4.2. Descriptive statistics

Table (3) shows the tested variables' descriptive statistics, including some central indicators and dispersion.

Therefore, the minimum distance between the mosque and the company's main office in Tehran is 1.37 km. Also, considering the average value of the financial leverage variable indicates that approximately 60% of the assets of the sample companies are financed by borrowing. Another noteworthy point of this table is that the market value of Return on Equity of most sample companies is higher than its book value, evidenced by the value of the average Growth Opportunities variable (1.680) in the table (3).

As observed in the table above, the mean of the negative skewness of stock return and down-to-up volatility variables are -0.173 and -0.073, respectively, which is higher than the values reported by Cao, Xia, and Chan (2016) and Li, Wang and Wang (2017). This indicates that the sample companies in this study are more prone to stock prices crash. The average religion at a distance of 100 km indicates that the average distance between the nearest mosque and the headquarters of companies is 38.633 km, which shows that the shorter the distance between the sample companies

and mosques, the more religious beliefs of their managers are.

Table 3. Descriptive Statistics for Tested Variables

Variables	Abbreviation	Distance	Mean	Median	Max	Min	S.D.
Negative Skewness of Stock Return	NCSKEW	----	-0.173	-0.286	3.465	-3.295	2.145
Down-to-Up Volatility	DUVOL	----	-0.073	-0.064	0.573	-0.862	0.027
Religion (Religion Manager)	RELIGION	100KM	38.633	40.077	73.493	1.376	10.302
Firm Size	SIZE	----	6.301	6.256	8.138	4.863	0.647
Financial Leverage	LEV	----	0.598	0.602	1.213	0.173	0.212
Growth Opportunities	GWTH	----	1.680	1.443	2.696	0.868	0.630
Return on Equity	ROE	----	0.048	0.090	0.402	-1.010	0.186
Heterogeneity of Investors	DTURN	----	-0.010	0.006	16.146	-14.372	0.461

4.3. Regression assumptions

Before estimating the model, it is necessary to examine the regression model's assumptions, including the normality of the dependent variable, the homogeneity of variance, the lack of multicollinearity between the explanatory variables, and the lack of autocorrelation between the error components of the model. In order to investigate the normality of the dependent variable distribution, the Jark-Bra test is applied. The results of this test are presented in Table (4). Since the significance level of this test for the dependent variable is less than 0.05, the null hypothesis representing that the dependent variable is normal would be rejected. To solve this problem, Johnson transformations are used and the results based on the normality of the dependent variable are presented in Table (5).

Table 4. Results of Jark-Bra Test

Variable	The significance level of the Jark-Bra test	Variable	The significance level of the Jark-Bra test
Negative Skewness of Stock Return	0.000	Masculinity	0.000
Down-to-Up Volatility	0.000	Firm Size	0.000
Uncertainty Avoidance	0.004	Financial Leverage	0.000
Power Distance	0.006	Growth Opportunities	0.000
Individualism	0.001	Heterogeneity of Investors	0.000

Furthermore, the White correction method is used to solve the possible heteroscedasticity problem. In addition, to ensure that there is no multicollinearity problem between the variables, the multicollinearity test is evaluated by using the variance inflation factor (VIF), considering that the values of this statistic for the explanatory variables in Table (6) are less than 10, it can be discovered that the multicollinearity problem is not a threat in the model. F-Limer and Hausman statistics are also used to estimate the type of data and the method used in the final fit, and the results are given in Tables (7) and (8), respectively. Finally, the Durbin-Watson statistic is applied to test the autocorrelation between the error components of the model and the results are presented in Tables (9) and (10).

According to Table (4), the level of significance of the dependent variable (the criteria of stock price crash risk) is less than 5%. Therefore, it does not have a normal distribution. Since one of the

regression assumptions is the normality of the dependent variable distribution, Johnson's transformation in the Minitab Statistical Software is used to convert the distribution of the dependent variable to the normal distribution; the results are shown as follows:

Table 5. Results of Jark-Bra Test after Johnson's Transformation

Variable	Significance Level
Negative Skewness of Stock Return	0.168
Down-to-Up Volatility	0.174

The results of Table (5) show that the significance level of the dependent variable after Johnson transformations is equal to (0.168 and 0.174), which indicates the normalization of the dependent variable.

Table 6. Check the multicollinearity between Variables

Model	Variable	NCSKEW	DUVOL	RELIGION	SIZE	LEV	GWTH	ROE	DTURN
Model 1	VIF	1.41	1.36	1.39	1.35	1.42	1.33	1.65	1.47
	Tolerance	0.709	0.990	0.719	0.741	0.704	0.751	0.97	0.55
Model 2	VIF	1.28	1.97	1.62	1.37	1.66	1.87	1.73	1.63
	Tolerance	0.667	0.497	0.336	0.851	0.775	0.997	0.943	0.589

Limer test:

In order to select one of the panel data methods or Pooled data, the F-Limer statistic is applied. According to the results obtained from the F-Limer test, the null hypothesis is rejected and the alternative hypothesis is confirmed; in other words, the panel data method is more appropriate.

Table 7. Result of F-Limer Test

Test Summary	Research Model	Statistics value	Degrees of freedom	Significance Level	Test Level
Cross-Section F	(1)	8.813	63.339	0.000	0.05
Cross-Section F	(2)	9.673	63.339	0.000	0.05

Hausman Test:

After selecting the panel method by the F-Limer test, the Hausman test is used to select one of two methods consisting of fixed or random effects. The results obtained from Table (8) indicate using the fixed effects versus random effects method in estimating the regression model.

Table 8. Result of Hausman test- Fixed Effects

Result of Test	Probability Value	Degrees freedom	Significance Level	Chi-Square Statistics
Fixed-cross section	0.018	7	0.000	4.683
Fixed-cross section	0.010	7	0.000	5.938

4.4. Hypothesis test results

The result of testing the first hypothesis is shown separately in Table (9).

Table 9. Results of estimating the first model based on two criteria for stock price crash risk

Variables	Negative Skewness of Stock Return		Down-to-Up Volatility	
	Coefficient	T Statistic	Coefficient	T Statistic
C	0.361	0.733	0.673	0.997
Uncertainty avoidance	-0.701**	-10.607	-0.696**	-10.341
Power distance	0.022	1.256	0.035	1.329
Individualism	0.175**	2.983	0.263**	3.015
Masculinity	0.173	1.012	0.186	1.148
SIZE	-0.001*	-3.928	-0.003*	-3.998
LEV	0.673**	9.997	0.396**	4.886
GWTH	0.059	0.302	0.024	0.674
ROE	-0.406**	-5.412	-0.320**	-5.302
DTURN	0.031	1.143	0.248	1.302
Determination Coefficient	0.428		0.494	
F Statistic	10.793		10.158	
P-Value	0.000		0.000	
Durbin-Watson Test	1.948		1.993	

** and * represent statistical significance at the 5% and 1% error levels, respectively.

As shown in Table (9), the coefficient of determination shows that the independent and control variables (0.428, 0.494) explain the changes of the dependent variable, respectively. The probability values of the F statistic (0.000) show that the multivariate regression pattern is significant; Therefore, the null hypothesis indicating the goodness of the fit is accepted, which points to the accuracy of the model determination. The values of the T-statistic for the types of cultural elements, including Power Distance (1.256 and 1.329) and Masculinity (1.012 and 1.148), show that these two cultural elements based on the criterion of Negative Skewness of Stock Return coefficient (NCSKEW) and Down-to-Up Volatility (DUVOL) have no significant effects. Also, according to the results, the elements of Uncertainty Avoidance have a negative and significant effect. Individualism in managers has a significant positive effect on stock price crash risk factors. The results of testing the second hypothesis (estimation of model number 2) separately based on each of two criteria of Negative Skewness of Stock Return coefficient (NCSKEW) and Down-to-Up Volatility (DUVOL) for the stock price crash risk are shown in Table (10):

As shown in Table (10), the value of the F statistic is equal to 0.000 and indicates that both models are significant at a 95% confidence level and have the necessary adequacy. The Adjusted Coefficient of Determination (R2) indicates that approximately 73% of changes in the Negative Skewness of Stock Return coefficient (NCSKEW) and 68% of changes in the variable “Down-to-Up Volatility (DUVOL)” can be explained by the explanatory variables of the model. Also, the values obtained from Durbin-Watson Test indicate the lack of first-order autocorrelation between the error of the two models. Also, the obtained coefficients for the religion variable show the Negative Skewness of Stock Return coefficient (-0.038) and Down-to-Up Volatility (-0.046), which indicates a negative relationship between religion and factors for stock price crash risk. According to the t-statistic, it can be argued that this relationship is significant. This means that according to the distance between the mosques and the companies' main office, the shorter the distance, the higher the level of religiosity of the managers. Finally, due to their beliefs in Islam and fairness, they try to hide bad news from companies. Indeed, the non-concealment of managers leads to negative news not being accumulated in the company and not being released in the stock market suddenly, and ultimately it could reduce the stock price crash risk.

Table 10. Results of estimating the second model based on two criteria for stock price crash risk

Variables	Negative Skewness of Stock Return		Down-to-Up Volatility	
	Coefficient	T Statistic	Coefficient	T Statistic
C	0.039*	3.671	0.041*	3.558
Religion	-0.038*	-3.663	-0.046*	-3.563
SIZE	-0.168**	-3.218	-0.286**	-2.516
LEV	0.053*	2.673	0.048*	2.788
GWTH	0.235	0.741	0.228	0.689
ROE	-0.264**	-3.763	-0.307**	-3.924
DTURN	0.218	0.914	0.211	0.857
F Statistic	12.248**		F Statistic	10.668**
P-Value	0.000		P-Value	0.000
Adjusted Determination Coefficient	0.732		Adjusted Determination Coefficient	0.684
Durbin-Watson Test	2.143		Durbin-Watson Test	2.053

** and * represent statistical significance at the 5% and 1% error levels, respectively.

4.5. Sensitivity analysis

The Impact of Religion on the Stock Price Crash Risk in Environments with Different Corporate Governance: Complementary and Alternative Theory

The debate on whether the impact of internal and external monitoring on managers' behavior based on theory is complementary or alternative is still unclear in this study. From a corporate governance perspective, managerial opportunism will be severe if the quality of corporate governance is low (corporate governance). It is doubtful that religion can restrict managers from hiding bad news in companies with lower corporate governance. From the perspective of foreign corporate governance, since religion is a part of social culture and not legal, the extent to which people agree or disagree with religious teachings depends on their moral discipline. Theoretically, there is a complementary or alternative relationship between religion and corporate governance mechanisms. Based on the theoretical framework, Chen et al. (2013) state that the relationship between religion and corporate governance is consistent with theory, not alternative. The relationship between religion and corporate governance mechanisms regarding stock price crash risk reflects two aspects of corporate governance. This section analyses two aspects of internal and external corporate governance. Table (11) presents the results of the cross-sectional analysis. As it is clear, the results show that religion coefficients are negative and significant in both management groups with internal and external mechanisms of corporate governance in companies. These results show that the relationship between religion and corporate governance (internal and external supervision) in Iran is significant, consistent with Callen and Fang (2015). The obtained results support the complementary theory in line with the research conducted by Chen et al. (2013). Whether religion can be effectively linked to reducing the stock price crash risk depends on the internal sovereignty of companies. In this way, religion can play an effective role in companies with high corporate governance in a strong internal environment. These results mean that religion cannot completely replace domestic corporate governance and a strong legal system. When internal corporate governance and a high-quality legal environment are sufficient, conditions have been created that lead to greater religious influence.

Table 11. Results of Sensitivity Analysis Estimation Based on Two Criteria of Stock Price Crash Risk

Variables	Negative Skewness of Stock Return		Down-to-Up Volatility	
	Coefficient	T Statistic	Coefficient	T Statistic
C	0.024*	3.557	0.029*	3.688
Religion	-0.033*	-3.325	-0.036*	-3.468
CG-Internal	-0.297**	-2.273	-0.306**	-2.318
CG-External	-0.386**	-2.035	-0.392**	-2.098
SIZE	-0.212**	-3.108	-0.224**	-3.614
LEV	0.073*	2.483	0.069*	2.417
GWTH	0.217	0.845	0.227	0.915
ROE	-0.428**	-3.059	-0.412**	-3.083
DTURN	0.584	0.875	0.577	0.996
F Statistic	9.628**	F Statistic	9.443**	
P-Value	0.000	P-Value	0.000	
Adjusted Determination Coefficient	0.612	Adjusted Determination Coefficient	0.598	
Durbin-Watson Test	1.793	Durbin-Watson Test	1.768	
** and * represent statistical significance at the 5% and 1% error levels, respectively.				

Table 12. Results of Sensitivity Analysis Estimation Based on Two Criteria of Stock Price Crash Risk

Variables	Company-Specific Monthly Returns		Maximum Sigma	
	Coefficient	T Statistic	Coefficient	T Statistic
C	0.039*	3.971	0.042*	3.971
Religion	-0.022*	-3.667	-0.031*	-3.667
SIZE	-0.418**	-3.266	-0.387**	-3.266
LEV	0.034*	3.986	0.028*	3.986
GWTH	0.310	0.973	0.264	0.973
ROE	-0.410**	-3.536	-0.382**	-3.536
DTURN	0.612	0.824	0.597	0.824
F Statistic	12.723**	F Statistic	11.589**	
P-Value	0.000	P-Value	0.000	
Adjusted Determination Coefficient	0.512	Adjusted Determination Coefficient	0.467	
Durbin-Watson Test	1.918	Durbin-Watson Test	1.967	
** and * represent statistical significance at the 5% and 1% error levels, respectively.				

The Effect of Religion on Criteria for Stock Price Crash Risk

In this section, following previous research, two other stock price crash risk metrics are used to measure it. In order to measure the stock price crash risk, first use the firm-specific monthly return relationship (Hutton, Marcus and Tehranian, 2009; Bradshaw et al., 2010; Kim, Li and Zhang, 2011; Callen and Fang, 2013). On the other hand, according to Bradshaw et al. (2010), maximum sigma creates a quantitative and continuous measure to calculate the stock price crash risk. Also, maximum sigma is defined as outflow returns based on the standard deviation of a particular company. Therefore, in sensitivity analysis, considering the effect of religion on other stock price crash risk indicators, we will seek the effect of this relationship. The result obtained in Table (12) shows that the more religious the company's managers are, the lower the risk of a stock price crash with the two criteria mentioned previously.

5. Discussion and Conclusion

Providing information about the company's activities is considered one of the managers' most important tasks. Providing this information helps investors evaluate the stewardship or accountability of managers regarding the resources available to them. In this regard, managers are motivated not to publish bad information and bad news to maintain their credibility. This negative information would be accumulated over time in the company, and when it reaches its peak, it suddenly enters the market and leads to a sharp drop or fall in stock prices. Various factors affect the behavior of managers as decision-makers in the organization. Weber believes that if religion and religious characteristics increase people's motivation to work and be profitable, it will be considered important. Belief in religion leads managers to make information better available to others, significantly improving the problem of information asymmetry. Also, according to the findings and theories of researchers such as Grullon, Kanatas and Weston (2009) and Li and Cai (2016), managers whose companies are closer to local mosques have higher religiosity and are less likely to engage in immoral issues per Islam. They always try to run the company in a healthy environment and do not always hide bad news from their shareholders. Therefore, the shorter the distance between the company and the surrounding mosques, the lower the stock price crash risk in those companies compared to other companies at a greater distance. On the other hand, the culture of each country is one of the important factors affecting the value of accounting at the national and international levels, which should be paid much attention to in accounting research. Gray (1988) argues that culture is classified into two dimensions: secrecy and transparency. While more limited information is reported in culturally secret societies to maintain power, a transparent culture emphasises providing transparent information. Dang et al. (2017) claim that both the culture of secrecy (due to the accumulation of negative news) and transparency affect the stock price crash risk of the company.

According to the discussion in this study, the effect of culture and religion on the stock price crash risk has been examined. The results show that only two dimensions of uncertainty avoidance and individualism significantly affect the stock price crash risk among the four dimensions of culture. The results show the negative effect of uncertainty avoidance on the stock price crash risk and the positive effect of individualism on the stock price crash risk. Given the negative impact of uncertainty avoidance, it can be argued that conservative risk-averse managers do not make decisions in uncertain conditions, and because they are less inclined to accumulate bad news, they might reduce the stock price crash risk. On the other hand, the positive effect of individualism on the stock price crash risk shows that individualistic managers who do not consult with others about their decisions and insist on their wrong decisions ignore the negative consequences of harmful investments with excessive trust in their decisions and lead to the accumulation of losses in the company and consequently increasing stock price crash risk. These results are consistent with the theoretical framework as well as the research conducted by Chui et al. (2010), Ferris, Jayaraman and Sabherwal (2013) and Dang et al. (2017). Another result of the study is that the religion and religiosity of the manager have a positive effect on the stock price crash risk. This finding is in line with the existing literature in this field and accordance with Li and Cai's findings (2016). Religious managers are less likely to distort and hide due to the company's institutionalization of religious and moral norms and the possible costs of violating religious and social norms (e.g. loss of credibility, emotional damages and other social anomalies) information and accumulating bad news. As a result, the stock price crash risk is reduced. According to these results, it is suggested to potential investors to pay attention to the organisation's geographical location in choosing investment companies. In addition, shareholders and the board of directors are advised to pay special attention to their personal characteristics when choosing a manager as much as possible to managers who have characteristics such as belief in religious norms

and conservative managers who do not make decisions in uncertainty.

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Appendix

Cultural Attitudes Questionnaire

Phrase	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Completely Disagree
1-Meetings are usually more effective when run by one man.					
2-Men are more important than women in having a career path.					
3- Women do not value promotion and recognition in their work as much as men.					
4- Women value working in a friendly atmosphere more than men.					
5- Men usually solve problems by logical analysis, while women usually solve problems intuitively.					
6- Solving organizational problems usually requires strength and an active approach that typically comes from men.					
7- Who takes the top management position of the organization is a priority with a man, not a woman.					
8- There are some jobs that a man can always do better than a woman.					
9- Women pay more attention to the social aspects of their jobs than to human progress and advancement at work.					
10- One should not pursue one's own goals alone, regardless of the good of the group.					
11- It is important for the manager to encourage loyalty and a sense of duty in the group.					
12-It is more important for a person to work to be accepted by the group than to be accepted by the himself or herself.					
13- Individual rewards are less important than group welfare.					
14- Group success is more important than individual success.					
15- It is important for people to have job descriptions and instructions explained so that people always know what is expected of them.					
16- Managers expect employees to follow orders and procedures carefully.					
17- Rules and regulations are important because they let employees know what the organization expects of them.					
18- Standard operating procedures are useful for employees at work.					
19- Operating instructions are useful when working.					
20- It is often necessary for a supervisor to emphasize her/him power and authority when dealing with employees.					
21- Managers should not scrutinize the opinions of their subordinates.					
22- A manager should avoid socialization her/him employees outside the workplace.					
23- Employees should not oppose the decisions of their managers.					
24- Managers should not delegate important and difficult tasks to employees.					
25- Managers should make most decisions without consulting employees.					

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RESEARCH ARTICLE

The Relationship between Supervisory Independence and Auditor's Opinion Shopping: Market Competition influence

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Abstract

It is stated in the financial reporting literature that companies in a competitive industry will pursue better disclosure policies. On the other hand, Product market competition substitutes internal governance that reduces agency costs**.** This study investigates the effect of product market competition on the relationship between the supervisory independence of the firm and the auditor's opinion on shopping. In this study, four methods have been considered to determine the occurrence of opinion shopping. It is assumed that opinion shopping occurs when one of these four conditions is met. The study sample includes 162 listed companies on the Tehran Stock Exchange during 2014–2019. Research hypotheses were tested by using logistic regression analyses. The results show that if the auditor's opinion shopping criterion is the ratio of the amount of restatement of financial statements to income, the board's independence has a negative and significant relationship with the auditor's opinion shopping. The research findings also show that the audit committee's independence was not related to the auditor's opinion shopping criteria. Also, separate tests on the role of product market competition on the above relationships indicate that this variable does not have moderator effects.

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1. Introduction

Dechow,Ge and Schrand (2010) stated that the extent to which auditors influence the quality of accounting information stems from their role in intentionally or unintentionally presenting the firm's economic and financial reality. Ruddock, Taylor and Taylor (2006) argued that auditors could add value to financial statements by reducing the likelihood of deliberately misrepresenting accounting information. Therefore, given that auditors should audit the information produced by accounting systems, and since one of the most important factors affecting the amount of auditing fees is the power and authority of the board, it is likely that in a competitive environment, corporate governance colludes with their auditor if they intend to disclose incorrect accounting information. From the historical point of view, when managers negotiate the audit fee, this raises concern that auditors play the role of a manager in many companies instead of supporting the capital market (Blue Ribbon Committee, 1999; Securities and Exchange Commission, 1988).

Previous studies have shown that product market competition is considered a kind of external governance mechanism and is a vital factor in making information disclosure decisions by companies. On the one hand, product market competition forces companies in similar industries to seek out competitors' information and, on the other hand, to hide their own information to have a competitive advantage. Product market competition broadly makes firms dependent on external competitive advantage and encourages owners to strengthen internal corporate governance mechanisms and reduce the opportunistic behaviors of managers (Teng and Li, 2011). Thus, product market competition substitutes internal governance that reduces agency costs (Giroud and Mueller, 2011; Baggs andBetignies, 2007). Darrough and Stoughton (1990) stated that companies operating in a competitive industry would pursue better disclosure policies. Cheng, Man and Yi (2013) believe that competition plays a vital role in managers' voluntary disclosure decisions. They attribute this to the manager's motivations for disclosure, influenced by the company's economic decision-makers, the organizational environment, and the characteristics of the industry. On the other hand, in a contradictory view, Gal-Or (1985) and Gertner, Gibbons and Scharfstein (1988) predicted that companies in more competitive industries do not pursue disclosure policies that contain useful future information and possibly provide incorrect reports. Raith (2003) states that companies try to dissuade competitors from entering the industry in the face of economic and competitive pressures. One way to deal with these pressures is to manipulate and manage earnings to provide stable and reliable information to the market. Lin and Wei (2014) also showed that companies' willingness to disclose information voluntarily decreases with increasing competition in the product market.

Therefore, we assume that managers in a competitive environment disclose information consistent with their objectives to act superior to their competitors and collude with their auditor to obtain an acceptable audit opinion. Therefore, the primary purpose of this study is to investigate the effect of competition on the relationship between supervisory independence and the auditor’s opinion shopping from the perspective of whether the board and the audit committee collude and engage in opinion shopping or not?

2. Literature Review and Hypothesis Development

2.1. Auditor’s opinion on shopping

In auditing literature, auditor’s opinion shopping is a situation in which the manager is looking for auditors who, even if the reliability of the financial statements is seriously damaged, support current reporting methods and assist the firm in its financial reporting objectives (SEC, 1988). In other words, it is the attempts that the manager makes to influence or even manipulate the auditor's decisions to obtain a more favorable audit opinion (Garcia Osma et al., 2018). Independent auditors can't publish ads to gain a client and perform guaranteed auditing services for legal reasons, but due to the

conditions of competition between auditors, it is possible to facilitate the submission of audit reports (quality reduction) in exchange for a higher fee; this is called opinion shopping. Therefore, to determine the auditor's opinion shopping by the client, it is necessary to identify the relationship between audit quality and audit fee. This section will explain the relationship between these two variables that determine opinion shopping.

2.2. Audit quality and audit fees

Since audit quality is multidimensional and inherently invisible, there is no single standard for measuring it. By combining financial reporting quality criteria, the researchers created an index of audit quality, arguing that if auditors perform high-quality audits, this should also be reflected in the financial statements.

According to previous studies, one of the dimensions of audit quality that distinguishes high-quality auditor services from low-quality auditor services is the expertise of the auditing firm in the industry (Almutairi, Kimberly and Terrance, 2009). O'Keefe, King and Gaver (1994) state that the auditors specialize is, especially in the economic sectors, the more knowledge he has about the client's activities, and he provides better services. Therefore, more auditors' expertise increases the quality of audit services and the quality of financial information.

Since specializing in the industry is a costly investment, the auditing firm wants a normal rate of return on the investment made. This is reflected in the higher fees for industry specialist firms versus non-specialist firms. According to previous studies, including the ones by Wang and Iqbal (2009) and Craswell, Francis and Taylor (1995), the auditor's expertise in the industry directly impacts the pricing of auditing services. According to Carson (2009) and Choi et al. (2010), the expertise of the auditing industry has a positive relationship with the fee, so the larger and more specialized the auditing firm, the more fees it receives.

Large audit firms have a higher incentive to perform a quality audit because they intend to maintain their competitive position, and therefore in research, the auditor's size has been considered an important variable (DeAngelo, 1981). DeAngelo (1981), O'Keefe, King and Gaver (1994) and Braunbeck (2010) believe that the larger the audit firm, the more resources it has, and therefore it can provide better services, and as a result, the larger the audit firm, the higher the quality of the audit and the higher the quality of the financial information reported. Another variable that may affect the amount of auditors' fees is the size of the auditing firm. It is argued that large auditors, because of concerns about maintaining their reputation, are more conservative in estimating audit risk. In other words, large auditors try to estimate the audit risk at a high level, thereby reducing the risk of not detecting important misstatements. This approach increases the audit cost and, therefore, the audit fee. However, small auditing firms have less reputation, and their concerns are more about keeping customers in a competitive market. Because of this, they try to reduce the scope of proceedings in different ways and receive lower fees (Wang, 2015). Choi et al. (2010) focused on the office size of an auditing firm and concluded that large auditing firms have a higher fee and higher-earning quality than small firms. Large auditing firms have a higher quality of work due to greater independence, the presence of specialized manpower, less dependence on the audited income of a particular company, performing audit procedures with high efficiency and effectiveness, and conducting continuous auditing, and thus receive higher fees from their clients than other firms. As DeAngelo (1981) and Fargher, Taylor and Simon (2001) state that larger audit firms have more financial independence, making them less likely to adopt and use bold (aggressive) and accrual accounting practices. As the size of the audit firm increases, the agency costs and the cost of the client's capital decrease. When the client signs a contract with a large institution, this client's action reflects the importance of audit quality and, on the other hand, the reduction of agency costs (Palmrose, 1986). With the increase in

audit quality, the client's internal contradictions also decrease and improve the investors' attitude towards the company. Under these circumstances, the audit fee also increases (Simunic &Stein, 1987). Therefore, due to their higher audit quality, larger audit firms reduce information risk more appropriately for investors, which is expected to increase the company's audit fees.

Today, the restatement of financial statements and the quality of auditing are both events that attract most investors' attention, and the restatement of significant financial statements is a factor that can leave the reliability of published financial information in a state of ambiguity. If the audit quality is high, the likelihood of a restatement of the financial statements due to significant errors in previous periods is minimized. According to auditing standards, auditors should have reasonable assurance that financial statements are free from a material misstatement by planning and performing audit operations (Public Company Accounting Oversight Board, 2010). Previous studies have shown that the characteristics of the auditor, including the firm size, the auditor's reputation, the auditor's expertise, can affect the quality of the audit and the employer's obligation to restate financial statements due to a lack of accepted accounting or financial reporting principles in the following year. They also found a positive and significant relationship between audit quality and restatement, which indicates that large and reputable auditors are more likely to issue restatement (Agrawal and Chadha, 2005; Demirkan and Fuerman, 2014). In this regard, Agrawal and Chadha (2005) found a significant relationship between audit quality and restatement of financial statements. According to Files, Sharp and Thomson (2014), the characteristics of auditors and the intensity of restatement affect the repetition of financial statement restatements. Owners of companies audited by smaller audit firms are also more likely to have their financial statements restated; in their research, Lazer, Livnat and Tan (2004) found that companies with longer tenure are not interested in restating financial statements.

Chambers and Payne (2008), in their study on audit quality and reliability of accruals, concluded that high audit quality, as well as the application of the Sarbanes-Oxley Act, increases the reliability of accruals. Lai (2009) concluded that companies with higher investment opportunities are more likely to have more discretionary accruals; however, this relationship becomes weaker when they are audited by auditors who are members of the five major auditing firms.

2.4. Independence of the board and auditor’s opinion shopping

The non-executive members of the board supervise the executives’ decisions by supervising them. As a result, the board's composition can affect the financial performance of companies. If the majority of the board members are independent non-executive directors, the board will be more efficient. In a study, Carcello et al. (2002) concluded that one of the monitoring tools to reduce agency problems between managers and owners is non-executives (independent members) in the board's composition. Non-executive members are professional managers with expertise in decision control. Non-executive directors purchase high-quality auditing services to protect their capital and reputation, avoid legal debt, and protect their own interests and shareholders’ interests. Also, in a study conducted by (Ramdani and Wittloostuijn, 2010), more independent managers can perform managerial oversight tasks more effectively.

Tsui, Jaggi and Gul (2001) concluded in their study that there is a negative relationship between audit fees and board independence. Shan, Troshani and Tarca (2019) showed that when the level of managerial ownership is consistent with shareholder interests (e.g., "convergence of interests"), the relationship between managerial ownership and the size of the audit firm and audit fees is negative. Conversely, the relationship is positive when the level of managerial ownership is contrary to the interests of the shareholders (e.g., "conflict of interest"). In other words, when managers do not have the company's stock, they choose smaller auditing firms and pay lower fees.

In a study, Bernardus andFitriany (2017) show that an increase in abnormal audit fees increases the likelihood of issuing an acceptable opinion and hence a level of opinion shopping occurs. Their study also reveals that receiving an unusual audit fee increased the issuance of invalid opinions, led to the auditors becoming dependent on the client and caused the auditors' independence.

The results of their research also showed a negative relationship between the ability of management and the likelihood of the auditor expressing concern about the continuity of the activity. Finally, the results of their study indicate a relationship between management ability and auditors' decisions.

According to the agency theory of conflict of interests between managers and owners, managers may disclose incorrect information in order to achieve their goals and policies. The validation requirement of auditors' information limits managers from disclosing the information. Therefore, managers may collude with the auditor.

Hypothesis 1: There is a significant relationship between board independence and the auditor's opinion shopping

2.5. Independence of the audit committee and opinion shopping

The audit committee must be independent of the entity to perform effectively. To maintain independence, members of the audit committee should be selected from non-executives or external directors. Beasley et al. (2000) found that the audit committee in companies with fraudulent reporting has less independence than other companies. The findings of Carcello and Neal (2000) indicate that companies in financial crisis and have independent audit committees are less likely to receive an opinion on the non-continuation of activity. Beasley et al. (2000), Carcello and Neal (2000), and Abbott, Parker and Peters (2004) are based on the theory that independent audit committees have no personal or financial affiliation with executive management. Thus, an independent audit committee may disagree with management on some issues (Baysinger and Butler, 1985). Managers who are independent of the firm's operations are expected to seek quality auditing and reduce fraud and earning management (Beasley, 1996). Therefore, when the audit committee members are composed of independent managers, they will be able to apply more influence on the executive management to request more audit scope to ensure the quality of the audit. This, in turn, increases the audit fee. The results of Abbott, Parker and Peters's (2004) research also confirm the theory that there is a positive relationship between the independence of audit committee members and audit fees.

However, the findings in the research by Chan, Liu and Sun (2013) indicated a negative relationship between the independence of the audit committee and the audit fee. Carcello, Hermanson and Ye (2011) concluded that a stronger audit committee could reduce the audit feet by underestimating the audit risk. It can also increase the audit fee by requesting an independent auditor to make further efforts in a study; Brown and Wright (2008) and Dezoort, Hermanson and Houston (2008) concluded that the audit committee is more likely to support the auditors' position when they have more power. Sultana et al. (2015) showed that there is a positive relationship between conservatism in accounting and the three characteristics of the presence of managers with financial expertise in the audit committee, the manager's previous experience in the audit committee and the frequency of audit committee meetings; however, no relationship was found between the independence of audit committees and conservatism in accounting.

Alzoubi (2019) discovered that an audit committee and internal audit performance reduce income management and improve the quality of financial reporting. Alkilani, Hussin and Salim (2019) showed in their research that the expertise of the audit committee effectively improves financial reporting. Their findings also showed that the efficiency of corporate governance increases the quality of financial reporting.

In 2012, the Tehran Stock Exchange Organization obliged listed companies to establish an audit committee. One of the missions of the audit committee is to select and change the auditor. Since the audit committee is one of the specialized committees of the board, they have common interests. Given the above points, it is likely that the audit committee also agrees with the board in disclosing incorrect information.

Hypothesis 2: There is a significant relationship between the independence of the audit committee and the auditor's opinion shopping.

2.6. Product market competition, supervisory independence and opinion shopping

Chhaochhariaet al. (2012) claim that competition greatly reduces agency problems, and those companies in less competitive industries are less efficient than companies in more competitive industries. Companies in less competitive industries are likely to have stronger governance mechanisms to align management interests with shareholders. Competition in the product market motivates managers to behave more efficiently. Due to conflicts of interest between managers and investors, investments need to be monitored to prevent inefficient investment in free cash flow.

Competition and disclosure theories state that the nature of competition has a different effect on financial disclosure and reporting. Typically, companies face two dimensions of competition in the product market: the first dimension is the threat posed by the entry of potential competitors, which can have a negative effect on the profitability of companies; in this case, the decision to enter the market depends on the entry costs and expected future benefits after entering the market; the second dimension is competition between existing companies that can threaten their competitive position in the market because entering the market is somewhat costly and decision making in the market depends on the expected future benefits (Li, 2010). Lin and Wei (2014) claimed that companies' willingness to disclose information voluntarily decreases as product market competition increases. Cheng, Man and Yi (2013) believe that competition plays a very important role in managers' voluntary disclosure decisions. They attribute this to the manager's motivations for disclosure, influenced by the company's economic decision-makers, the organizational environment, and the characteristics of the industry. Raith (2003) states that companies try to dissuade competitors from entering the industry in the face of economic and competitive pressures. One way to deal with these pressures is to manipulate and manage earnings to provide stable and reliable information to the market. In his research, Hang Shin (2018) showed that the company's market power has a positive relationship with audit fees. In particular, his research shows that, first, there is a positive relationship between market power and audit fees. Second, major shareholders reduce the positive relationship between market power and audit fees. Third, foreign investors strengthen the positive relationship between market power and audit fees. Wang (2015) provided evidence that auditors demand more payment for auditing companies in more competitive industries.

Studies in the area of competition have shown that managers are more likely to provide users with incorrect information to help them achieve their goals in a competitive environment in a competitive market. Since this information is disclosed, it must be validated by an independent auditor. Therefore, it is probable that the board of directors and the audit committee collude with the independent auditor in competitive market conditions and engage in opinion shopping by using their authority to change the auditor and determine the audit fee.

Hypothesis 3: Product market competition affects the relationship between board independence and the auditor's opinion shopping.

Hypothesis 4: Product market competition affects the relationship between the independence of the audit committee and the auditor's opinion shopping

3. Research method

3.1. Statistical sample and population

The statistical population of this research is the companies listed on the Tehran Stock Exchange for6 years from 2014-2019. The sample of this study included 162 companies (972 year-company) which were determined according to the elimination sampling among the companies of the population and according to the following conditions:

(1) They are not members of financial intermediaries, holdings, banks and insurance industries (due to their different operational nature);

(2) They have not entered the Tehran Stock Exchange after 2014; and

(3) Do not change the fiscal year during the study, and the operational halt should not be more than six months.

To collect data related to the experimental section and to test research hypotheses, data related to dependent, independent and control variables were collected from the audited financial statements of Tehran Stock Exchange companies on the Codal website.

3.2. Regression model

The following regression model has been used to test the research hypotheses:

Opinion shopping = $\beta_0 + \beta_1$inddir_board + $\beta_2$inddir_audit + β_3HHI + $\beta_4$inddir_board * HHI + $\beta_5$inddir_audit * HHI+ β_6Leverage + $\beta_7$inst_own + β_8Assets + β_9Age + β_{10}RnD + β_{11}Industry + ε

3.3. Research variables

3.3.1. Dependent variable

3.3.1.1 Opinion shopping: This auditor's opinion shopping variable is measured in the following four independent ways. Each of these four modes is fitted separately in the model.

Accordingly, when the increase in the company's audit fee this year is higher than the average increase in the audit fee in the industry compared to that in the previous year, and at the same time the quality of the audit is reduced (each of the following four causes according to previous researches mentioned in the theoretical foundations, indicates a decrease in the audit quality), the auditor's opinion shopping has occurred:

1) When the industry specialist auditor has been changed to a non-specialist auditor, number one is assigned; otherwise, the number is zero. Following prior research (Neal and Riley, 2004), the market share approach calculated auditor specialization (First criterion).

2) The auditor has changed from the auditing organization (as a large auditing firm) to other auditing firms; the number is one, and otherwise, zero is assigned (second criterion).

3) The ratio of the amount of restatement of financial statements to income is higher than that in the previous year, the number is one, and otherwise, zero is allocated (third criterion).

4) Accruals of financial statements have increased compared to that in the previous year, the number is one, and otherwise, zero is assigned (fourth criterion).

3.3.2 Independent variables

3.3.2.1 Inddir- board: Percentage of non-executive board members to total members of the company i in year t

3.3.2.2 Inddir- audit: Percentage of independent members of the audit committee to total members of the company i in year t

3.3.3 Moderator variable

3.3.3.1 HHI: Herfindahl index is the total square of the considered company's sales share from the total sales of active companies in the same industry in year t; this index measures competition.

$HHI=S^2_1+S^2_2+S^2_3+\ldots\ldots\ldots+S^2_n$

3.3.4 Control variables:

3.3.4.1Leverage: The financial leverage index is measured by dividing total liabilities by total assets of the company i in year t.

3.3.4.2 insti_own: Percentage of total shares held by the institutional investors of the company i in year t

3.3.4.3 Assets: The natural logarithm of the assets of the company i in year t

3.3.4.4 Age: The age of the company is the number of years of the life of the company i, from the year of establishment to the year t

3.3.4.5 RnD: Ratio of R&D costs to assets for the company i in year t

3.3.4.6 Industry: assign a number to each industry

4. The Results

4.1. Descriptive statistics of observations:

This study's descriptive findings, including mean, median, standard deviation, minimum observation and maximum observation, are presented in Tables 1 and 2. It should be noted that the number of companies studied is 162 companies, and their information has been collected for 6 consecutive years (972 year-company).

Table 1. Descriptive statistics of quantitative variables related to the models of research hypotheses testing

Variables	Year-company	Symbol	Mean	Median	SD	Min	Max
Independence of the board	972	inddir_board	0.657	0.600	0.194	0.200	1.000
Independence of the Audit Committee	972	inddir_audit	0.659	0.667	0.109	0.333	1.000
Herfindahl index	972	HHI	0.022	0.001	0.092	0.001	0.722
Financial Leverage	972	Leverage	0.720	0.633	0.306	0.001	2.616
Institutional shareholders	972	inst_own	0.304	0.195	0.309	0.000	0.963
Firm size	972	Assets	14.224	14.101	1.301	10.533	19.313
Firm age	972	Age	20.189	19.000	8.782	3.000	51.000
R & D costs	972	RnD	0.001	*0.000	0.006	0.000	0.148

Table 2. Frequency of (binary) variables zero and one related to models of research hypotheses testing

Name of the variable	Symbol	One Frequency	Frequency percentage	Frequency	Zero Frequency percentage
Opinion shopping criterion method1	Opinion(1)	86	9	886	91
Opinion shopping criterion method2	Opinion(2)	77	8	895	92
Opinion shopping criterion method 3	Opinion(3)	58	6	914	94
Opinion shopping criterion method4	Opinion(4)	184	19	788	81

According to the results of descriptive statistics, on average, 66% of the board members are non-executive, and approximately 65% of the audit committee members are independent. The youngest surveyed company has been listed on the Tehran Stock Exchange since 2011, and the maximum presence of the surveyed companies is 51 years. Also, on average, 31% of the company's shareholders are institutional shareholders. 9% of the population engaged in opinion shopping according to criterion one. According to criterion number two, 8%, according to criterion number three, 6%, and criterion number four, 19% of the companies engaged in auditor's opinion shopping.

The results of the colinearity test between the model's explanatory variables (VIF) are presented in Table 3. Given that the VIF statistic of the above variables is around 1 and below 5, the colinearity between the explanatory variables of the regression model is not severe, and there is no problem in

the fitting.

Table 3. VIF test results for explanatory variables used in research regression models

Variables	Symbol	Centred VIF	Variables	Symbol	Centred VIF
Independence of the board	inddir_board	1.126	Institutional shareholders	inst_own	1.089
independence of the Audit Committee	inddir_audit	1.116	Firm size	Assets	1.162
Herfindahl index	HHI	1.063	Firm age	Age	1.046
Financial Leverage	Leverage	1.139	Research and development costs	RnD	1.026

4.2 Hypotheses testing

The final results of fitting the four models and the AIC values are presented in Table 4.

Table 4. Results of AIC statistics for the model of research hypotheses

Dependent variable measurement	Identification criteria	Logistic model	Logistic model by applying time factor	Panel logistic regression model with fixed effects	Panel logistic regression model with variable effects
The first criterion	AIC coefficient	148.178	153.139	235.089	235.089
The second criterion	AIC coefficient	149.699	156.998	325.399	325.399
The third criterion	AIC coefficient	93.763	101.947	219.400	219.400
The fourth criterion	AIC coefficient	467.636	463.860	452.784	452.784

According to the results presented in Table 4 and the AIC values of each of the four mentioned models, it can be concluded that the most appropriate method to fit the model in the first to third cases of dependent variable measurement is logistic due to having the lowest AIC value and in the fourth mode of measurement, since the results of the fitting of the two models are the same, one of the two models of the panel and fixed effects logistic regression is fitted and the output is reported in the following tables.

As it is clear from the results in Table 7, considering that the P-value of the variable of board independence is less than the significance level of 0.05, it is accepted and according to the regression coefficient sign, which is equal to -6.4106, so there is a significant and negative relationship between the board independence and the third criterion of the auditor's opinion shopping (the ratio of the amount of restatement of financial statements to income).

Meanwhile, according to the results presented in Tables 5 to 8, the independence of the board of directors and the independence of the audit committee are not significantly related to other criteria of the auditor's opinion shopping (change from large auditor to the small auditor, change from industry specialist auditor to non-specialist auditor and increase in discretionary accruals in the current year compared to that in the past year). Considering this, the first hypotheses (in the three criteria of opinion shopping) and the second hypothesis (with all four criteria of opinion shopping) are not confirmed. In addition, competition in the industry has not been able to affect the relationship between the independence of the board of directors and the independence of the audit committee with the auditor's opinion shopping criteria of the auditor's opinion, and therefore hypotheses 3 and 4 are not confirmed.

Table 5. Results of fitting the model related to the first criterion of opinion shopping (a simultaneous increase of audit fee and change from industry specialist auditor to the non-specialist auditor)

Variables	Symbol	Regression coefficients	SD	t-statistic	P - Value
Constant	β_0	-0.001	0.002	-0.009	0.993
Independence of the board	inddir_board	0.001	0.002	1.051	0.293
Independence of the Audit Committee	inddir_audit	0.001	0.003	0.249	0.803
Herfindahl index	HHI	0.001	0.002	0.327	0.743
Herfindal relationship with the independence of the board	inddir_board * HHI	-0.001	0.002	-0.445	0.657
Herfindal relationship with the independence of the audit committee	inddir_audit * HHI	-0.002	0.003	-0.319	0.750
Financial Leverage	Leverage	0.001	0.002	1.329	0.183
Institutional shareholders	inst_own	0.002	0.003	0.307	0.759
Firm size	Assets	0.001	0.002	3.196	0.001
Firm age	Age	0.001	0.002	0.201	0.841
R & D costs	RnD	-0.001	0.002	-0.373	0.709
Industry code				Controlled	

Table 6. Results of model fitting related to the second criterion of opinion shopping (a simultaneous increase of audit fee and change from large auditor to small auditor)

Variables	Symbol	Regression coefficients	SD	t-statistic	P-Value
Constant	β_0	-0.001	0.002	-2.254	0.024
Independence of the board	inddir_board	-0.001	./002	-0.201	0.841
Independence of the Audit Committee	inddir_audit	0.001	0.002	1.740	0.082
Herfindahl index	HHI	0.002	0.003	0.776	0.438
Herfindal relationship with the independence of the board	inddir_board * HHI	0.003	0.002	0.391	0.696
Herfindal relationship with the independence of the audit committee	inddir_audit * HHI	-0.002	0.001	-0.781	0.435
Financial Leverage	Leverage	0.001	0.002	0.074	0.941
Institutional shareholders	inst_own	-0.002	0.003	-2.132	0.033
Firm size	Assets	0.001	0.002	1.616	0.106
Firm age	Age	-0.001	0.002	-1.281	0.200
R & D costs	RnD	-0.002	0.002	-0.153	0.878
Industry code				Controlled	

5. Conclusion

Using appropriate statistical tests, research hypotheses were tested, and the results were presented. The following is a description of the results obtained from the hypotheses testing:

Regarding the first hypothesis of this research, the results showed that the board of directors' independence has a negative relationship with the auditor's opinion shopping (the third measurement criterion). This result is consistent with the results of the research by Teng and Li (2011) and Carcello et al. (2002), who showed that there is a significant relationship between board characteristics and auditor collusion (acceptable report). On the other hand, this result contradicts Tsui, Jaggi and Gul's (2001) research, which showed that the board's independence pays less auditing fees. The results also indicate that there was no significant relationship between the independence of the board and the auditor's opinion shopping (the other three criteria of measurement).

Table 7. Results of fitting the model related to the third criterion of opinion shopping (simultaneous increase of audit fee and increase of the amount of restatement in the current year compared to that in the previous year)

Variables	Symbol	Regression coefficients	SD	t-statistic	P-Value
Constant	β_0	-54.152	119.667	-0.001	0.999
Independence of the board	inddir_board	-6.4101	2.9809	-2.150	0.032
Independence of the Audit Committee	inddir_audit	7.737	14.858	0.521	0.603
Herfindahl index	HHI	3067.201	4411.529	0.695	0.487
Herfindal relationship with the independence of the board	inddir_board * HHI	391.259	218.327	1.792	0.073
Herfindal relationship with the independence of the audit committee	inddir_audit * HHI	-4884.718	6608.307	-0.739	0.460
Financial Leverage	Leverage	-0.592	2.238	-0.264	0.792
Institutional shareholders	inst_own	0.674	2.135	0.315	0.753
Firm size	Assets	1.989	0.962	2.068	0.039
Firm age	Age	-0.300	0.178	-1.689	0.091
R & D costs	RnD	-0.232	9.169	-0.025	0.980
Industry code				Controlled	

Table 8. Results of fitting the model related to the fourth criterion of opinion shopping (a simultaneous increase of audit fee and increase of discretionary accruals this year compared to that in the previous year)

Variables	Symbol	Regression coefficients	SD	t-statistic	P-Value
Constant	β_0	-0.943	0.271	-3.485	0.001
Independence of the board	inddir_board	0.019	0.095	0.202	0.840
Independence of the Audit Committee	inddir_audit	-0.160	0.151	-1.055	0.291
Herfindahl index	HHI	3.354	3.983	0.842	0.400
Herfindal relationship with the independence of the board	inddir_board * HHI	0.034	1.858	0.018	0.985
Herfindal relationship with the independence of the audit committee	inddir_audit * HHI	-4.826	5.597	-0.862	0.388
Financial Leverage	Leverage	-0.21	0.026	-0.784	0.433
Institutional shareholders	inst_own	-0.097	0.061	-1.591	0.112
Firm size	Assets	0.083	0.016	5.091	0.000
Firm age	Age	0.004	0.002	1.659	0.097
Industry code				Controlled	

Although managers, independent of the company's operations, are expected to demand quality auditing, the reason for the contradiction in the results could be measuring the auditor's opinion shopping variable. This is because the appointment of the board of directors in Iran often happens based on relations. Therefore, although the board member may have complete independence from the executives, he is not aware enough to detect collusion and manipulation of accounting figures by executives. Given the above, the results of our research showed that the independence of the board has a negative relationship with the measurement method of restatement of financial statements, but it was not significantly related to other measurement methods.

The second hypothesis of this study, which showed that the independence of the audit committee has no significant relationship with the auditor's opinion shopping, is in contradiction with the results of Lennox (2002), which showed that there is a significant relationship between the characteristics of the audit committee and receiving an acceptable audit report. The result of this study also contradicts the research by Alkilani, Hussin and Salim (2019) and Alzoubi (2019), in which the existence of an audit committee improved the quality of reporting.

One of the reasons for the contradiction between the results of our research and similar research is that despite the formation of an audit committee being mandatory by the Exchange Organization for member companies in 2012, establishing an audit committee has not been seriously done by many companies or even if it is done, newness and lack of familiarity of this committee with the limits of its powers and duties have had a diminishing effect on its effectiveness. Also, some companies have formed an audit committee nominally and have practically no effective activities.

In general, based on the theoretical foundations mentioned, it can be stated that company managers engage in auditor's opinion shopping to achieve the desired results in the audit report. The first reason is the agency's cost, and managers look for more lenient auditors in their work; maybe because they identify violations in the statements but do not disclose these violations in their reports, or in other words, they ignore the poor quality of the financial statements. Another reason is related to the intensification of the information asymmetry phenomenon in which managers increase the degree of information asymmetry to achieve their goals and interests by improving the auditor's opinion. For example, to hide the weakness of their performance, managers seek to change the auditor or maintain the current auditor to prevent the publication of unfavorable news about the company. The third reason is related to the conservative approach of auditors; this means that managers prefer to look for auditors who are not too conservative and to comply with their demands to minimize disagreements over accounting and reporting practices. Therefore, considering that the board of directors' independence is one of the monitoring tools, it reduces the auditor's opinion shopping by the managers.

In the third and fourth hypotheses of the research, the results showed that product market competition does not affect the relationship between supervisory independence and the auditor's opinion shopping. This contrasts with the findings revealed by Gal-Or (1985) and Gertnero, Gibbons and Scharfstein (1988) indicate that companies disclose incorrect information and collude with the auditor in a competitive environment. The competition not being effective also contradicts the research findings stated by Cheng, Man, and Yi (2013) in terms of content, which showed a decreasing effect of competitive conditions in the market on information disclosure. In his research, Hang Shin (2018) showed that the company's market power has a positive relationship with audit fees. According to his study, market competition requires a higher quality audit as a supervisory tool. It can be argued that market competition reduces the tendency of managers to engage in the auditor's opinion shopping. Given that the result of this study shows the lack of effectiveness of competition, the results of these two studies are not consistent with each other.

In his research, Gal-Or stated that when managers are in a competitive condition, in order to be more successful in a competitive market, they take actions that they prefer not to disclose information about. He cited two reasons why managers are not interested in disclosing information. One reason is that they do not want the competitors to be aware of their strategy and the second reason is that the owners do not get aware of some of their activities. The reasons for the contradiction between the results and the other research findings and the reasons stated above are the difference between time and place and the prevailing conditions. Another reason for the difference could be the competitive market conditions. Competition in Iran is not real. For example, there are companies in the automotive and pharmaceutical industries in the study population. Since there are few domestic producers in these two industries, especially in the automotive industry, the automotive market and the pharmaceutical market do not have competitive market conditions compared to the economic level of society.

As stated above, all research hypotheses were rejected (Except for one case). We expected to see a decrease in auditor's opinion shopping as Supervisory Independence increased, but that did not happen. That could be the reason for the lack of good role-playing by Supervisory Independence. Future research should pay more attention to the efficiency of corporate governance in the Tehran

Stock Exchange.

The results show that if the auditor's opinion shopping criterion is the ratio of the amount of restatement of financial statements to income, the board's independence has a negative and significant relationship with the auditor's opinion shopping. The research findings also show that the audit committee's independence was not related to the auditor's opinion shopping criteria. Also, separate tests on the role of product market competition on the above relationships indicate that this variable does not have moderator effects. The research results should be interpreted according to the following limitations: Limitation of The statistical population, Limitation of variables measurement and Limitation of the research period, as each of these conditions can affect the results of the research

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RESEARCH ARTICLE

The Moderating Effect of the Inflation on the Relationship between Asset Revaluation and the Financial Statements of Companies Listed on the Tehran and Bombay Stock Exchanges

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Abstract

This study investigates the moderating effect of the inflation rate on the relationship between asset revaluation and the financial statements of companies listed on the Tehran and Bombay stock exchanges. In this study, parameters including financial leverage, liquidity, firm size, fixed assets ratio, and firm growth and the data of 112 companies listed on the Tehran Stock Exchange (TSE) and 563 companies listed on the Bombay Stock Exchange (BSE) during the period 2015-2019 are used. Multiple regression is employed to test the research hypotheses to determine the relationship between the dependent and independent variables. F-statistic, F Limmer, and Husman tests are used to test the significance of regression models. The Generalized Least Squares (GLS) method estimates the research models. The results of testing the research hypotheses demonstrate that in both the Tehran and Bombay stock exchanges, without considering the role of the inflation rate, the revaluation of fixed assets is positively and significantly associated with financial leverage, liquidity, and firm size, fixed assets ratio, and firm growth. Moreover, considering the role of the inflation rate, inflation moderates the relationships between financial leverage, liquidity, firm size, fixed assets ratio, firm growth, and the revaluation of fixed assets.

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1. Introduction

Financial information of firms is produced through the accounting system, and the purpose of financial reporting is to provide accurate and timely information. Economic decision-makers seek up-to-date information and indicate the value of assets as they are because presenting accurate and timely information is an important factor in the decision-making of insider and outsider users of financial statements (Solikhah, Hatuti, and Budiyono, 2020). The increase in the general level of prices, i.e., inflation, which is a serious concern in many countries such as Iran, has led to a gap between assets' market value and book value; that is, assets' book values do not reflect the economic realities (Solikhah, Hatuti, and Budiyono, 2020). Thus, information recorded and reported based on historical costs lacks relevance, which is one of the important qualitative characteristics of financial information, leading to misled economic decision-makers. The suggested solution for addressing or mitigating this problem is to reconsider the cost of assets, referred to as "asset revaluation". If in an economy struggling with inflation, accounting items, following the historical cost principle, are reported based on the original costs and their book values are not adjusted for inflation, an ambiguity arises as to whether the financial statements provided based on the historical cost principle have the required qualitative characteristics to help the shareholders make the right decisions. If accounting information based on historical costs lacks the desirable quality under inflationary conditions, the decisions made based on such information are not of good quality (Javid, Ahmadiloyeh, 2015).

There is limited research on selecting fair value measurement techniques for non-financial assets. As non-financial and financial assets have different characteristics from each other and due to the non-existence of the fair value of assets in active markets, this study examines the effects of leverage, firm size, liquidity, firm growth, and fixed assets ratio and also investigates the relationship between asset revaluation and financial statements in the TSE and BSE considering the role of inflation using appropriate measurement models and then compares them.

2. Theoretical Framework and Hypotheses Development

2.1. Asset revaluation

Asset revaluation is a formal process of updating the book values of assets to their fair values. In recent years, fair value accounting has been extensively used, but U.S. Generally Accepted Accounting Principles (GAAP)and the International Financial Reporting Standards (IFRS) hold differing views on fair values for non-financial assets.

Although both U.S. GAAP and IFRS settings allow the recognition of the reduction in fixed assets' values, only IFRS permits the recognition of their structuring surplus (Choi et al., 2013). Non-current or fixed assets are purchased to be held or used for more than a year and are not for sale in ordinary operations. From the economic perspective, the value of a fixed asset finds a concept when it is close to its market price or replacement cost at the same date. Usually, during the inflationary period, the price of fixed assets increases, while in the accounting system, the cost principle is always applied (HaqiqiTalab and Mousavi, 2015).In accounting, revaluation is a necessary technique for the correct presentation of the value of capital assets of a firm and refers to the revaluation and adjustment of book values to market fair values and maybe upwards or downwards. Haqiqi Talab and Mousavi (2015) suggest different reasons for revaluation, including the tendency to increase the borrowing capacity, issuing bonds, reducing operating cash (Brown, Izan and Loh, 1992; Tay, 2009), improving the prospect of firm growth and liquidity (Lin and Peasnell, 2000).

2.2. The role of inflation in revaluation and the quality of information presented in financial statements

The financial statements of capital-intensive companies indicate that work in progress and fixed

assets often comprise a major portion of the balance sheet; thus, identifying and determining the cost, recording, and controlling assets are of great importance in the statement of financial position and relevance of the values of these items, especially with the current inflation, has always been a challenge facing the accounting profession. Eventually, after two decades of continuing disputes, the Iranian government agreed to allow private-owned enterprises, like state-owned enterprises, to revalue their fixed assets and use revaluation tax exemptions. The executive by-law of revaluation, due to the inflationary conditions of the last two decades, can be a step taken toward the transparency of financial statements (Amani, 2011). Regardless of theoretical issues and problems, implementing the relevant rules and regulations always leads to new questions and arguments, requiring seeking and providing solutions. Widespread inflation in different societies, the increasing complexity of financial analysis methods, and various needs of insider and outsider users, particularly sensitivities of decision-making authorities, have made it necessary to provide realistic information in financial reporting (Haqiqi Talab and Mousavi, 2015). There is a considerable difference between the book values and the current values of firms' assets. Considering that the true value is not indicated in financial statements, asset revaluation can improve the transparency and relevance of financial statements. If revaluation surplus were tax-exempt, firms would be more willing to revalue their assets (Marfoo, Momenzadeh, and Momenzadeh, 2013). In developed countries, firms' financial statements and published information are the most important sources of information about firms' financial position and managers' performance. Therefore, accounting standards and accepted accounting principles as the base for providing this information should have specific characteristics to lead to the presentation of reliable and relevant information. One of the underlying assumptions of financial statements is the monetary unit assumption as the measure of economic events, while in inflationary conditions, this assumption is highly affected, and if the purchasing power of money is assumed unchanged, the provided information does not match economic reality (Shabahang and Setayesh, 2001). Transparent and reliable financial information provides the basis for the users' decision-making. Managers, investors, creditors, and other users need comparable, relevant, and understandable information to reach informed and right decisions. Although financial information can be extracted from different sources, financial statements constitute the primary sources of financial information. Hence, they should have desirable qualities. Financial statements will be of good quality if they are prepared based upon certain criteria, i.e., accounting standards. The increase in the inflation rate, constant changes in prices, and the reduction in the purchasing power of money in different societies have led to a huge gap between the information presented in financial statements and the economic realities. The reduced purchasing power of countries' currencies over time and significant changes in relative prices of goods and services have resulted in the inconsiderable difference between the historical costs at which fixed assets are presented in financial statements and their current values as the indicator of economic realities. Under inflationary conditions, the financial information provided by accountants using traditional methods and without considering the effects of inflation is not relevant and can mislead users of financial statements. Therefore, it is important to discuss inflation and the effects of price changes and how they should be reflected in financial statements by using an effective tool to help users make the right financial and economic decisions (Nekouei, Salehi, and Ekmiabi, 2014).

2.3. Financial leverage and fixed asset revaluation

Firms with high leverage are likely to face problems receiving loans because creditors have concerns about the failure of such firms to pay off their debts. Positive accounting theory suggests that managers' decisions about asset revaluation demonstrate their motivations for reducing the level

of leverage. Asset revaluation leads to increased asset values, improved financial ratios, an enhanced level of creditor confidence, and a larger amount of loans a firm can receive from lenders. In other words, a lower level of leverage leads to a lower level of risk for creditors because it indicates a better position of firm assets (Seng and Su, 2009); Iatridis and Kilirgiotis, 2012). Solikhah, Hastuti, and Budiyono (2020) find that financial leverage has a positive and significant effect on the decision to undertake fixed asset revaluation, while liquidity, firm size, fixed asset sensitivity, and firm growth do not have any effect on the fixed asset revaluation. Valiyan, Abdoli, and Hashemi (2018) show that asset restructuring has a negative and significant relationship with financial leverage, and firms with the highest asset restructuring sensitivity adjust their actual leverage towards the target leverage.

Giani and Martani (2018) indicate that 20 percent of building construction companies undertaking asset revaluation have reduced financial leverage and increased debt.

Hypothesis 1-1: there is a significant relationship between financial leverage and fixed asset revaluation.

Hypothesis 1-2: the inflation rate moderates the relationship between financial leverage and fixed asset revaluation.

2.4. Liquidity and fixed asset revaluation

Liquidity refers to a firm's ability to pay off its short-term debts timely (Halsey et al., 2005). Firms with a low level of liquidity have a strong incentive to revalue their assets because asset revaluation provides more realistic information about the amount of cash that would be received from selling fixed assets and increases borrowing capacity (Tay, 2009). The fair value of a fixed asset indicates the price at which it can be sold. Thus, presenting assets at their fair values leads to an increased level of creditor confidence and enhanced borrowing capacity of a firm. Hence, managers are willing to revalue their assets to receive more loans from creditors (Tay, 2009). Mansouri, Saeedi Garaghani, and Asadi Dubani (2018) find that asset revaluation increases audit costs. Firms that revalue their assets experience more audit costs than firms using the historical cost model. Azmi (2018) shows that the benefits of the revaluation of fixed assets are realized in the subsequent year, and the motivation for revaluation is to disclose fixed assets' fair values to financial statements' users. Javid and Ahmadi Loyeh (2015) indicate that, due to inflation, the quality of adjusted accounting information is higher than accounting information based on historical costs.

Hypothesis 2-1: there is a significant relationship between liquidity and fixed asset revaluation.

Hypothesis 2-2: the inflation rate moderates the relationship between liquidity and fixed asset revaluation.

2.5. Firm size, fixed assets ratio, and fixed asset revaluation

The high proportion of fixed assets leads to information asymmetry, a conflict of interests, and agency costs. Thus, large firms with huge fixed assets constantly attempt to reduce information asymmetry through asset revaluation. Revalued fixed assets are presented at their fair values in financial statements, leading to the optimal use of information presented by insider and outsider users in financial statements. Thus, large firms seek methods for revaluing their assets to present a fair picture of assets' real values. Mert (2020) finds that countries facing the problem of rising inflation rates undertake fixed asset revaluation more extensively than countries with a constant inflation rate. In addition to applying international accounting standards, such countries have taken effective measures to reduce prices. Haqqani suggests that inflation in different societies and the increasing complexity of financial analysis methods have made it necessary to undertake asset revaluation. Taqi Nataj, Momenzadeh, and Momenzadeh (2017) show that although capital increase from the

revaluation surplus brings advantages such as increased ownership ratio and improved borrowing capacity, it leads to the reduction in many financial ratios, firm growth rate (including internal and acceptable growth rate), share intrinsic values, and P/E ratio.

Hypothesis 3-1: there is a significant relationship between firm size and fixed asset revaluation.

Hypothesis 3-2: the inflation rate moderates the relationship between firm size and fixed asset revaluation.

Hypothesis 4-1: there is a significant relationship between fixed assets ratio and fixed asset revaluation.

Hypothesis 4-2**:**the inflation rate moderates the relationship between fixed assets ratio and fixed asset revaluation.

2.6. Firm growth and fixed asset revaluation

Growing firms need capital sources to expand their business and increase their financial profitability. Asset revaluation leads to an increase in creditor confidence and the firm's borrowing capacity. Asset revaluation and the reflection of fair values in financial statements result in reduced information asymmetry and agency costs. When potential stakeholders such as investors and creditors have information about a firm's assets' position and fair values, they will be more inclined to invest in the firm and give it loans. Marfoo, Momenzadeh, and Momenzadeh (2020) find that, in some countries, the cost model is adopted as the accounting policy, and asset revaluation is not allowed.

In Iran, in recent years, with the adoption of some regulations, tax exemption has applied to revaluation surplus; thus, firms have displayed a growing tendency towards revaluation. Bae, Lee, and Kim (2019) show that asset revaluation leads to an increase in the value relevance and timeliness of the information. In contrast, firms with poor financial health and a high level of information asymmetry are more likely to experience higher stock price crash risk after revaluation.

Noravesh, Sarraf, and Pakdaman (2018) indicate that asset revaluation has different effects on banks' profitability and capital adequacy; that is, revaluation does not improve banks' profitability but is significantly and positively related to capital adequacy, i.e., the greater the number of revaluations, the higher the capital level of banks.

Hypothesis 5-1: there is a significant relationship between firm growth and fixed asset revaluation.

Hypothesis 5-2: the inflation rate moderates the relationship between firm growth and fixed asset revaluation.

3. Research Methodology

The present study is quasi-empirical analytical research. The data are quantitative, and in nature, this is considered to be positive research. This study is post-event research as it uses past information. In terms of purpose, this is applied research. Multiple regression is employed to test the research hypotheses. The F-statistic is used to test the significance of the regression model. The panel data model with fixed effects and the GLS method are employed to estimate the research models.

3.1. Statistical population and sampling method

The statistical population comprises all the companies listed on the TSE and BSE. The data used in this study, including the list of the companies listed on the TSE from 2015 to 2019, were collected from the website of the Securities and Exchange Organization (SEO) of Iran, Tadbir Pardaz, and Rahavard-e-Novin software, also; the data of the companies listed on the BSE during 2015-2019 were extracted from the database of the BSE. Considering the nature of the research and some inconsistencies among the companies listed on the TSE, the systematic removal sampling method is used.

The following conditions are considered to select the research sample from the TSE.

1- The research sample does not include banks, financial institutions, or investment and leasing companies.
2- To maintain the comparability, the fiscal year of the selected companies ends on 20th March.
3- The selected companies did not change their fiscal year during 2015-2019.
4- The selected companies had been listed on the TSE by 20th March 2015 and have been consistently active during 2015-2019.
5- The financial information of the selected companies is available.

Considering the above conditions, 112 companies were selected, and their related data were collected from the website of the SEO of Iran and Rahavard-e-Novin software. Also, 563 companies listed on the BSE were selected as the sample.

3.2. Measurement of research variables

Table 1 indicates the measurement of the research variables.

Table 1. Measurement of Research Variables

Variable description	Measurement	Variable type	Parameter
Fixed asset revaluation	It equals 1 if firm i revalued its assets in year t, and 0 otherwise.	Dependent variable (dummy variable)	FAR_{it}
Financial leverage	The ratio of total debt to total assets	Independent variable	LEV_{it}
Liquidity	The ratio of current assets to current liabilities	Independent variable	LIQ_{it}
Firm size	Natural logarithm of sales	Independent variable	FS_{it}
Fixed assets ratio	The ratio of fixed assets to total assets	Independent variable	TFS_{it}
Firm growth	Current year's assets minus prior year's assets divided into total assets	Independent variable	FG_{it}
Inflation rate	The inflation rate in each financial period announced by the central banks of Iran and India	Moderator variable	π_{it}

Source: Solikhah, Hastuti, and Budiyono, 2020

3.3. Research models for hypotheses testing

Model (1) is employed to test hypotheses 1-1, 2-1, 3-1, 4-1, and 5-1:

Model (1)

$$FAR_{it} = \beta_0 + \beta_1 LEV_{it} + \beta_2 LIQ_{it} + \beta_3 FS_{it} + \beta_4 TFS_{it} + \beta_5 FG_{it} + \varepsilon_{it}$$

Where:

FAR_{it}: fixed asset revaluation of firm i in year t,LEV_{it}: financial leverage of firm i in year t,LIQ_{it}: liquidity of firm i in year t,FS_{it}: the size of firm i in year t,TFS_{it}: the ratio of fixed assets of firm i in year t,FG_{it}: growth of firm i in year t,β_0: intercept, $\beta_1, \dots, \beta_5$: the regression coefficients, ε_{it}: the disturbance component

Model (2) is employed to test hypotheses 1-2, 2-2, 3-2, 4-2, and 5-2:

Model (2)

$$FAR_{it} = \beta_0 + \beta_1 \pi_{it} \times LEV_{it} + \beta_2 \pi_{it} \times LIQ_{it} + \beta_3 \pi_{it} \times FS_{it} + \beta_4 \pi_{it} \times TFS_{it} + \beta_5 \pi_{it} \times FG_{it} + \varepsilon_{it}$$

Where:

FAR_{it}: fixed asset revaluation of firm i in year t,$\pi_{it} \times LEV_{it}$: the moderating effect of inflation rate on financial leverage of firm i in year t, $\pi_{it} \times LIQ_{it}$: the moderating effect of inflation rate on the liquidity of firm i in year t, $\pi_{it} \times FS_{it}$: the moderating effect of inflation rate on the size of firm i in year t, $\pi_{it} \times TFS_{it}$: the moderating effect of inflation rate on the ratio of fixed assets of firm i in year t, $\pi_{it} \times FG_{it}$: the moderating effect of inflation rate on growth of firm i in year t, β_0: intercept,

$\beta_1, \ldots, \beta_5$: the regression coefficients, ε_{it}: the disturbance component

4. Data Analysis

In this study, the data of 112 Iranian companies listed on the TSE and 563 Indian companies listed on the BSE during the period 2015-2019 are analyzed. The required statistical tests are carried out using the Eviews 10 software.

4.1. Descriptive statistics of research variables

Table 2. Descriptive statistics of research variables of companies listed on the TSE during the period 2015-2019

variable	mean	median	standard deviation	skewness	kurtosis	Min	max
Fixed asset revaluation	0.830	1	0.367	1.764	1.115	0.000	1
Financial leverage	0.634	0.625	0.282	1.245	2.183	0.013	2.849
Liquidity	6.217	1.186	1.145	0.837	0.152	0.908	14.652
Firm size	6.296	6.224	0.621	0.835	1.172	4.811	8.368
Fixed assets ratio	0.107	0.092	0.172	0.072	0.666	0.092	0.884
Firm growth	0.075	0.069	0.164	0.705	1.627	-0.790	0.627

source: the research findings

Firm size with the value of 6.296 has the highest mean, and the variable firm growth with 0.075 has the lowest mean. The value of the standard deviation of revaluation is 0.367, which shows the average dispersion around the mean of fixed asset revaluation. The liquidity variable has the greatest standard deviation, which indicates the dispersion of this variable compared to other variables.

Table 3. Descriptive statistics of research variables of companies listed on the BSE during 2015-2019.

Variable	mean	median	standard deviation	skewness	kurtosis	min	Max
Fixed asset revaluation	0.769	1	0.625	1.685	1.012	0.000	1
Financial leverage	0.896	0.523	0.635	1.075	2.785	0.196	2.769
Liquidity	5.452	1.036	1.825	0.739	0.652	0.796	12.385
Firm size	6.965	5.285	1.852	0.906	1.452	5.965	9.736
Fixed assets ratio	0.632	0.956	0.328	0.121	0.825	0.129	0.985
Firm growth	0.208	0.172	0.112	0.685	0.562	-0.052	0.956

source: the research findings

Firm size with the value of 6.965 has the highest mean, and firm growth with 0.208 has the lowest mean. The standard deviation of revaluation equals 0.625, which shows the average dispersion around the mean of fixed asset revaluation.

4.1. Inferential statistics

4.1.1. Equality of the variance of the error term (residuals)

In this study, the assumption of the equality of residual variances is tested using the Breusch-Pagan-Godfrey test. Considering the results of the table below, the significance level of the test for both models in two countries is less than 0.05; thus, the null hypothesis suggesting the equality of variances in both models is rejected. Therefore, the GLS regression addresses the inequality of variances.

Table 4. The results of the Breusch-Pagan-Godfrey testing of the TSE

Research model	Statistic	Degrees of freedom	Statistic value	P-value
Model (1)	F statistic	(4 and 661)	6.179	0.000
Model (2)	F statistic	(4 and 661)	3.717	0.005

source: the research findings

Table 5. The results of the Breusch-Pagan-Godfrey testing of the BSE

Research model	Statistic	Degrees of freedom	Statistic value	P-value
Model (1)	F statistic	(7 and 2807)	6.286	0.000
Model (2)	F statistic	(7 and 2807)	4.952	0.001

source: the research findings

4.1.2. The absence of residual autocorrelation

The results of the estimation of research models demonstrate that the Durbin Watson (DW) statistic values in both models in the TSE and BSEare in their allowed area. Thus, there is no reason for rejecting the absence of autocorrelation in the residuals. In other words, the hypothesis that there is no autocorrelation among the residuals holds in the research models.

Table 6. The results of testing the absence of residual autocorrelation in the TSE

Research models	Statistic	Statistic value
Model (1)	The Durbin Watson (DW) statistic	2.059
Model (2)	The Durbin Watson (DW) statistic	2.045

source: the research findings

Table 7. The results of testing the absence of residual autocorrelation in the BSE

Research models	Statistic	Statistic value
Model (1)	The Durbin Watson (DW) statistic	2.015
Model (2)	The Durbin Watson (DW) statistic	2.079

source: the research findings

Table 8. The results of testing the absence of multicollinearity among explanatory variables in the model (1) in the TSE

Variable	Variance Inflation Factor (VIF)
Financial leverage	1.148
Liquidity	1.131
Firm size	1.044
Fixed assets ratio	1.010
Firm growth	1.121

source: the research findings

4.1.3. The absence of multicollinearity among explanatory variables

The Variance Inflation Factor (VIF) is used to test the absence of multicollinearity. AVIFless than 10 suggests the absence of multicollinearity. The results presented in Table 8 demonstrate that the values of VIFs of independent variables in both models in the TSE and BSE are in their acceptable range.

Table 9. The results of testing the absence of multicollinearity among explanatory variables in model (2) in the TSE

Variable	Variance Inflation Factor (VIF)
Financial leverage x inflation rate	1.317
Liquidity x inflation rate	1.290
Firm size x inflation rate	1.021
Fixed assets ratio xinflation rate	1.036
Firm growth xinflation rate	1.631

source: the research findings

Table 10. The results of testing the absence of multicollinearity among explanatory variables in model (1) in the BSE

Variable	Variance Inflation Factor (VIF)
Financial leverage	1.317
Liquidity	1.290
Firm size	1.021
Fixed assets ratio	1.036
Firm growth	1.125

source: the research findings

Table 11. The results of testing the absence of multicollinearity among explanatory variables in model (2) in the BSE

Variable	Variance Inflation Factor (VIF)
Financial leverage xinflation rate	1.533
Liquidity xinflation rate	1.853
Firm size xinflation rate	1.143
Fixed assets ratio xinflation rate	1.347
Firm growth xinflation rate	1.049

source: the research findings

4.1.4. Normality of the error term (residuals)

To check the normality of the error term, Jarque–Bera testis is used. Regarding the results of the table below, the value of the significance level of the Jarque–Bera test for both models in the TSE and BSE is less than 0.05; thus, the residuals of research models do not follow a normal distribution. When the sample size is large enough and the classic assumptions hold, the violation of the normality assumption does not usually cause a major problem. Considering the central limit theorem (CLT), even if the residuals are not normally distributed, test statistics follow an approximately normal distribution and are unbiased and efficient. Thus, the non-normality of residuals does not cause a serious problem in the analysis process.

Tabel 12. The results of the normality of the error term in the TSE

Research model	Statistic	Statistic value	P-value
Model (1)	Jarque–Bera	10.283	0.005
Model (2)	Jarque–Bera	8.164	0.015

source: the research findings

Table 13. The results of the normality of the error term in the BSE

Research model	Statistic	Statistic value	P-value
Model (1)	Jarque–Bera	26.797	0.000
Model (2)	Jarque–Bera	8.268	0.016

source: the research findings

4.1.5. Testing the stationarity of research variables

The results of the stationarity test are presented in Tables (14) and (15). Considering the results of the "Levin-Lin-Chow" test results, the p-values of all variables are less than %5; thus, all the dependent and independent variables have been stationary during the research period. As shown in Tables (14) and (15), all the variables are stationary, and there is no need for a cointegration test.

Table 14. The results of testing the stationarity of research variables in the TSE

Variable	The Levin-Lin-Chow statistic	P-value	Result
Fixed asset revaluation	4.280	0.000	Stationary
Financial leverage	8.620	0.000	Stationary
Liquidity	-1.986	0.000	Stationary
Firm size	9.210	0.000	Stationary
Fixed assets ratio	5.229	0.000	Stationary
Firm growth	-6.340	0.000	Stationary

source: the research findings

Table 15. The results of testing the stationarity of research variables in the BSE

Variables	The Levin-Lin-Chow statistic	P-value	Result
Fixed asset revaluation	6.521	0.000	Stationary
Financial leverage	7.985	0.000	Stationary
Liquidity	1.125	0.000	Stationary
Firm size	9.958	0.000	Stationary
Fixed assets ratio	6.584	0.000	Stationary
Firm growth	2.854	0.000	Stationary

source: the research findings

4.1.6. F limmer test

As indicated in Tables (16) and (17), the p-values of the F limmer test of both research models in the TSE and BSE are less than %5; thus, to estimate both models, the panel data method is employed.

Table 16. The results of the F limmer test in the TSE

Research model	Statistic	Degrees of freedom	Statistic value	P-value
Model (1)	F limmer	(110 and 551)	1.497	0.002
Model (2)	F limmer	(110 and 551)	1.388	0.009

source: the research findings

Table 17. The results of the F limmer test in the BSE

Research model	Statistic	Degrees of freedom	Statistic value	P-value
Model (1)	F limmer	(562 and 2243)	1.974	0.000
Model (2)	F limmer	(562 and 2243)	1.293	0.034

source: the research findings

4.1.7. Hausman test

As presented in Tables (18) and (19), the p-values of the Hausman test of both models in the TSE and BSE are less than %5; thus, the fixed-effects model is used to estimate both models.

Table 18. The results of the Hausman test in the TSE

Research model	Statistic	Degrees of freedom	Statistic value	P-value
Model (1)	Hausman	4	37.686	0.000
Model (2)	Hausman	4	14.154	0.006

source: the research findings

Table 19. The results of the Hausman test in the BSE

Research model	Statistic	Degrees of freedom	Statistic value	P-value
Model (1)	Hausman	8	31.494	0.000
Model (2)	Hausman	6	35.107	0.000

source: the research findings

4.2. Model estimation and results analysis

4.2.1. Hypotheses testing in the TSE

The model's estimation method is determined after testing the regression and stationarity assumptions. Research models must be estimated considering the results of F limmer and Hausman tests, in which in both models, heteroscedasticity exists; thus, the GLS method is used to estimate the research models. The results of model (1) estimation in the TSE are as follows:

Table 20. The results of estimating the first model of research in the TSE (without considering the effects of the inflation rate)

$$FAR_{it} = \beta_0 + \beta_1 LEV_{it} + \beta_2 LIQ_{it} + \beta_3 FS_{it} + \beta_4 TFS_{it} + \beta_5 FG_{it} + \varepsilon_{it}$$

variable	the estimated coefficient	standard error	t statistic	p-value
Intercept	-0.393	0.032	-12.102	0.000
Financial leverage	0.085	0.017	4.828	0.000
Liquidity	0.055	0.004	11.981	0.000
Firm size	0.186	0.021	8.559	0.000
Fixed assets ratio	0.035	0.012	2.873	0.004
Firm growth	0.186	0.026	7.153	0.000
The coefficient of determination	0.525	The adjusted coefficient of determination		0.426
F statistic	5.344	p-value (F statistic)		0.000

source: the research findings

The p-value of the F-test is 0.000 (less than 0.05); thus, the model is significant, and there is a linear relationship between the dependent and independent variables. The R-squared equals 0.525, which shows that nearly 52 percent of changes in the variable of the revaluation of fixed assets are explained by independent variables, and the rest is affected by other factors that are not reviewed in this study.

Table 21. The results of estimating the second model of research in the TSE (considering the effects of the inflation rate)

$$FAR_{it} = \beta_0 + \beta_1 LEV_{it} + \beta_2 LIQ_{it} + \beta_3 FS_{it} + \beta_4 TFS_{it} + \beta_5 FG_{it} + \varepsilon_{it}$$

variable	the estimated coefficient	standard error	t statistic	p-value
Intercept	-0.417	0.033	-12.492	0.000
Financial leverage inflation rate	0.128	0.017	7.169	0.000
Liquidity inflation rate	0.045	0.005	8.302	0.000
Firm size inflation rate	0.172	0.023	7.224	0.000
Fixed assets ratio inflation rate	0.015	0.012	1.212	0.000
Firm growth inflation rate	0.196	0.017	11.529	0.001
The coefficient of determination	0.554	The adjusted coefficient of determination		0.462
F statistic	6.020	p-value (F statistic)		0.000

source: the research findings

The p-values of t statistics of independent variables equal 0.000 (less than 0.005), and all are positive and significant. Therefore, financial leverage, liquidity, firm size, fixed assets ratio, and firm growth, considering the inflation rate, have positive and significant effects on the revaluation of fixed assets; that is, with the increase in each of these variables, the revaluation of fixed assets of companies listed on the TSE increases; thus, hypotheses 1-2 to 5-2 are accepted at the 95 percent confidence level. Moreover, the p-value of the F–test is 0.000 (less than 0.05), thus, the model is significant. The

R-squared equals 0.554, i.e., nearly 55 percent of changes in the fixed-asset revaluation variable are explained by independent variables. The rest is affected by other factors that are not investigated in this study.

Therefore, without considering the role of the inflation rate in the companies listed on the TSE, there are positive and significant relationships between financial leverage, liquidity, firm size, fixed assets ratio, firm growth, and the revaluation of fixed assets. Furthermore, considering the role of the inflation rate in the companies listed on the TSE, the inflation rate moderates the relationships between financial leverage, liquidity, firm size, fixed assets ratio, firm growth, and fixed asset revaluation. The findings of the present study are consistent with the studies of Nurjannah (2013) and Iatridis and Kilirgiotis (2012). Also, the findings are consistent with Solikhah, Hastuti, and Budiyono (2020)concerning financial leverage but inconsistent regarding liquidity, firm size, the sensitivity of fixed assets, and firm growth.

4.2.2. Hypotheses testing in the BSE

The p-value of the F-test is 0.000 (less than 0.05); thus, the model is significant. The R-squared equals 0.465; that is, independent variables explain nearly 46 percent of changes in the variable financial leverage, and the rest is affected by other factors that are not investigated in this study. According to the results presented in Table (22), the p-value of the t-statistic of financial leverage, liquidity, firm size, fixed assets ratio, and firm growth equals0.000 (less than 0.05), and its coefficient is positive and significant. Thus, financial leverage, liquidity, firm size, fixed assets ratio, and firm growth, considering the inflation rate, have positive and significant effects on the revaluation of fixed assets; that is, with the increase in each of these variables, the fixed asset revaluation of companies listed on the BSE increases; thus, hypotheses 1-1 to 5-1 are accepted at the 95 percent confidence level.

Table 22. The results of estimating the first model of research in the BSE (without considering the effects of the inflation rate)

$$FAR_{it} = \beta_0 + \beta_1 LEV_{it} + \beta_2 LIQ_{it} + \beta_3 FS_{it} + \beta_4 TFS_{it} + \beta_5 FG_{it} + \varepsilon_{it}$$

variable	the estimated coefficient	standard error	t statistic	p-value
Intercept	-0.074	0.062	-1.201	0.030
Financial leverage	0.229	0.033	6.857	0.000
Liquidity	0.070	0.010	6.891	0.000
Firm size	0.082	0.044	1.840	0.006
Fixed assets ratio	-0.002	0.024	-0.373	0.008
Firm growth	0.027	0.012	2.187	0.029
The coefficient of determination	0.465	The adjusted coefficient of determination		0.355
F statistic	4.212	p-value (F statistic)		0.000

source: the research findings

The p-value of the F-test is 0.000 (less than 0.05); thus, the model is significant. The R-squared equals 0.573; that is, independent variables explain nearly 57 percent of changes in fixed asset revaluation in the BSE; the rest is affected by other factors that are not investigated in this study. Therefore, without considering the role of the inflation rate in the companies listed on the BSE, there are positive and significant relationships between financial leverage, liquidity, firm size, fixed assets ratio, firm growth, and the revaluation of fixed assets.

Table 23. The results of estimating the second model of research in the BSE (considering the effects of the inflation rate)

$$FAR_{it} = \beta_0 + \beta_1 LEV_{it} + \beta_2 LIQ_{it} + \beta_3 FS_{it} + \beta_4 TFS_{it} + \beta_5 FG_{it} + \varepsilon_{it}$$

variable	estimated coefficient	standard error	t statistic	p-value
Intercept	-0.351	0.033	-10.362	0.000
Financial leverage inflation rate	0.050	0.017	2.901	0.003
Liquidity inflation rate	0.057	0.020	2.833	0.004
Firm size inflation rate	0.419	0.072	5.794	0.000
Fixed assets ratio inflation rate	0.042	0.005	8.081	0.000
Firm growth inflation rate	0.160	0.021	7.289	0.000
The coefficient of determination	0.573	The adjusted coefficient of determination		0.483
F statistic	6.359	p-value (F statistic)		0.000

source: the research findings

Moreover, considering the role of the inflation rate in the companies listed on the BSE, the inflation rate moderates the relationships between financial leverage, liquidity, firm size, fixed assets ratio, firm growth, and fixed asset revaluation. The research findings are consistent with Iatridis and Kilirgiotis (2012). The findings are consistent with Solikhah, Hastuti, and Budiyono (2020) for financial leverage but inconsistent regarding liquidity, firm size, fixed asset sensitivity, and firm growth.

5. Conclusion

Many researchers have considered forecasting accuracy as the quality of accounting information in recent years. Suppose accounting items are recorded at their historical costs and are not adjusted to their fair values when an economy is experiencing inflation. In that case, ambiguity will arise as to whether the provided financial statements have the required qualitative characteristics for the right decision-making of shareholders. This study attempted to measure and compare some of the major historical and inflation-adjusted financial statement ratios by employing two appropriate models. Thus, the main issue is the existence of ambiguity about the quality of the accounting information of financial statements based on historical costs in an inflationary economy and its association with the asset revaluation practices of firms. The present study results showed that financial leverage, liquidity, firm size, fixed assets ratio, and firm growth, without considering the role of the inflation rate, are positively and significantly related to asset revaluation. Also, considering the role of the inflation rate, financial leverage, liquidity, firm size, fixed assets ratio, and firm growth have positive and significant relationships with asset revaluation. In other words, if firms have high financial leverage, liquidity, fixed assets ratio, growth, and size, they are highly likely to revalue their assets.

Suggestions based on the research hypotheses

Speculation, misconceptions, and investors' lack of knowledge about the capital increase, the prevailing market and industry conditions, and emotional reactions are why there is a difference between theoretical analyses and investors' decisions. When making decisions, especially long-term investment decisions, investors should completely and thoroughly review a firm's financial information and forecasts and consider the effect of capital increase from asset revaluation surplus on the firm's current and future financial position. Inflationary conditions and currency fluctuations in Iran have made it difficult to match historical financial information to economic realities. Standard 11 (tangible fixed assets) has suggested a solution for tackling this issue by allowing the selection of one of the historical cost or revaluation models; however, asset revaluation has not been widely used

as depreciation expenses are not deductible to the provisions of the direct taxes law. In recent years, regulators have encouraged revaluation through tax exemption. Still, the complexity of the process, the time limitation, the gradual withdrawal, and the tax exemption's future did not lead to public acceptance. If in Iran, similar to many countries of the world, the revaluation surplus was tax-free, firms' financial reporting would be more relevant and of higher quality, and firms would undertake asset revaluation more frequently. Currently, the market values of firms' assets are considerably different from their book values. Considering that the true value is not indicated in its financial statements, asset revaluation can improve the transparency and relevance of financial statements. Firms would be more willing to use the revaluation model, provided that the revaluation surplus was subject to tax exemption

In the current situation, accountants should offer proper solutions for reducing the accounting profit error caused by applying the historical cost model to maintain firms' capital and power. According to the direct taxes law, state-owned firms' fixed asset revaluation surplus is not subject to income tax and other taxes. Therefore, state-owned firms revalue their assets without any concern over the tax consequences of revaluation. To facilitate the process of revaluation, it is suggested that tax exemptions be considered for revaluations. Moreover, it is suggested that other firms also change their view on asset revaluation and improve the quality of financial reporting considering the inflationary conditions of Iran.

Further to the study

1) Future research could examine the effect of tax cut policy on the relationship between the revaluation of fixed assets and the future performance of companies listed on the TSE and BSE, emphasizing the role of inflation.
2) Moreover, it would be interesting to investigate the role of asset revaluation on other variables such as audit quality, earnings quality, financial reporting lag, value communication, information content, share price, and leverage of the companies listed on the TSE and BSE.
3) Further studies should be conducted to examine the effect of the revaluation of fixed assets on the timeliness and relevance of information disclosed in the financial reports of the companies listed on the TSE and BSE, emphasizing the role of inflation.

Research limitations

As with most studies, the present study is subject to some limitations. First, this study's systematic removal sampling method led to the removal of some industries, such as financial intermediation; thus, generalizing the results to all the industries should be done with caution. Second, research hypotheses were tested using a dummy variable instead of revalued amounts owing to the small number of revaluations during the research period. Third, it was not possible to use the one year ago and one-year headsets because of the small number of observations and the different times of firms' asset revaluations.

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RESEARCH ARTICLE

Market Fragility and Stock Returns: Evidence from Tehran Stock Exchange

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Abstract

Recognising and investigating stock return behaviour has always been one of the most critical issues in scientific and investment communities. In recent years, factor models have been used in many studies related to stock return prediction. This research is based on a six-factor model, including the Fama-French five-factor model plus the market fragility factor. The explanatory power of this model has been examined in the Tehran securities market from 2009 to 2018 for 117 companies. The results show that the explanatory power of the six-factor model is better than the Fama-French five-factor model in the Iranian capital market. The results also suggest that market fragility has a significant negative relationship with stock returns. Policymakers can consider this result in financial and investment issues and people interested in this issue.

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1. Introduction

High wandering liquidity and willingness to make a profit and the greater familiarity of major and small investors with financial markets in recent years have increased individuals' willingness to invest in the stock market and have guided these funds toward financial markets (Ramezani and Kamyabi, 2017). In this regard, the correct pricing of capital assets can provide suitable conditions for investors to enter the investment area with confidence and accept the risk of this type of investment. Based on financial literature, the true value of an asset is determined by its risk and return. An asset with lower risk is selected among different investment options with the same return. Risk refers to the conditions that lead to the real return on assets being different from the predicted return (Hadian, Hashemi and Samadi, 2017). Explaining the relationship between risk, return, and pricing of capital assets has been a topic that has become the dominant paradigm of capital markets in recent decades. Their goal is to increase the accuracy of predicting the expected return and reduce the inconsistencies proposed in previous models (Ramazani and Kamyabi, 2017). Over the last years, various studies have investigated the factors affecting investment risk, and various variables such as market factor, book value to market value, etc., have been introduced as risk factors (Hadian, Hashemi and Samadi, 2017). After presenting the 3-factor and 5-factor Fama French models, the researchers have tried to add a new variable to the 5-factor Fama French model. To help investors and other users, the present study added one variable of market fragility to Fama–the French five-factor model to examine the model presented in the Iranian stock exchange markets .Moreover, the relationship between the market fragility rate variable and the stock returns will be examined. The second hypothesis tests the impact of market fragility on stock returns. As mentioned before, market fragility can occur due to various factors in the capital market. It is expected that the presence of this factor in the capital market of society can affect stock returns. As a result, analysts, investors and firm managers should be aware of the effect of market fragility on stock returns. This awareness can help investors and analysts determine stock returns and help managers foresee the company's stock value. Also, confirming the higher analysis power of the 6-factor model by adding a market fragility variable to the 5-factor model can provide a more effective model for measuring stock returns. Due to the lack of research to investigate the relationship between market fragility and stock returns, the second hypothesis of this research was developed. There are two main questions in this research. First, will adding the market fragility variable to the Fama-French model improve the valuation of the capital assets of this model compared to the 5-factor model? Second, is there a significant relationship between the market fragility rate variable and the stock returns?

2. Literature Review and Hypothesis Development

Estimating returns based on variables that are easy to estimate has become an interesting topic for research since it determined that stock returns play a vital role in the decisions of market participants. The first models presented to estimate returns date back to the 1960s when Markowitz's (1952) theory of securities attracted the attention of researchers (Fan and Yu, 2013). The capital asset pricing model (CAPM) was the first model introduced by Sharpe (1964) to estimate returns. In this model, it is assumed that the return of each portfolio results merely from systematic risk (Beta), which is known as the single-factor model (Salehi and Salehi,2016).

Fama and French (1992) provided evidence of experimental failures of the capital asset pricing model. Using cross-sectional regression, they confirmed that firm size, profit to price ratio, book value to market value, and market beta are crucial in describing expected returns. They also emphasised a significant relationship between the mean return and beta of stocks. Many studies have examined the Fama-French model and its development; we refer to some of them here. For example,

Abbasian, Tehrani and PakdinAmiri (2021) examined the adjusting effect of market leverage on the explanatory power of the Fama-French model. They found that, by examining the three-factor model, the effect of market factor and size is significant, and the effect of value factor is not significant. Also, their results based on the test of the adjusted three-factor model and considering the market leverage in its calculation indicate that the effect of market factors, value, and size is significant. In both tests, the effect of the market factor is significant and direct, and the effect of the size factor is significant and indirect. Also, the results of their study indicate that the value of the adjusted coefficient of determination in the adjusted three-factor model is higher than the three-factor model and the addition of market leverage improved the model explanation.

Mirzaei, Khani and Botshekan (2020) expanded asset pricing factor models using the company life cycle. They used the data of companies listed on the Tehran Stock Exchange and OTC between 2004 and 2018 and various test assets in the form of portfolios arranged according to the different characteristics of the companies. The results showed that the expanded models have a better performance in explaining the difference between the stock returns of companies (test assets) compared to the conventional models, and this difference in performance in terms of explanatory power was more evident for test assets formed using the company life cycle than the test assets formed without using the company life cycle. Hou, Xue, and Zhang (HXZ) (2015) proposed a four-factor model known as the q-factor model in 2004. Explanatory variables of this model are beta, firm size, return on equity and investment. In this model, return on equity (ROE) is the difference between the mean return of stocks with high profitability and the mean return of stocks with low profitability. Also, the investment factor (IA) is the difference between the mean return of the stocks with conservative investment and the mean retunes of stocks with bold investment (Hou, Xue, and Zhang 2015). After developing the q-factor model, they added this model's return on equity and investment to their three-factor model and named their new model as Fama-French five-factor model. Therefore, in the Fama-French five-factor model, the explanatory variables are beta, firm size, the ratio of book value to market value, return on equity, and investment.

Fama and French tested their new model and concluded that it could explain changes in stock returns between 69 and 93 percent of cross-sectional changes in expected returns for portfolios of size, B/M, return on equity and investment (Fama-French, 2015). Evaluating the predictive power of the proposed models (alone or by adding a new variable) has always been one of the questions of researchers. Hadian, Hashemi and Samadi (2017) investigated the effect of financial constraint factors on the ability to explain stock returns by the Fama-French three-factor model, Carhart four-factor model, and Fama-French five-factor model. In this study, the effect of financial constraints on the ability to explain stock returns was examined by Fama-French three-factor model, the Carhart four-factor model, and the Fama-French five-factor model. The financial constraint indicator of the company has been estimated using rank-ordered logit regression. The statistical sample consisted of 120 companies listed on the Tehran Stock Exchange from 2008 to 2015. The research results suggest that the stock returns of companies with financial constraints move in line with each other, meaning that financial constraints represent a common and systematic risk dimension. Also, by adding the financial constraint factor to the Fama-French three-factor model and the Carhart four-factor model, the power of these models to explain stock returns increases, but no evidence was found that adding the financial constraint factor to Fama-French five-factor model increases its ability to explain stock returns. Babalooyan and Mozafari (2016), in a study entitled "Comparison of the predictive power of the Fama-French five-factor model with the Carhart four-factor model and HXZ q-factor model in explaining stock returns, showed that, in using the monthly information of companies listed on the

Tehran Stock Exchange from 2010 to 2014, the ability of Fama-French five-factor model to explain stock returns is more than Carhart and HXZ models and showed that, unlike the results of Fama-French in US stock exchanges, the value factor (HML) in the Tehran stock exchange is significant.

The results suggest that among the beta factors, size, value, the tendency to past performance (momentum), return on equity, and investment, momentum and investment in the Tehran Stock Exchange do not affect stock returns. In another study, Ramezani and Kamyabi (2017) examined the explanatory power of stock returns by the six-factor model and compared it with the Fama-French five-factor, Carhart four-factor, and HXZ q-factor models in explaining the expected return on stocks. The results of the research using the monthly data of companies listed on the Tehran Stock Exchange during 2001-2005 showed that the ability to explain stock returns by the Fama-French five-factor is more than the Carhart four-factor, and HXZ q-factor models and increasing the momentum factor did not increase the model's explanatory power. In contrast to the results of Fama-French in US stock exchanges, the value factor (HXZ) is significant in Tehran Stock Exchange and is not known as a redundancy factor. Also, adding two investment and return on equity factors to the model significantly increases its explanatory power.

Dirkx and Peter (2020) concluded that the 6-factor model compared to the 3-factor model does not provide any justifiable superiority. Considering the importance of predicting stock returns, efforts continue to provide models with a higher ability to explain changes in stock returns. With the increasing attention to capital markets in recent years, investigating the factors affecting stock returns has become one of the most important and controversial topics in financial management. Gharibnia et al. (2018) examined firm size as one of the factors affecting stock returns. In this study, among the companies listed on the Tehran Stock Exchange, 70 companies were selected from 2008 to 2015. In previous studies in which the Fama-French multifactor model has been used, the relationship between firm size and stock returns was examined as a simple linear relationship. In contrast, this relationship may not be linear. In this study, by adding the square of the firm size factor to the Fama-French models, the hypothesis of a non-linear relationship between firm size and stock returns was tested. The model estimation results showed that the coefficients of firm size and squared firm size variables are positive and negative, respectively, and statistically significant. The non-linear relationship between the firm size and stock returns in the Tehran Stock Exchange is confirmed. Hajiannejad, Izadinia and Ebrahimi (2014) showed that multifactor models are more appropriate than the one-factor capital asset pricing model. The study results also showed that the Carhart four-factor model does not have a comparative advantage over the Fama-French three-factor model. Among the variables of premium risk, market, size, and momentum, only two variables (premium risk and size) affected stock returns. Also, due to the recent financial crisis and the effect of financial falls on investors' wealth, many studies have proposed new variables that can predict the probability of market crash or acute events, including the market fragility index. Bauguess (2017) argued that no rule we contemplate today could prevent future market stress events. Still, the timely collection of current market information and practices will enable both regulators and the market participants they monitor to more clearly assess and respond to emerging and ongoing risks in the industry using accurate and reliable data. Various factors can lead to market fragility. Some examples are as follows: Raman et al. (2020) stated that the withdrawal of algorithmic traders has a significant propensity to generate feedback loops that can make markets more "fragile". Specifically, they found that a reduction in algorithmic trading or algorithmic liquidity provision significantly increases the probability of extreme market conditions. The potential for fragility is further exacerbated by the fact that

algorithmic traders in a stock withdraw significantly from that stock even in the absence of stressful conditions when another similar-sized stock experiences an extreme event. Thus, withdrawal of algorithmic traders displays significant contagion and correlation across stocks, even when stressful market conditions do not. Moreover, Kozhan et al. (2021) found another source of market fragility. They showed that liquidity providers' portfolio inventory management was also potentially a source of market fragility. In addition, the likelihood and the number of extreme volatility episodes significantly increase with the magnitude of aggregate correlated portfolio inventories and decrease with the dispersion of these correlated portfolio inventories across different VLPs[1]. Choi (2014) believes that easing credit constraints remains the most effective means of achieving financial stability in a small open economy, and comprehensive efforts are essential. so easing credit constraints is essential to maintain market stability. In addition to the market fragility variable, stock price fragility has also been investigated by researchers. Francis et al. (2021) showed a positive relationship between stock price fragility and bank loan cost. They argued that this relationship is manifested more especially when lenders consider more value to institutional shareholders as a regulatory factor in the company or when loans rely on information received through existing relationships with the company. Rajizade et al. (2021) concluded a positive and significant relationship between stock fragility and the speed of stock price convergence. The market fragility index is the market sensitivity to a shock to the market that manifests itself in the market index. Lin and Guo (2019) considered the market fragility a factor of stock price volatility in the face of regional shocks and tensions. They have considered the study of large shareholders' data as a reasonable indicator for identifying the potential for systematic fragility in their listed companies. In addition to the mentioned studies, Koulovatianos, Li and Weber (2018) concluded that market participants had prioritised corporate stocks to invest instead of bonds. However, instead of observing higher bond rates, paradoxically, the stock has been completely negative since the fall of Leman-Brothers. This increase in market fragility can lead to a decline in bonds and the tendency to buy stocks and dividends. Sensoy Ozturk and Hacihasanoglu (2014) proposed a new framework for constructing a financial fragility index by combining the five main variables in developing countries using principal component analysis and dynamic conditional correlation. The study's main result was the creation of financial fragility index at different times for emerging economies such as Turkey. Bernoth and Pick (2011) reported a close relationship between companies operating in the banking and insurance industries and the importance of proposing a new framework.

Sandhu, Georgiou and Tannenbaum (2015) concluded that the fragility or ability of the system to fail in the face of accidental turbulence is negatively related to the geometric concept of Ricci curvature. Berger and Pukthuanthong (2012) showed that the high levels of fragility index presented indicated a significantly higher probability of market crash among many countries. They argue that the risk measure presented by them reflects the periods in itself, and, in case of any shock during these periods, the greatest harm can be expected. In other words, they argue that the mentioned shock effect can be at its highest during periods of high fragility. The key point is that fragility alone does not necessarily lead to a crash. In this framework, the occurrence of the crash can depend on the fragile system and the occurrence of shock (Berger and Pukthuanthong, 2012).

Berger and Pukthuanthong (2016) combined their fragility risk measures with a number of economic variables that identify periods of market stress. These periods can be considered periods of

[1] voluntary liquidity provider

market turmoil in which shocks are most likely to occur. It is argued that the intersection of increasing fragility, reflecting a system's vulnerability to shock, will precede many market failures by increasing market stress, which indicates a potential shock. The results of the new risk measure show that before moving to conservative investment, in which prices are adjusted for risk innovations, the risk measure increases. These results suggest that the intersection of fragility and market stress is strongly correlated with the mean of subsequent weak conditional returns. They showed that neither fragility nor market stress included combined risk measure information. Koulovatianos et al. (2018) explained that it is crucial to avoid misinterpreting seemingly good market trends as market robustness at times of underlying market fragility. Market fragility always implies weaker investment in the real economy. This weakness alters the effects of planned fiscal and monetary policies.

It can be concluded that adding and examining newer variables can change the reliability of the 5-factor Fama French model (Roy, 2021; Roy and Shijin, 2018). Therefore, in this research, market fragility is added to the model as a surplus variable to examine its effects on the original model. In addition, when the market is fragile, stock returns can increase or decrease. Therefore, in addition to comparing the 5-factor and 6-factor models, this study also examines the relationship between market fragility and stock returns. In case of a shock to the market, investors or companies may make irrational decisions that could affect the market and future stock returns. The point is that since the Iranian market has faced severe economic sanctions in recent years, most Iranian firms have had financial problems (Salehi, Tarighi and Rezanezhad, 2019). Regardless of the political factors and sanctions that have affected Iran's economy and its capital market, there are many similarities between Iran's economy and other emerging countries, including inflation rate, unemployment rate, economic growth rate, mono-productivity, and low labour cost and so on. It can be concluded that these factors, in addition to companies, also affect the capital market and sometimes cause market fragility. These factors make it possible to generalise the results of this study to similar countries.

The results of the mentioned studies led the researcher to add a market fragility variable to the Fama-French five-factor model and present a six-factor model and compare it with the Fama-French five-factor model to provide a model that can have more explanatory power so that the shareholders, market participants, and the officials can make better decisions using it and provide more public welfare with economic growth and prosperity.

Based on the theoretical foundations and background of the studies and according to the aim of this study, the hypotheses of this study are presented as follows:

Hypothesis 1: The six-factor model can better explain the stock returns of companies than the five-factor model.

Hypothesis 2: There is a significant relationship between the market fragility rate variable and the stock returns of companies.

3. Research Methodology

The present study is applied in terms of aim and is correlational. This study uses a deductive-inductive approach and is one of the regression analyses among all types of correlational research. The data used in the present study are real and historical information, so the present study can be considered a post-doc analysis. The statistical population of the present study included all companies listed on the Tehran Stock Exchange from 2009 to the end of 2018. A systematic elimination method was used to determine the statistical sample. For this purpose, 117 companies were selected to estimate the models and test the research hypotheses. Their data have been reviewed monthly for ten years. In other words, the final sample consisted of 14040 companies-months. Also, to develop the

theoretical foundations of research, the library method was used. The information provided on the Central Bank and financial statements submitted to the Stock Exchange Organization and other related information such as Tadbir Pardaz and Rahavard-e Novin databases collected the desired data.

3.1. Research model and variables

To test the hypotheses in this study, two multivariate regression equations were developed as follows:

The first model was derived from the Fama-French five-factor model (2015):

$$R_i - R_f = \alpha_0 + \beta_1(R_m - R_f) + \beta_2 SMB_{it} + \beta_3 HML_{it} + \beta_4 RMW_{it} + \beta_5 CMA_{it} + \varepsilon_{it}$$

The second model, in which fragility was added to examine our hypotheses, was derived from the Berger and Pukthuanthong model (2016; 2012).

$$R_i - R_f = \alpha_0 + \beta_1(R_m - R_f) + \beta_2 SMB_{it} + \beta_3 HML_{it} + \beta_4 RMW_{it} + \beta_5 CMA_{it} + \\ + \beta_6 fragility_{it} + \varepsilon_{it}$$

To test the first hypothesis, the first and second models were compared. Then, the second model was used to test the second hypothesis.

Where the variables are defined in this way:

Market premium risk factor (Rm-Rf): Surplus of the return expected from the market portfolio relative to the risk-free rate of return

Size factor (SMBit): The difference between the returns of portfolios consisting of large corporate stocks and portfolios consisting of small corporate stocks

Book value to market value ratio (HMLit): The difference between the return on a portfolio consisting of stocks of companies with a high book value to market value ratio and low book value to market value

Return on equity factor (RMWit): The difference between stock portfolio returns with a strong return on equity and stock portfolios of companies with low return on equity.

Investment factor (CMAit): The difference between the stock portfolio returns with high investment and the stock portfolio of companies with low investment. Fama and French believe these companies have conservative and bold strategies.

This variable was derived from the research conducted by Berger and Pukthuanthong (2016).

Fragility: Fragility is the market's sensitivity to a shock the market that manifests itself in the market index.

$\text{Fragility}_{i,t} = \text{FI} \quad \rightarrow$ Fragility Index

To obtain fragility, the regression of monthly surplus return for each industry is calculated relative to the mean market return during the t-1 month and the t-12 to t-1 months.

4. Research Findings

4.1. Descriptive research statistic:

Descriptive statistics provide an overview of the status of research data distribution. Descriptive statistics related to research variables are presented in Table (1).

Table 1. Descriptive statistics of research variables

Description	Mean	Median	Max	Min	SD	Skewness	Kurtosis	Number of observations
Investment factor	0.003	0.500	0.500	-0.500	0.500	-0.013	1.000	14040
Book value to market value factor	-0.238	-0.500	0.500	-0.500	0.439	1.083	2.174	14040
Stock return	3.337	-0.150	313.403	-55.490	16.281	2.997	26.083	14040
Markey premium risk factor	1.447	1.083	66.509	-31.262	3.471	6.606	155.152	14040
Return on equity factor	-0.146	-0.500	0.500	-0.500	0.478	0.611	1.374	14040
Size factor	0.137	0.333	0.333	-0.333	0.303	-0.903	1.816	14040
Fragility factor	0.915	-0.732	1.055	-5.427	0.912	-1.235	5.453	14040

Source: Research findings

Table 1 presents the descriptive statistics on the research variables. It shows the descriptive parameters for each variable separately. These parameters mainly include information about central indices, such as maximum, minimum, mean and median, and dispersion indices, such as standard deviation. The most critical central index is the mean, which indicates the distribution's balance point and center of gravity. It is a good index to show the centrality of the data. For example, the mean of the fragility variable is -0.915, indicating that most of the data on this variable are centred on this point. In general, dispersion parameters are the standard for determining the degree of dispersion of data with each other or their dispersion relative to the mean. One of the most important dispersion parameters is the standard deviation. For example, the value of this parameter for the fragility variable is 0.913. The Descriptive statistics of this research are consistent with Barvels (2015), Martins, and Eid (2015) and inconsistent with Acaravci and Karaomer (2017).

4.2. Testing the normality of research variables

In this research, the ordinary least squares method is used to estimate the model parameters. The results of the Jarque-Bera test for the dependent variable are presented in Table 2.

Table 2. Jarque-Bera statistics for research dependent variables

Normality test	RI_RF
Jarque-Bera	7.514909
Significance	0.000
Number of observations	14040

Source: research findings

Based on Table 2, since the value of the Jarque-Bera statistic is smaller than the significance level of 0.05, the variables are not normal. Hence, the data should be transformed by appropriate statistical methods. In this project, Box-Cox transformation in Minitab software was used. As shown below, the Jarque-Bera test was performed again on the transformed data.

Table 3. Jarque-Bera statistic for research dependent variable after normalisation

Normality test	RI_RF
Jarque-Bera	3.332735
Significance	0.000
Number of observations	14040

Source: research findings

The dependent variables gained from the mentioned methods were somewhat close to the normal distribution. Due to the non-normality of stock exchange data, the central limit theorem was used in this study due to the large sample size (N> 30) and the high number of observations. Based on the central limit theorem, it can be concluded that when the base volume in the sampling is larger, the variance among the samples will be less. The mean distribution of the sampled populations will be closer to the normal distribution. The normality of the desired distribution increases with an increasing number of replications (n) (Badri and Abdolbaghi, 2011).

4.3. Testing the stationarity of variables (unit root)

The Phillips Perron unit root test was used to examine the research variables. If the time series used in the regression are not stationary, we may experience false regression. The Phillips Perron unit root test for the study variables is given below.

Table 4. Examining the stationarity of variables

Variable	Phillips Perron test		Result
	Statistic	sig	
CMA	530.3540	0.000	Stationary
FRAGILITY	275.515	0.000	Stationary
HML	390.4579	0.000	Stationary
RI_RF	570.7234	0.000	Stationary
RM_RF	933.498	0.000	Stationary
RMW	740.7124	0.000	Stationary
SMB	13.1607	0.000	Stationary

Source: research findings

The results of Table 4 show that the probability value of all tests is less than 0.05 for all variables, indicating that all research variables are stationary.

4.4. Collinearity of variables

In linear econometrics, collinearity occurs when two or more explanatory (independent) variables in a multivariate regression are highly correlated. The correlation coefficient was used to investigate the collinearity among the explanatory variables in this study. The results are shown in Table 5.

The maximum absolute value of the correlation coefficient among the variables is 0.674, and other values are small, indicating no high collinearity between the explanatory variables.

4.5. Testing the research hypotheses

Model recognition test

The type of estimation method should first be determined to estimate the model related to hypotheses. Therefore, Chow's (F-Limmer) statistic is calculated to determine whether the pooling or panel data methods should be used.

Table 5. Value of correlation coefficient

	RIRF	RMRF	SMB	HML	RMW	CMA	FRAGILITY
RIRF	1.000						
RMRF	0.089	1.000					
SMB	-0.039	0.008	1.000				
HML	0.173	0.038	0.101	1.000			
RMW	0.674	0.073	-0.035	0.193	1.000		
CMA	0.010	0.005	-0.047	0.332	0.096	1.000	
FRAGILITY	-0.318	-0.281	0.105	-0.136	-0.260	-0.044	1.000

Source: research findings

Table 6. F-Limmer test results

Model	F-Limmer statistic	df	p-value	result
Firs model	1.822	(116.139)	0.000	Panel method
Second model	1.669	(116.139)	0.000	Panel method

Source: research finding

Considering that the p-value in both models is less than the error level of 0.05, the null hypothesis of this test, which states that the pooling method is preferred over the panel method, is rejected, and the panel method is preferred for estimation. The intercept must be considered for the equation.

Estimation of the model with fixed or random-effects model:

The panel method should test the fixed-effects model versus the random-effects model. The Hausman test is used for this purpose.

Table 7. Hausman test results

Model	Hausman statistic	df	p-value	result
First model	140.517	5	0.000	Fixed effects
Second model	193.642	6	0.000	Fixed effects

Source: research findings

Since the significance value of the Hausman test for both models is less than the error level of 0.05, the null hypothesis based on equation estimation by random effects is rejected. The models should be estimated using fixed effects.

Model estimate

Autocorrelation test

The autocorrelation test is one of the classical regression assumptions.

Table 8. Estimation of the first research model

Variable	Y= RI_RF Coefficient	Statistic t	p-value
RM_RF	0.199	3.155	0.001
SMB	-0.825	-1.186	0.235
HML	3.723	6.952	0.000
RMW	22.75	21.735	0.000
CMA	-2.703	-5.468	0.000
C	7.416	12.980	0.000
Model general fit	R^2=0.471 Adjusted R-squared= 0.467 F= 102.802 Prob (F)= 0.000 D.W= 1.925		

Durbin-Watson statistic is a test statistic used to examine the existence of autocorrelation between residues in regression analysis. The results of estimating the regression model of both models are reported in Tables 8 and 9. The model estimation results and F significance level are less than 0.05, indicating that the input variables, including control and independent variables, are significant at the 95% confidence level and suitable model fit.

Results of testing the first research hypothesis

In the five-factor model (second model), the value of the Adjusted R square is 0.467355, the F-statistic of the test is 102.8027, and its significance value is 0.000, which is less than the error level of 0.05, indicating that the regression model is significant. The value Adjusted R square indicates how much of the dependent variable of stock returns can be explained by independent variables. Independent variables can explain 47% of the dependent variable changes in this case.

Table 9. Estimation of the second research model

variable	Y= RI_RF		
	Coefficient	Statistic t	p-value
RM_RF	0.037	3.666	0.000
SMB	0.142	0.199	0.841
HML	3.162	6.589	0.000
RMW	21.703	22.837	0.000
CMA	-2.613	-5.215	0.000
FRAGILITY	-2.639	-5.283	0.000
C	4.841	11.614	0.000
Model general fit	R^2=0.489 Adjusted R-squared= 0.485 F= 109.451 Prob (F)= 0.000 D.W= 1.996		

Source: research findings

In the six-factor model (second model), the value of the Adjusted R square is 0.485187, and the F-statistic of the test is 109.4516. Its significant value is 0.000, less than the error level of 0.05, indicating that the regression model is significant. The Adjusted R square indicates how much of the dependent variable of stock returns can be explained by independent variables. Independent variables can explain 49% of the dependent variable changes in this case. Thus, according to the research findings, the adjusted R square and F-statistic values in the six-factor model are larger and more robust than in the five-factor model. It can be stated that the six-factor model can be better than the five-factor model of stock returns of companies listed in Explain the Iranian stock market, and the first hypothesis is confirmed.

Results of testing the second research hypothesis

In the third model, the coefficient of the effect of the independent variable of fragility on the dependent variable of stock return (RI_RF) is -2.639086, and the t-test statistic is -5.283131, whose absolute value is greater than the critical value of t at the error level of 5%. It means that the observed coefficient is significant. The significance value is also 0.0000, smaller than the error level of 0.05 and confirms the above finding. Thus, it can be stated that, with a 95% probability, there is a significant negative relationship between the fragility rate variable and the stock returns of companies listed on the Iranian stock market, and the second hypothesis is confirmed.

5. Conclusion

After the financial crisis of 2007 and 2009, many studies proposed measurement criteria that could predict the phenomena of crash or development. In the model presented in the research, stock returns are calculated based on market fragility. The results suggest that fragility has a significant negative relationship with stock returns, indicating that market returns are sensitive to shocks in the stock market. In other words, with increasing market fragility, stock returns decrease, which might be due to psychological issues related to the personality type of investors in Iran. These results are in line with those of studies conducted by Bernoth and Pick (2011), who studied fragility in the banking and insurance industry and Sensoy, Ozturk and Hacihasanoglu (2014), who studied fragility index in the emerging economies of Turkey, Zaremba and Konieczka (2013), Berger and Pukthuanthong (2016), Pukthuanthong and Roll (2009), Lin and Guo (2019), Sandhu, Georgiou, and Tannenbaum (2015) who examined the fragility of the market.

The F-statistic of the models shows that both models are generally significant, but what is essential is the coefficient of determination of each model, which is 47% in the Fama-French five-factor model and 49% in the Fama-French five-factor model six-factor model presented. Hence, the six-factor model has more explanatory power than the Fama-French five-factor model. This result aligns with the outcome of research conducted by Abbasian, Tehrani and PakdinAmiri (2021) and Mirzaei, Khani and Botshekan (2020). Hence, even though there is relative evidence that liquidity risk can affect and explain returns by liquidity, policymakers and economic officials of the country should set rules to inform listed companies on the economic events in the area of releasing additional information. The stock exchange organisation can also play an essential role in the effectiveness and efficiency of information in creating suitable conditions for making optimal economic decisions by actual and potential investors by paving the way for designing and implementing relevant information disclosure.

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RESEARCH ARTICLE

The Effect of Auditor's Characteristics on the Future Stock Price Crash Risk

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Abstract

Negative skewness is among the features of crash risk that finally result in more volatility in the negative return. The contributing factors to stock price crash risk spread at the firm level, but the agency cost brings about information asymmetry. Should the information asymmetry between managers and investors be high, negative news about the firms would not transfer to the capital market on time, so when negative information holding passes the threshold, it will spread rapidly in the market and causes a drop in the stock price. According to the empirical observations, corporate governance is designed to decline agency cost and stock price crash risk. Hence, we can consider the auditors as a type of corporate governance effective in reducing agency costs and information asymmetry, so the objective of the present study is to assess the effect of auditor's characteristics on future stock price crash risk. To reach the study's objective, 90 listed firms on the Tehran Stock Exchange were analyzed for 9 years from 2011 to 2019 using the descriptive-correlation analysis method and the multivariate regression test. The results of this study proved a significant and negative relationship between the auditor's characteristics (such as consistency in the unqualified opinion and improved audit opinion) and the risk of the stock prices crash in the future. These findings reinforce the role of the audit report in evaluating the reliability of financial reporting and verifying that the auditor's opinion impacts the market analysis. The results also show that the market can distinguish between the various types of auditors' opinions. Also, they show a negative and significant relationship between an auditor's characteristics (the tenure of the auditor) and the risk of the characteristics stock prices crash in future. The empirical observations of this study are consistent with the supervised learning paradigm (theory). By showing that the auditors' characteristics reduce the existing risk in financial markets, the present study contributes to the literature on determining factors in stock price crash risk and is the first study to assess the effect of improved and consistent qualified auditor's opinion on future stock price crash risk.

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1. Introduction

The stock price is a widely used index that directly reflects the market response to new information about the company's future (Yun Lee, 2020). Accounting researchers have focused mainly on information asymmetries between managers and shareholders to explain the market crash. According to Jin and Myers (2006), managers intend to magnify company performance and prospects to spread the good news to the market and prevent bad news by choosing a specific strategy. If the cost of keeping bad news is less than the associated profit, managers tend to publish bad news all at once. Thus, stock prices fall as soon as the accumulated bad news is circulating in the market. Stock price fall hurts the investors as well as affiliates at the company level. It shakes investors' confidence in the company's management, reduces the demand for securities and liquidity of the relevant stocks, and thus leads to a loss of market value (Chua et al. 2019).

Recent studies provide empirical evidence in support of Jin and Myers (2006) theory regarding stock price crash risks and various corporate factors or the manager's specific motivations that facilitate or limit bad news (Hutton, Marcus and Tehranian, 2009; Kim et al., 2016; Kim, Li and Zhang, 2011a, 2011b; Kim, Wang and Zhang, 2016; Kim and Zhang, 2014; Robin and Zhang, 2015). However, little is known about how auditors' characteristics affect stock price crash risk. Auditors play an essential role in overseeing managers' production and dissemination of information. Auditors often gain accurate information about companies while interacting with corporations. Auditors' information may contain valuable private information that could not easily be obtained from corporate financial statements, voluntary disclosures, or even very complex analyses. Since auditors have more information about a company than investors and analysts, researchers look at any changes in the auditor as an essential issue and try to discover and understand the reasons for the change.

According to the existing literature, the quality of corporate financial reporting and audited financial statements increases with the auditor's tenure due to the familiarity and better understanding of business operations, accounting systems and reporting issues, thus improving audit quality. Therefore, investors have less uncertainty in investment-related decisions and estimating returns, reducing stock price falls (Su, Zhao and Zhou, 2016). Since management is responsible for preparing financial reports, accounting users such as market participants expect an objective third party to ensure that the reported information is accurate. The audit report provides the auditor's opinion on how the company's financial statements comply with generally accepted accounting principles. In this way, stakeholders make decisions based on audited information, assuming reasonable, complete, fair, and impartial (Arens, Elder and Beasley, 2008). In other words, considering the potential conflict of interest that may exist between management and owners of capital in terms of information asymmetry, the auditor's review of financial information increases the validity of the information and reduces the information risk (Danescu and Spatacean, 2018). An audit report can be a source of information, leading to changes in market indicators. The independent auditor's report plays an important role in validating financial statements and has the potential to ensure timely disclosure of bad news, thus limiting stock price crash risks (Habib and Jiaying Huang, 2019).

In this study, we expand the research literature by examining the role of independent auditors in stock price crash risks due to activities related to an accumulation of bad management information. This study also contributes to the microstructure literature and the economic implications of financial reporting, which show that the content of the audit report affects the validity of the firm's financial statements and that the market can distinguish between different types of statements. The findings of this study can show the importance and necessity of this research and fill the research gap in this field. This study can provide new evidence of the Iranian environment, enrich the relevant literature, and help investors in decision makings to quickly adjust their valuation, thus reducing the likelihood of sharp fluctuations in stock prices.

2. Literature Review and Hypothesis Development

2.1. Auditor opinion and stock price crash risk

The main view about stock price crash risk in the financial sector is that the risk of falling arises from the accumulation of bad news resulting from its deliberate concealment by management. When bad news is spread, stock prices fluctuate irregularly and eventually fall as negative information reaches the market. Discussion and research on stock price crash risk come from two aspects. The first aspect is the risk factors for falling. Information environment (De Fond et al., 2015) and representation problems due to opportunistic management behaviours, such as avoiding tax by corporate, additional in-service benefits for managers (Xu et al., 2014) over-investing are the two main sources of falling risk. The second aspect is the impact of internal and external corporate governance mechanisms on the risk of a crash, such as ownership structure (Wang, Cao and Ye, 2015), institutional investor equity (Xu, Yu and Yi, 2013) and independent auditing (Jiang and Yi, 2013). Due to the objective existence of agency problems, management is motivated to act opportunistic behaviours by hiding bad news for personal gain, which leads to stock price crash risk.

Many studies on agency theory have shown a conflict of interest between shareholders and management. The opportunistic behaviour of management may be curbed by considering external corporate governance mechanisms. One of these mechanisms may be relying on independent auditing, which plays an effective role in promoting the concept of accountability and strengthening stakeholder trust in financial statements (Wanis, 2021). This increases the importance of the audit, which aims to comment on the financial statements through the auditor's comments which are issued at the end of the audit process, where the results affect the quality of the financial statements and thus reduce the costs and increase trust in published data.

According to signalling theory, information released by the company signals investors to make investment decisions. In this way, it is possible to inform investors by publishing an audit report on the reasonableness of the company's financial statements. According to signalling theory, earnings statements and audit reports contain essential information that can influence the investment decision-making process for investors. Since the audit report contains the auditor's opinion on the validity of the financial statements, it has the potential of signalling (Muslih and Nuryatno Amin, 2018).

According to Arens, Elder and Beasley (2015), users of financial statements rely on the auditor's report to ensure the company's financial reporting. An audit opinion on the financial statements of companies that have been made public may affect the company's stock price. A good audit opinion is information that can increase a company's stock price, while an unfavourable audit opinion is an information that lowers a company's stock price. Therefore, the audit report can contain information that affects the company's stock price. Tahinakis, John and Evaggelia (2010) concluded in their study that audit reports contain limited information for investors and are not part of their decision-making process. Kipkosgei (2010) also concluded from his research that a very weak relationship exists between audit opinion and stock price. The research results of Selahatdin Kelten and Sarıtas (2020) showed that although the statistical results show the significance of the effects of the audit report in both markets (Turkey and Germany), its effect on the German stock market is less than on Turkey. Al-Othman (2019) found in his research that there is a statistically significant difference between stock prices after shifting the adjusted to the unadjusted type of report, while no statistically significant difference in stock price is presented as shifting the type of report from unadjusted to adjusted. Is.

Ianniello and Galloppo (2015) concluded that audit reports are informative for investors. On the other hand, the issues raised in independent auditors' reports, especially the containing clauses, are used for decision-making by various groups, including investors and financial analysts, affecting

stock prices and making the stock market react (Ittonen, 2012). Muslih and Nuryatno Amin (2018) found that the effect of audit opinion on stock price was not significant, and it was found that potential investors did not use audit reports in the decision-making process.

Since the commentary is so specific that its meaning is generally largely clear to all users, including investors, the audit report reflects the risk of the information (claims being consistent with the facts). Managers often have incentives to hide bad news by manipulating reported financial information, which may subsequently increase the risk of stock prices falling (Hutton, Marcus and Tehranian, 2009). An independent auditor plays a vital role by validating financial statements and can ensure that bad news is disclosed promptly, thus limiting stock price crash risk.

According to Purba (2009), commenting on the continuity of activity can affect investors' perceptions of the company's performance (Cahyaning Wibowo, 2019). This view will cast doubt on investors' investment decisions. Therefore, this statement is considered bad news that can affect the stock market's reaction. This reaction is reflected through changes in stock trading volume. On the other hand, changing audit opinions is not in the interest of shareholders. They can interpret this change as misinformation implemented by management (Melumad and Ziv, 1997). Previous studies have also found that auditing changes affect investor response (Firth, 1978; Ianniello and Galloppo, 2015). Assuming that the audit statements adjusted by the stock market are considered bad news, the market may react to this news, and this reaction is reflected in the price and volume of stock transactions which add to the fall in stock prices. Therefore, changing the comment will also affect the market; in other words, improving the comment will positively affect stocks' prices and trading volume. In other words, an improvement in the auditor's report (i.e., a change from an unfavourable report to a more favourable report) will lead to faster disclosure of information, and faster disclosure will lead to a market reaction. An improvement in the auditor's comments is also good news for the company. Investors expect auditors to provide warning signs in their reports in the form of audit commentary in cases where their owners are threatened. These arguments lead to the expression of the first and second hypotheses of the research as follows:

1- There is a significant relationship between consistency in the auditor's qualified opinion and future stock price crash risk.

2- There is a significant relationship between improvement in the auditor's opinion and future stock price crash risk.

2.2. Auditor’s tenure and stock price crash risk

Recent financial crises have addressed the auditors 'willingness to monitor owners' bad news reporting (PCAOB, 2010; Financial Crisis Inquiry Commission, 2011). In August 2011, the Public Company Accounting Oversight Board raised concerns about the auditor's independence and tenure. Despite these concerns, it is not clear whether the long-term relationship between the auditor and the client will lead to more bad management news. On the one hand, if auditors want to keep track of and prevent bad news from the client, it can be important to develop the auditor's knowledge of the client. Over time, auditors better understand their client's business and learn more about important issues that need special attention (Beck and Wu, 2006; PCAOB, 2011a; Price Water House Coopers, 2013). This "monitoring through learning" view shows that the auditor's long tenure helps prevent the client from keeping bad news activities. Thus, auditors' ability to identify and prevent bad news retention activities improves, and the risk of stock prices fall reduced (Callen and Fang, 2017). On the other hand, if a long-term relationship with the client reduces the auditor's independence (Davis, Soo and Trompeter, 2009; PCAOB, 2011b), auditors with a long tenure may be less aware of their clients' bad news retention activities. Measuring the retention of bad news by managers is challenging because managers have several methods (such as manipulating accruals, changing classifications, off-balance-

sheet accounting, and non-transparent accompanying notes to financial statements) by which they hide bad economic news.

Contrary to concerns recently raised about the long-term relationship between the auditor and the client, there is compelling evidence consistent with monitoring through a learning perspective that indicates the auditor's tenure is negatively associated with the risk of a stock price crash next year (Callen and Fang, 2017). Accordingly, the development of client-specific knowledge throughout the auditor-client relationship enables auditors to identify and prevent client news retention activities effectively.

Therefore, the auditor's knowledge of the client provides important input for creating a high-quality audit, including identifying and preventing the retention of bad news by management. Acquiring client-related knowledge requires a significant learning curve in the early years, especially when learning the many potential ways an employer can gather bad news. Auditors gradually understand their client's business over time and learn more about important issues that need special attention (Beck and Wu, 2006; Johnson, Khurana and Reynolds, 2002). Accordingly, the auditor's long tenure should help prevent the client from holding bad news in all financial reporting methods and thus reduce the risk of future stock price falls.

According to Mautz and Sharaf (1961), a long-term relationship with a client reduces the auditor's independence. The Audit Accountability Report (AICPA, 1978) noted that as auditor tenure increases, auditors are more likely to succumb to pressure from their clients on financial reporting choices because they are too familiar with client management ("cognitive reasoning") and want to benefit from it by retaining the customer ("Motivational Argument"). Thus, from a "cognitive-motivational" perspective, auditors with longer tenure are less likely to be independent and, therefore, less aware of their client's bad news retention activities, thus increasing the risk of future stock price falls. As a result, the relationship between the auditor's tenure and stock price crash risk is not already clear. (Callen and Fang, 2017). Given these conflicting views, the relationship between the auditor's tenure and stock price crash risk is an empirical question, so the third hypothesis of the research is as follows:

3- there is a significant relationship between auditors' tenure and future stock price crash risk.

3. Research Methodology

3.1. The population of the statistical sample

The research data are extracted from the audited financial statements of listed firms on the Tehran Stock Exchange during 2011-2019 from Internet databases, including the Codal Website and the official website of the Stock Exchange. Table 1 displays the selected sample.

3.2.Regression models

To test the hypotheses of the study, after screening and sample selection from the listed firms on the Stock Exchange and collecting information from the defined variables in the operational definition of variables, the following measures are adopted:

Regression model for the first hypothesis: The conceptual framework of the research

$$CRASH_{it} = \beta_0 + \beta_1 OI_{it} + \beta_2 Size_{it} + \beta_3 Lev_{it} + \beta_4 MB_{it} + \beta_5 Roa_{it} + \varepsilon_{it}$$

Regression model for the second hypothesis:

$$CRASH_{it} = \beta_0 + \beta_1 CUO_{it} + \beta_2 Size_{it} + \beta_3 Lev_{it} + \beta_4 MB_{it} + \beta_5 Roa_{it} + \varepsilon_{it}$$

Regression model for the third hypothesis:

$$CRASH_{it} = \beta_0 + \beta_1 ADTTenure_{it} + \beta_2 Size_{it} + \beta_3 Lev_{it} + \beta_4 MB_{it} + \beta_5 Roa_{it} + \varepsilon_{it}$$

Table 1. The statistical sample of the study

No. of listed firms on the Tehran Stock Exchange at the end of 2019	436
No. of firms entered the Tehran Stock Exchange during the period of the study	(74)
No. of affiliated firms withholdings, intermediaries, banks, investment, insurance, and leasing during the period of the study	(109)
No. of firms with financial yearend other than March during the period of the study	(110)
No. of firms with no available information	(7)
No. of firms with more than 6 months of transaction halt during the period of the study	(46)
No. of firms understudy	90

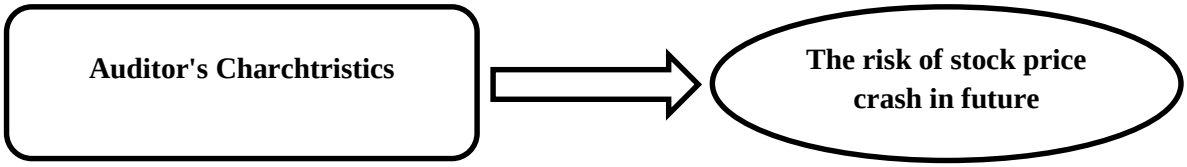

Figure 1. The concptual framework of the research

3.3. Research variables

3.3.1. Independent variables

auditor's tenure: a dummy variable that should include the auditor's tenure is more than 3 years 1; otherwise, 0 will be assigned (Kyriakou and Dimitras, 2018).

Improved auditor's opinion: improved opinion compares the opinion in the year under study with that of the previous year. For example, if an unqualified opinion is issued in the previous year and the auditor's report shows the qualified one in the current year, it is the improved opinion. Hence, in this paper, inspired by Cullinan et al. (2012), in case of change in opinion from unqualified to qualified 1, otherwise, 0.

Consistence in qualified opinion: In the previous year, the independent auditor issued qualified opinions on financial statements, which will happen in the upcoming period. The qualified opinion indicates that the firm's financial statements are by the accepted accounting principles and shown appropriately in all significant aspects. Hence, if the auditor's report in the year t and t-1 is qualified 1 otherwise, 0 will be assigned (Ianniello and Gallappo, 2015).

3.3.2. Dependent variable

future stock price crash risk

The skewness coefficient model of Chen, Hong and Stein (2001) and Hutton, Marcus and Tehraninan (2009) measures the future stock price crash. According to Chen, Hong and Stein (2001), the signs of the stock price crash are formed in the year prior to the actualization of the phenomenon under study and are the marks of negative skewness in the return of the company's stock. Therefore, the companies with the experience of negative skewness in their previous year's stock return will face a higher probability of the crash of their stock prices in the future year.

According to Hong and Stein (2003), stock return is an alternative solution to measure the asymmetry in the distribution of the return of negative skewness. Equation (1) can measure the negative skewness of the stock return.

Eq. (1)

$CRASH_{it}=NCSKEW_{it}=-(n(n-1)3⁄2\sum W_{J\theta 3})/((n-1)(n-2)(\sum W_{J\theta}2)\ 3⁄2))$

$NCSKEW_{it}$: negative skewness coefficient of monthly special return of the firm i in the year t. WJɵ: the firm's special monthly return of the firm i in month ɵ during the fiscal year estimated from equation 2. N: no. of observed months of return during the fiscal year. In the above table, the more the value of the negative skewness coefficient, the more is the firm exposed to stock price crash risk. According to eq, the firm's special monthly return is shown by w. (2) is equal to the natural logarithm of figure 1 plus the residual figure calculated via Eq. (3).

Eq. (2)

$W_{J\theta}=Ln|1+\varepsilon_{J\theta}|$

εJɵ: is the residual of the firm J in month ɵ and is defined as the remaining return or residual estimated via Eq. (3).

$r_{Jt}= \alpha_J+\beta_{1j}r_{mt-2}+ \beta_{2j}r_{mt-1}+ \beta_{3j}r_{mt}+ \beta_{4j}r_{mt+1}+ \beta_{5j}r_{mt+2}+\varepsilon_{J\theta}$

In eq. (3), rit is the firm's stock return i in month t, and rmt is the monthly return of the market based on (market index). Rmt: is market return in t period. In this paper, the price and cash earnings index of the Tehran Stock Exchange (TEDPIX) is used to calculate the market return that is calculable using the following formula:

$$R_{mt} = \frac{TEDPIX_t - TEDPIX_{t-1}}{TEDPIX_{t-1}}$$

Where

TEDPIX: is the return of price and cash earnings of the stock exchange at the end of period t

TEDIPIX: is the return of price and cash earnings of the stock exchange at the beginning of period t; Rmt: return mean of the market in month t

3.3.3. Control variables

Firm size: natural logarithm of total assets (Yun Lee,2020)

Return on assets: net profit of ordinary shareholders divided by total assets (Yun Lee,2020)

Financial leverage: total liabilities divided by total assets (Yun Lee,2020)

Market value to book value of equity (Yun Lee,2020)

$MB = \frac{MVE}{BVE}$

4. Results

4.1. Descriptive statistics

Table 2 illustrates the descriptive statistics of the existing firms in the sample.

Table 2. descriptive analysis of values related to dummy variables

Variable	Sig.	Dummy variable	Frequency	Frequency percentage	No. of observations
Improved opinion	OI	0	758	0.936	810
		1	52	0.064	
Auditor's tenure	ADTTenure	0	311	0.384	
		1	499	0.616	
Consistence in qualified opinion	CUO	1	337	0.416	
		0	473	0.584	

Since the variable of improved auditor's opinion and consistency in qualified opinion is a dummy with the mean value of 0.064 and 0.416, we can claim that among the sample firms of the study, about 6% have a change in unacceptable opinion to acceptable and 42% acceptable report in current and the previous year.

Table 3. Descriptive statistics of the research variables

Variable	Sig.	Mean	Std. dev.	Kurtosis	Skewness	Max.	Min.
future stock price crash risk	CRASH	-0.263	0.879	3.326	-0.751	2.928	-3.457
Financial leverage	LEV	0.588	0.224	2.933	-0.010	0.066	1.343
Market value to book value of equity	MB	2.294	1.075	8.505	1.848	-2.391	13.160
Return on assets	ROA	0.134	0.267	23.375	3.358	-0.939	2.206
Firm size	SIZE	27.953	1.572	3.660	0.515	23.616	32.987
No. of observations: 810							

As shown in Table 3, the future stock price crash risk variable is -0.263, indicating undesirable news publications' effect on the stock price.

4.2. Results of unit root test of variables

This section will discuss the reliability of variables and their related tests in combined data. The Levin Lin Chu test is used to assess reliability in this paper.

Table 4. Unit root test (Levin, Lin, and the Chu)

Variable	Levin, Lin, and the Chu	Significance	Result	Variable	Levin, Lin, and the Chu	Sig.	Result
CRASH	-24.678	0.000	Reliable	OI	-6.280	0.000	Reliable
LEV	-13.410	0.000	Reliable	CUO	-3.203	0.001	Reliable
MB	-21.185	0.000	Reliable	ADTTenure	-14.218	0.000	Reliable
ROA	-18.699	0.000	Reliable	SIZE	-12.648	0.000	Reliable

Since the significance level of the test for all study variables is smaller than 0.05, the existence of unit root in series is rejected, and the data are stationary.

4.3. Results of hypothesis testing

Tables 5, 6, and 7 illustrate the information related to the study's hypotheses, respectively. The multivariate linear regression for the used variables is applied for each hypothesis. To measure the significance, the F-Fisher is used, and the coefficient of determination is used to measure the explanatory power of patterns.

Table 5. The results of the first hypothesis testing

Sign	Coefficients	T statistic	Probability	VIF	Test	Value	probability
C	-23.732	-12.515	0.000	-	Coefficient of determination	0.439	
OI	-0.195	-1.374	0.017	1.066	Durbin-Watson	2.373	
SIZE	0.844	12.705	0.000	1.045	F-Limer	2.712	0.000
LEV	-0.048	-0.018	0.855	1.121	Hausman	105.186	0.000
MTB	0.051	2.376	0.018	1.045	F-Fisher	5.957	0.000
ROA	-1.485	-9.409	0.000	1.174			

As can be seen in tables 5, 6, and 7, the values of the f statistic and their subsequent probability show that the null hypothesis, that is, the insignificance of the entire pattern (all coefficients are 0), is rejected and the estimated regression pattern is significant, in general. The independent variables explain about 24, 24, and 26% of changes of the dependent variables, respectively—the lack of autocorrelation among residuals obtained using the Durbin-Watson statistic. According to table 5, since the significance level of the variable of improved auditor's opinion is smaller than 5%, there is a significant relationship between improved auditor's opinion and future stock price crash risk, so the first hypothesis of the study concerning the relationship between **improved auditor's opinion and** future **stock price crash risk is accepted**. According to table 6, since the significance level of the

variable of consistency in qualified opinion is smaller than 5%, there is a significant relationship between consistency in qualified opinion and stock price crash risk, so the second hypothesis of the study concerning the relationship between **consistency in qualified opinion and** future **stock price crash risk is accepted**. According to table 7, since the significance level of the variable of auditor's tenure pinion is smaller than 5%, there is a significant relationship between auditor's tenure and stock price crash risk, so the third hypothesis of the study concerning the relationship between **auditor's tenure and** future **stock price crash risk is accepted**.

Table 6. The results of the second hypothesis testing

Sign	Coefficients	T statistic	Probability	VIF	Test	Value	probability
C	-23.789	-12.595	0.000	-	Coefficient of determination	0.439	
CUO	-0.169	-1.602	0.011	1.009	Durbin-Watson	2.374	
SIZE	0.842	12.705	0.000	1.042	F-Limer	2.566	0.000
LEV	0.004	0.16	0.987	1.116	Hausman	99.785	0.000
MTB	0.050	2.351	0.019	1.022	F-Fisher	5.964	0.000
ROA	-1.524	-9.782	0.000	1.121			

Table 7. The results of the third hypothesis testing

Sign	Coefficients	T statistic	Probability	VIF	Test	Value	probability
C	-22.515	-11.755	0.000		Coefficient of determination	.449	
ADT TENURE	-0.319	-4.027	0.000	1.026	Durbin-Watson	2.376	
SIZE	0.808	12.091	0.000	1.031	F-Limer	2.564	0.000
LEV	0.012	0.045	0.964	1.138	Hausman	96.350	0.001
MTB	0.050	2.382	0.018	1.046	F-Fisher	6.208	0.000
ROA	-1.477	-9.707	0.000	1.133			

5. Conclusion and Suggestions

The present study aims to ass the effect of auditor's characteristics on stock price crash risk among 90 listed firms on the Tehran Stock Exchange during 2011-2019. As the information mediator of the capital market, the auditor is a key reference for investing in collecting trustful information about the listed firms and plays an important role in economic development. Regarding the obtained results from statistical analysis, the information indicates a significant relationship between improved auditor's opinion, consistency in qualified opinion, and future stock price crash risk. The findings contribute to recent studies on the economic consequences of auditor's opinion, strengthen the role of audit reports in assessing the reliability of financial reporting, and emphasize that auditor's opinion influences the market interpretation and that the market can differentiate between different types of opinions. Receiving qualified opinions from the firm is considered good news, so the auditor's opinion is a valuable source of information in the stock market. Thus, auditing reports have valuable information, and positive changes in auditors' opinions bear important information content for the stock market in Iran. The study results align with Al-Othman's (2019) contrast with Muslih and Nuryatno Amin's (2018). Further, the results show that an auditor's tenure is negatively associated with the future stock price crash risk. The empirical results of the study conform with the supervision approach through learning and the development of knowledge specific to the customer during the period of relationship between auditor-employer will allow the auditors to detect and prevent the measures adopted by the employers to hold bad news and that declines the future stock price crash risk. Due to acquaintance and a better understanding of the auditor from the commercial operation, the accounting systems, reporting issues, and finally, improvement in audit quality, the quality of

firms' financial reporting and audited financial statements are increased. Consequently, the investors are more assured about their investment decisions and return prediction, so the results align with Callen and Fang (2017).

According to the results of the study, since the type of report affects those who are addressed, we recommend the supervisory bodies for the quality of auditors, such as the Official Accounting Association, assess various firms and the governance systems more meticulously to create a path for increasing audit quality to not present a qualified report to lower the risk of stock price crash. According to the findings, we recommend that investors and capital market practitioners, in addition to financial variables, consider the tenure of auditors as a determining factor in return and risk of stock price crash. Moreover, we recommend the auditing regulators, including the Official Accounting Association and Auditing Organization, extend the compulsory rotation period of audit firms to five years or more to improve the audit quality.

For future studies, the following suggestions are proposed:

Since the audit features on the risk of falling stock prices in the next year were examined, it is suggested that an issue be considered on the risk of falling stock prices in the current year.

In this paper, the skewness coefficient model of Chen, Hong and Stein (2001), Hutton, Marcus, and Tehranian (2009) is used to calculate the stock crash risk. We recommend that future studies consider the stock price crash risk as a dummy variable if the firm at the end of the fiscal year experienced at least one period of crash 1; otherwise, 0 will be assigned.

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RESEARCH ARTICLE

Accepting Financial Transactions Using Blockchain Technology and Cryptocurrency based on the TAM Model: A Case Study of Iranian Users

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Abstract

This study aims to design a technology acceptance model (TAM) to accept financial transactions using blockchain technology and cryptocurrency transactions. By employing an unlimited sample of users by selecting 154 participants based on the Morgan table and analyzing the surveyed data with the Partial Least Squares-Structural Equation Modeling (PLS-SEM). The results indicated that Perceived ease of use and Perceived usefulness positively and significantly impact the attitude toward cryptocurrency transactions supported by blockchain technology. Also, the attitude has a positive and significant impact on Iranian users' behavioral intention toward cryptocurrency transactions supported by blockchain technology. In addition, at a certain level of experience, users feel confident and can trust blockchain-based applications. Accordingly, governments, companies, and decision-makers should consider the results achieved in this study. The current study is the pioneer study in an emerging economy like Iran. The results may help policymakers mandate new regulations to new circumstances. This study mentions the influences of ease of use and usefulness of cryptocurrency transactions supported by blockchain technology.

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1. Introduction

In recent decades, advanced personal computers (hardware and software), tablets, and mobile phones have significantly influenced customers' lives. It had the same effect on the global market and the development of the economic system. The dedication to designing and generating an excellent mobile application has increased due to market demand and the rapid development of information technology (Abbaszadeh, Salehi and Faiz, 2019; Zhonggen and Xiaozhi, 2019; Albayati, Kim and Rho, 2020). The financial market has many new technologies launched every day, but most cannot succeed or survive. Blockchain has been in the global market for more than ten years and seriously invades the finance market and threatens the future of traditional businesses. As Oh and Shong (2017) said, Blockchain is a distributed ledger created by blocks containing transaction details connected in chronological order to form a series of chains. Therefore it is a distributed ledger in which participants of the Blockchain peer-to-peer (P2P) network, not the central administrator, generate blocks.

It is known as a trustful technology (Miakotko, 2017). However, Blockchain and cryptocurrency are unexpected technologies, and it is difficult to predict future adoption in the financial system (Shahzad et al., 2018). Moreover, it has a wide spectrum of applications ranging from finance to social services and has greatly influenced the emerging business world. Since blockchain technology is embedded in e-commerce services, cryptocurrencies are gaining huge prevalence. Bitcoin and few such cryptocurrencies have utilized the decentralized nature of Blockchain. Moreover, several companies have developed blockchain proofs-of-concept, with some heading towards production deployments. So, commercial Blockchain is largely in the pilot or proof-of-concept stage across a broad range of use cases, with payments and supply chain being two of the most promising use cases(George et al., 2019).

Blockchain can be considered a distributed database system containing immutable ledgers prone to attack by malicious users (Ghosh et al., 2020). For example, Deloitte1 recently surveyed 1000 companies in seven countries about integrating Blockchain into their business operations. Their survey found that 34% had a blockchain system already in production, whereas 41% expected to deploy a blockchain application within 12 months (Deloitte, 2016). Hence, Blockchain can transform conventional approaches for handling dark side effects into value-creating activities. The results of automated textual analysis on a corpus of expert ideas provide preliminary support for several aspects of blockchain governance. Furthermore, the study articulates a decision frame that directors can use for optimal relationship governance and identifies several areas for future research (Mishra, Kukreja and Mishra., 2022).

In recent years, given the advent of new technologies, it has been necessary to design a new model, create a new perspective, and help to adopt blockchain technology among the Iranian users due to the lack of internal exploratory research and lack of attention to the specific culture of a particular country in foreign studies. Therefore, to implement the technology acceptance model (TAM) in financial transactions supported by blockchain technology, the present study´s innovation is that it intends to answer the determinants of behavioral intentions of Iranian users/customers with cryptocurrency transactions; by using blockchain-based applications.

2. Theoretical Foundations and Literature Review

Over the past decade, blockchain technology has become a hot topic for many new operating systems, especially in financial applications, while still being used by the users/customers at the lowest expected level (Wunsche, 2016). This concern has led us to look for reasons for the

1 . Deloitte is one of the Big Four accounting organizations and the largest professional services network in the world by revenue and number of professionals, with headquarters in London, England.

intentions of users/customers to use blockchain technology while most participants still use traditional banking services. However, this has resulted in high costs and time without privacy and control (Martins, Oliveira and Popovič., 2014). Moreover, there has been considerable success in accepting new IT service users (Venkatesh and Davis, 2000). So that there is sufficient theoretical and empirical knowledge to support the TAM (Davis, 1989), many authors and researchers have sought to use TAM as a powerful model for accepting new technology among users (Granić and Marangunić, 2019). Blockchain is a technology to secure the integrity and reliability of transaction records without a trusted 3rd service provider by having all the participants in the network create, record, store and verify transaction information jointly, and has the structure to realize various application services based on distributed network infrastructure using security technologies including Hash, Digital Signature and Cryptography (Bahga and Madisetti, 2016). This Blockchain technology was prepared to safely save and use a cryptocurrency called Bitcoin. Blockchain 1.0, which had the main functions of issuing, distributing and transacting digital currencies as the core technology of Bitcoin, now defeats the limitations of the present Bitcoin and is being developed into Blockchain 2.0, getting for expansion into various areas (Financial Services Commission, 2016).

Various models have been proposed for technology acceptance. These models include the theory of reasoned action, TAM, planned behavior theory, theory of planned behavior analysis, integrated technology acceptance model, and unified acceptance and application of technology (Ahmadi Deh Qutbuddini, 2010). Among the above theories, TAM has been one of the most widely used models for examining the acceptance and use of information technology (Venkatesh and Bala, 2008). On the other hand, the representative technology of Bitcoin 2.0 is Ethereum. Besides the cryptocurrency function, Smart Contracts, in which various types of schemes for the transaction scripts of Bitcoins are made possible, are recognized. It is expected that Blockchain will be expanded to a platform in which various decentralized applications are developed and performed, including contracts for real estate and online voting (Tapscott and Tapscott, 2016)

In the late 1980s, Davis proposed TAM based on the theory of logical action by Ajzen and Fishbein (1980) (Bagozzi, 2007; Park et al., 2009; Hernandez, Jimenez, and Jose-Martin, 2008, cited in Farzin Yazdi, Baradar, and Ghaebi, 2013: p. 173). TAM uses blockchain technology through the behavioral intention of individuals to use technology. According to Davis (1989), in order to accept technology, two essential factors must be taken into account: perceived ease of use and perceived usefulness of that technology because these two factors affect the attitude of participants towards the use of technology and cause them to decide to use that technology (Farzin Yazdi, Baradar, and Ghaebi., 2013: p. 173). In other words, when users perceive a system to be easy to use, their perception of its use also increases.

In Figure 1, TAM strongly supports the user's acceptance and behaviour towards new technologies by finding appropriate decision-making tools that may affect the new system's success. In this section, a list of customer behavioral intention indicators is specified to measure the impact of these indicators on blockchain acceptance.

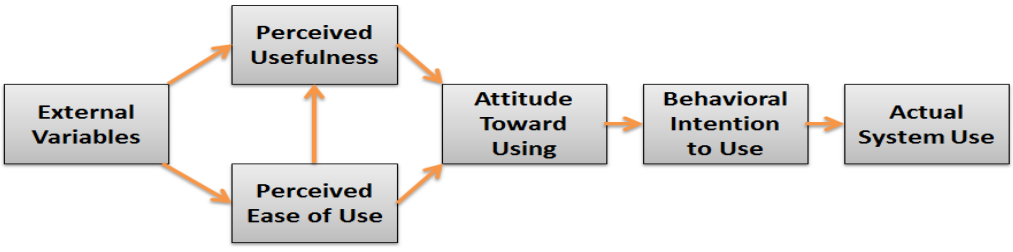

Fig. 1. Technology acceptance model TAM (Davis, 1989)

The importance of customers' acceptance of new technology is felt in its feedback. Inventors, for example, receive few comments on technology feasibility and then move on to improve the company's invention. In addition, more information and more accurate predictions can increase the likelihood of acceptance (Tornatzky, Fleischer and Chakrabarti., 1990) that, in turn, can predict the actual desire to use a particular technology by measuring the customer's behavioral intent (Salloum et al., 2019). However, IT is claimed to positively affect the customers' performance: a great need to use advanced technology to adapt to different tasks (Goodhue and Thompson, 1995). Therefore, blockchain technology can be a significant technology that the markets need. With this new technology, many industries can develop and advance. Furthermore, using blockchain technology can improve the quality of services (Aste, Tasca and Di Matteo ., 2017).

Recently, blockchain technology has grown rapidly globally, offering various solutions to secure transactions and services. Blockchain technology is based on the usual structure of databases but decentralized. Each node in this network is responsible for encrypting, authenticating, and validating transactions and storing these transactions within blocks. In this technology, both parties to a transaction will perform a transaction without a third party or intermediary to authenticate and validate the parties. Yet, other benefits of Blockchain include powerful users, durability, reliability and longevity, integrity, transparency and immutability, and faster transaction with lower costs (Bahga and Madisetti, 2016; cited in Golosova and Romanovs, 2018). In addition, embracing new, tradable technology is so complex and costly that failing to implement such information technology would cost millions of dollars (Vankatesh and Bella, 2008), which increases the need for proper forecasting of market needs. However, the acceptance or implementation of technology has become a major concern for many organizations to achieve tangible or intangible benefits (Jasperson, Carter and Zmud., 2005). Moreover, from the perspective of financial institutions, the emergence of Blockchain does not just have technical significance – the emergence of a highly efficient database system – but has the possibility that if the business model of existing financial intermediaries disappears or gets reduced, the financial services relying on them can disappear altogether, or some of them can be replaced, and financial transaction patterns of consumers can be changed. Also, it was discovered that the distributed characteristic of Blockchaincannot be applied when developing financial services (Oh and Shong, 2017)

Also, in the research literature, Kazemian et al. (2020), by an unlimited sampling, with a sample of 376 individuals, indicated that perceived usefulness and social image significantly affected customers' attitudes toward using Tejarat Bank mobile. But the perceived ease of use did not have a significant effect. Manzoor and Norouzi (2019) found that actual benefits of blockchain technology in the energy sector could be billing, sales and marketing, exchange and market, process automation, security, and data management, protecting the privacy of the transaction parties, sharing resources in the fields of wholesale energy exchanges and supply sector, digitalization, IoT platforms, and peer-to-peer and decentralized exchanges of energy. Furthermore, Rahimi and Bushehri (2019), using the Delphi technique, identified the key performance measures of the defence industry's supply chain and, then, using the qualitative research method of content analysis and using semi-structured and in-depth interviews, studied the role of blockchain technology in each of the key criteria of the defence industry supply chain. They found that the proper use of this new technology could improve the defence industry's supply chain performance. Rakhshan Dadi and Hosseini (2019), using the qualitative analysis method, studied and explained blockchain technology and its applications in the IoT and concluded that blockchain technology could be used effectively in health care privacy and access to patient data. Mostafavi, Ebrahimi Ordaklu and Abbasi. (2019) indicated that blockchain technology effectively sped up transactions, increased

security, combated bank embezzlement, stored customers' information, and reduced the time and costs associated with banking operations. Mullah Hosseini and Forouzanfar (2019) presented a local technology acceptance model among the managers of these companies. According to their results, the two factors of attitude to use and intention to use had the greatest impact on technology acceptance. Furthermore, Asadollahi and Choobineh (2018) and Jahanbin et al. (2018) pointed out the importance of blockchain technology. In an empirical study, Alam Beigi and Ahangari (2014) studied the agricultural promoters (120 participants) in West Azerbaijan province and by, identifying the external variables that affect the two aspects of perceived usefulness and ease of use as the two aspects of the TAM showed that the experience variable had a significant effect on perceived utility, and was able to predict 77% of perceived utility changes. In addition, Farzin Yazdi, Baradar, and Ghaebi. (2013) considered the perceived usefulness, ease of use, and attitude towards the most factors affecting RFID acceptance among 24 librarians of Yazd University libraries.

Al-Emran, Mezhuyev, and Kamaludin. (2020), using the partial least squares-structural equation model (PLS-SEM), studied 416 undergraduate students in IT at Pahang University, Malaysia, and showed that acquisition, application, and protection of knowledge had positive effects on the perceived ease of use and usefulness. Furthermore, Al-Bayati et al. (2020), through an online survey of 251 users of blockchain technology and using PLS-SEM, showed that users are receptive to blockchain-based applications at a certain level of experience and are encouraged to use them with a high level of confidence. Salloum et al. (2019) studied 435 students at 5 universities in the UAE. They found that system quality, computer self-efficacy, and computer-game play significantly impacted perceiving the ease of use of e-learning. In addition, the quality of information, perceived pleasure, and accessibility positively affected the perceived ease of use and usefulness of the e-learning system. In addition, Al-Emran, Mezhuyev, and Kamaludin. (2018), focusing on 152 software engineers from various software development companies in Malaysia, indicated that perceived usefulness, ease, organizational and team structures, maturity, and effectiveness significantly impacted technology acceptance adoption. According to Shahzad et al. (2018), perceived awareness and reliability significantly impact the intention to use bitcoin, while perceived usefulness explains, to some extent, the relationship between ease of use and intention. Folkinshteyn and Lennon (2016) concluded that bitcoin and blockchain technology, in general, were valuable supplements to existing financial technologies but were not perfect substitutes for all applications. Martinez, Oliveira and Popovič. (2014), focusing on 249 banking cases in Portugal, found that the most important factor in explaining internet banking behavior was behavioral intent to use internet banking.

3. Research Methodology

The instrument used in this survey study is a questionnaire based on Likert scale scoring (scores 1 to 7: strongly agree (7), agree (6), somewhat agree (5), neither agree nor disagree (4), somewhat disagree (3), disagree (2) and strongly disagree (1)). The collection method has been the documentary review of books, articles, and previous research. The present paper studies Iranian users/customers (investors and traders) using blockchain technology with different backgrounds and experiences (government employees, private sector employees, students, etc.) who transact money by technology for domestic and international purposes. Since there is no specific physical place to make these trades, the survey is done randomly. Although regional and cultural aspects can change the results, the results will not be affected by culture due to the focus on the Iranian culture in this study. In order to sample this unlimited population, 178 participants were selected from the

available random sampling method using the Morgan table. After sending the questionnaires online, among the target users, finally, 154 questionnaires were collected. This research is applied in purpose and is descriptive survey and field-exploratory in data collection. In order to measure the variables used in the research, the standard questionnaire of Al-Bayati et al. (2020) was used.

The study also added four demographic questions to classify the criteria. The collected data were analysed using the Smart-PLS 3.2 software using PLS-SEM for statistical analysis. Since this study is exploratory, the PLS-SEM method is the best way to find the most accurate results (Hair et al., 2016; Henseler, Ringle and Sarstedt., 2015). Moreover, for the reflective measurement model (Hair et al., 2016), we must consider all external factors and the average variance extracted (AVE). Finally, we will measure path coefficients in terms of the structural model (Selya et al., 2012). Accordingly, we will use all the mentioned criteria to support the measurement and the structural model.

According to the conceptual model of Figure 1, the structures of the TAM core include behavior intention, attitude, perceived usefulness, and perceived ease of use. Therefore, according to this classification, the hypotheses of this study are:

H1: The attitude of the Iranian users has a significant positive effect on the behavioral intention in cryptocurrency transactions;

H2. The perceived usefulness by the Iranian users has a significant positive effect on the attitude towards cryptocurrency transactions;

H3. The perceived ease of use by the Iranian users has a significant positive effect on the attitude towards cryptocurrency transactions;

H4. The perceived ease of use by the Iranian users has a significant positive effect on their perceived usefulness in cryptocurrency transactions;

H5. The indirect effect of perceived usefulness by the Iranian users on the behavioral intention of cryptocurrency transactions is positive and significant;

H6. The indirect effect of perceived ease of use by the Iranian users on the behavioral intention of cryptocurrency transactions is positive and significant;

Also, figure 2 shows how the components in the TAM model affect the behavioral intention of the Iranian users in using blockchain space for cryptocurrency transactions.

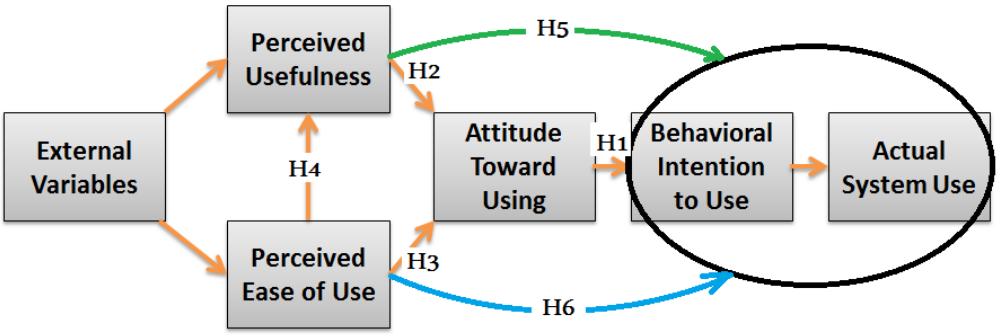

Fig. 2. Conceptual Model of Research

4. Results

This section summarizes the data collection and output findings of the software used. According to the demographic characteristics, most participants in the sample size (78 participants) are 25–34 years old. 14 participants are under 25, 43 participants are between 35 and 44, 13 participants are

between 45 and 54, and 6 are over 54 years old. 22 participants are women, 132 participants are men. 5 participants are under diploma, 8 participants have a diploma, 3 participants have associate's degrees, 76 participants have bachelor's degrees, 49 participants have master's degrees, and 13 participants have doctoral degrees higher. Regarding the job, 54 participants are public sector employees, 41 are private-sector employees, 4 are retired, 27 are students, and 28 have other jobs. Researchers and experts approved the content validity of the questionnaire in previous studies, and its reliability was obtained based on Cronbach's alpha coefficient of 0.873. Furthermore, the results of the central statistics and dispersion areas Table 1:

Table 1. Central and dispersion statistics

Component	Mean	Max	Min	S.d. Deviation
Perceived Ease of Use	5.87	6.50	5.25	0.29
Perceived Usefulness	6.50	6.83	6.17	0.18
Attitude	6.47	7.00	6.00	0.29
Behavioral Intention	6.50	7.00	6.00	0.28

Source: Research Findings

According to central statistics and dispersion results, each component's minimum and maximum values represent the respondents' average minimum and maximum scores to the Likert scale's scoring propositions (1 to 7). For example, the minimum and maximum values of the attitude are 6 and 7, respectively. The number 6 indicates the average of the lowest score given by the respondents to the items in this questionnaire. Furthermore, the mean statistics of the average of each component represent the average score of the respondents to the items of each of these components from 1 to 7. In addition, the dispersion statistics of the standard deviation of each component indicate the degree of dispersion of the respondents' scores to the items of each component, around the average of the score.

The content validity of the questionnaires (approved by researchers and experts in previous studies) and their reliability based on Cronbach's alpha coefficient are reported in Table 2:

Table 2. The results of validity, reliability and extracted variance

Questionnaire	AVE> 0.5	Cronbach's alpha	combined validity
Perceived Ease of Use	0.513	0.768	0.803
Perceived Usefulness	0.635	0.781	0.777
Attitude	0.639	0.723	0.775
Behavioral Intention	0.649	0.783	0.786

Source: Research Findings

According to Hair et al. (2016), each component's combined validity and reliability should be equal to or greater than 0.7 to be reliable. Moreover, the mean of extracted variance is a common criterion for measuring the convergent validity of each questionnaire. Values equal to or greater than 0.5 indicate that the component in question determines more than half of the variance of its items (Hair et al., 2016). According to the results of validity and reliability tests of perceived ease of use, perceived usefulness, attitude, and behavioral questionnaires related to the Iranian users in the blockchain space, one can say that all questionnaires have acceptable validity and reliability. In addition, the average variance extracted (AVE) of each of the above questionnaires (due to the value greater than 0.5) confirms their high validity and reliability. Results of the normality test are reported in Table 3:

According to the normality test results, since the probability value of all components is less than

5%, according to the alternative hypothesis of the normality test, based on which the distribution is not normal, these questionnaires do not have a normal distribution. Table 4 shows the correlation values between the research components.

Table 3-.The result of the normality test

Component	P-Value	Statistic K-S
Perceived Ease of Use	0.001	1.91
Perceived Usefulness	0.003	1.82
Attitude	0.000	2.12
Behavioral Intention	0.000	2.35

Source: Research Findings

Table 4- The result of the Correlation test

Components	Behavioral Intention	Attitude	Perceived Usefulness	Perceived Ease of Use
Perceived Ease of Use	–	–	–	1.00
Perceived Usefulness	–	–	1.00	0.396 (0.00)***
Attitude	–	1.00	0.311 (0.00)***	373/0 (0.00)***
Behavioral Intention	1.00	0.20 (0.00)***	0.46 (0.00)***	0.23 (0.00)***

According to the correlation test results, all components have a significant positive correlation. Thus, Iranian users positively correlate with perceived ease of use, usefulness, and attitudes toward cryptocurrency transactions. The structural equations obtained by Smart-PLS software to test the research hypotheses have reported the optimal model of acceptance of blockchain technology.

Figures 3 and 4 are the optimal models extracted from the structural equation modeling before and after removing non-significant items in each component. So that in Figure 3, the first item (PEoU1) and the second item (PEoU2) of the component of perceived ease of use by the users when using Blockchain were removed from the model due to their non-significance. Finally, the optimal model of Figure 4 was extracted. The values of each component's items coefficients and their probability values in Figure 4 indicate the significance of each coefficient (except for the item PEoU4, the rest at a 99% confidence level).

According to the results of path analysis in Figure 2 and Table 6, to test the research hypotheses, path coefficient values, t-student statistics, and probability value of each component is reported. H1 describes the path between the components of attitude and behavioral intention. The value of 0.525 of the path coefficient and the values of the t-test and its probability indicate a significant positive relationship between the attitude and behavioral intention of the Iranian users. Attitude has a significant positive effect (both because the value of the t-student statistic is greater than 2 and because the probability value is less than 1%) on users' behavioral intent when using Blockchain technology in cryptocurrency transactions. Therefore, H1 is confirmed, which states the significant positive effect of the Iranian users' attitudes on the behavioral intention of cryptocurrency transactions. In addition, the effect of the usefulness of transactions on users' attitudes when trading cryptocurrencies is positive and significant (0.597), which confirms H2. Moreover, the effect of blockchain technology during cryptocurrency transactions on attitude and usefulness has been positive and statistically significant. Therefore, H3 and H4 are also confirmed. Finally, the indirect effect of usefulness and ease of use in cryptocurrency transactions on Iranian users' behavioral intention is positive and statistically significant, confirming H5 and H6. In summary, all research

hypotheses are confirmed at a 99% confidence level.

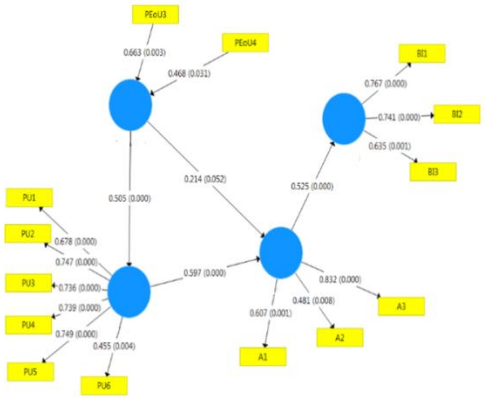

Fig. 4. Optimal Model after elimination of non-significant items

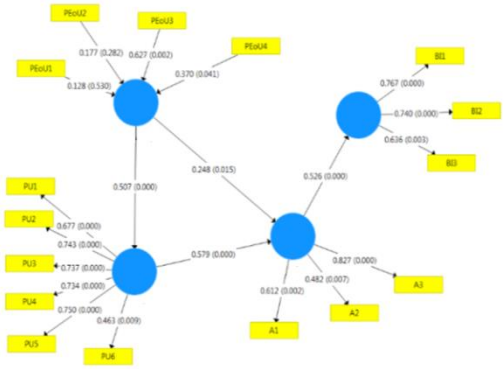

Fig. 3. Optimal Model before elimination of non-significant items

Table 5 provides a report of the statistics of coefficient of determination as well as the adjusted coefficient of determination, whose values, for example, for the behavioral intention, are 0.275 and 0.268, respectively:

Table 5. The result of R-Square and R-Square Adjusted

Dependent Component	Independent Component	R-Square	R-Square Adjusted
Perceived Usefulness	Perceived Ease of Use	0.255	0.247
Attitude	1-Perceived Usefulness 2- Perceived Ease of Use	0.532	0.522
Behavioral Intention	Attitude	0.275	0.268

Source: Research Findings

The attitude (as an independent component) can explain 26.8% of the changes in behavioral intention (as a dependent component). In comparison, 73.2% of the behavioral intention changes are explained by other components not present in the model mentioned above. In addition, the perceived usefulness and ease of use when trading cryptocurrencies explain 53.2% of the changes in users' attitudes. Finally, the perceived ease of use explains 25.5% of the changes in the perceived usefulness.

The results show that all the hypotheses are confirmed. Thus, the proposed model (TAM) successfully meets the research objectives and highlights the factors affecting users' behavior towards cryptocurrency transactions that support blockchain technology.

The TAM model was developed to match blockchain technology's users' behavior in cryptocurrency transactions. Findings indicate a high impact of the users' usefulness on their attitudes and impact on their behavioral intent towards cryptocurrency transactions. Furthermore, most respondents agree that their perceived usefulness and ease of use when using blockchain technology in cryptocurrency transactions affect their attitude and behavioral intent.

5. Conclusion and Recommendations

Recently, blockchain technology has grown rapidly globally and offers various solutions to secure transactions and services. Yet, the actual use of this technology is still very low because users show high resistance to this technology (Al-Bayati et al., 2020). Due to the low acceptance of this technology, this study aimed to design a TAM model to use blockchain technology and detect

the factors affecting the behavioral intent of users of cryptocurrency transactions. According to the survey conducted by questionnaire among 154 Iranian users, the results showed that users' perceived ease of use and usefulness had a high impact on their attitude and behavioral intention toward cryptocurrency transactions blockchain technology. Findings confirm that a 1% increase in the Iranian users' attitude, which is due to factors such as perceived ease of use and usefulness, increases by 0.525% in behavioral intention when cryptocurrency trading under blockchain technology, which is also statistically significant. Furthermore, the perceived ease of use of cryptocurrency transactions has a significant positive effect on their usefulness from these transactions. Moreover, the usefulness of cryptocurrency transactions has significantly positively affected their attitudes toward these transactions, greater than the perceived ease of use. This finding aligns with Nadeem et al. (2020), who declare that expectation positively impacts perceived pleasure and ease of use. A positive relationship between perceived ease of use and perceived pleasure was confirmed. The findings also reveal that expectation, perceived pleasure, and perceived ease of use significantly impact satisfaction. Moreover, it is found that perceived pleasure, perceived ease of use and satisfaction significantly influence the repurchase intention of Bitcoin.

Also, this finding confirms that Ter Ji-Xi, Salamzadeh and Teoh (2021) claims that three of the five proposed items (performance expectancy, effort expectancy and facilitating condition) are significant predictors of *BI* to adopt cryptocurrency as a medium of transaction.

Another result is that the indirect effect of both perceived ease of use and usefulness on users' behavioral intent has been positive and significant. Considering the youth and high level of education of most selected users, one can say that this group of Iranian users has the most culture of welcoming cryptocurrency transactions in the blockchain space. As Ter Ji-Xi, Salamzadeh and Teoh (2021) reveal, the relationship between BI and social impact became significant only when age was added as a moderator.

Considering the ease of use and usefulness of cryptocurrency transactions for users, the Iranian authorities must have a maximum support for users and traders by lifting sanctions and easy access to blockchain space. In addition, to increase users' access and perceived usefulness in using blockchain technology to trade cryptocurrencies, the authorities should remove the restrictions on cryptocurrency technology acceptance, such as increasing trust and support.

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