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The Effect of Economic Growth Rate Uncertainty on Financing Small and Medium Enterprises in Iran

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Abstract
Today, small and medium-sized enterprises (SMEs) play a key role in both developing and developed economies. However, the uncertainty of macroeconomic indicators, such as economic growth, may affect financing and investment of the SMEs in an economy. The present study explores the effect of the economic growth rate uncertainty on financing SMEs in Iran. To this end, the study has applied the Brownian motion approach to calculate the uncertainty of the economic growth rate. The study has also considered relevant data of the Iranian SMEs compiled by the Comprehensive Database of All Listed Companies (CODAL).
We have examined the SMEs with less than 100 employees throughout 2011-2017. The empirical results show that the effect of the economic growth rate uncertainty on the selected Iranian SMEs financing has been negative and statistically significant, while it seems an effective challenge to such firms in order to finance their productive investment.

1-Introduction

According to the World Bank[4], the SMEs are the firms that do not exceed 300 employees, with a maximum annual income and assets of 15 million USD. The International Monetary Fund (IMF)[5] and the Inter-American Development Bank (IADB)[6] also consider the SMEs as companies that the maximum number of their employees is about 100. Their maximum annual incomes are around 3 million USD. According to the African Development Bank (AfDB)[7], the maximum number of the employees in the SMEs is 50 and there is no limit to their income or assets (Gibson & Wart, 2012). In Europe, a small and medium-sized enterprise is a company that the maximum number of its employees is not more than 250 and its annual turnover is not more than 50 million. The balance sheet of the

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[5] www.imf.org
[6] www.iadb.org
[7] www.afdb.org

enterprise does not exceed € 43 million (Estiri and Moshiri, 2012). The Central Bank of Iran (CBI)[1] has considered a maximum of 10 people for microenterprises, 10-49 for small enterprises, 50-99 for medium-sized enterprises, and 50-99 for large enterprises.

The SMEs are facing several challenges, in which their restrictions are not just financing, but also non-financial problems play a major role in their development process. Some of these problems include administrative corruption, monopoly, lack of information and data heterogeneity, economic restrictions and sanctions, macroeconomic instability of government, inappropriate government policies, lack of basic production structures, tax rules and legal barriers (Karimi and Bouzarjamhari, 2012, Yoshino and Taghizadeh 2018).

In macroeconomic point of view, economic policies affect the financial performance of firms and their development plans. Accordingly, choosing the source of financing a firm plays a crucial role in corporate governance. Internal and external factors affect the capital structure of a firm and its economic growth. The firm itself can manage internal factors and their effects, but managers cannot control macroeconomic variables, as the external determinants. Information and knowledge on how and to what extent these factors influence capital structure can help managers make better and more efficient decisions about capital structure with the aim of financial stability and long-term growth (Mokhova and Zinecker, 2014).

Frank and Goyal (2003) have shown in a study that only 5% of the differences in capital structure can be explained by internal variables. This reveals that external determinants such as GDP and total investment affect substantially the capital structure. (Bokpin, 2009). On the other hand, the various conditions of the business and economic cycles as well as the macroeconomic situations affect the financing structure as well as its rate of adjustment relatively. External financing sources, including stock and debt markets, are directly affected by macroeconomic conditions and uncertainty of economic growth, while profitability, cash flows, capital cost, leverages and balance sheets affect characteristics of a firm such as financing, production, etc. (Camara, 2012).

This study identifies and presents the appropriate strategies for solving the problem of financing these companies in Iran by examining the experiences of the countries with successful and bank-based financing system, due to the necessity of improving the financing situation of the selected SMEs. In this regard, the uncertainty of economic growth is one of the factors affecting the financing of the enterprises investigated in this study. Having presented the theoretical discussion on the literature, this study presents the research methodology. Then, the study analyzes the empirical results of the model

[1] www.cbi.ir

estimation, and finally, indicates conclusion and policy recommendations of the empirical findings.

2- Theoretical Discussion

The capability of SMEs strongly depends on the potential of investment in innovation and quality, all of which require capital and financing. In the Iranian economy, due to the small capital market and lack of appropriate bank financing alternatives, the financial system is bank-based, and banks have a high level of responsibility for financing the small and large enterprises and the short and long-term financing (Marouf Khani, 2009). In addition, these firms need collateral for financing through the bank, and given the size and level of their assets, it is not possible to obtain easily the collateral to receive credit. Thus, the size is an important factor in financing small and medium-sized enterprises. The economic conditions of the country also play a key role in financing SMEs. Although more flexible rather than large companies, SMEs are facing more difficulties in financing when a financial crisis occurs in a country, because they do not have the collateral needed for financing, leading to increased financing risk.

Hence, it is necessary to analyze the ways of financing small and medium-sized enterprises in this situation, where the banking system is mainly financing Iran's industries. . In general, note that asymmetric information in financial market is one of the main problems in financing SMEs, leading to increased uncertainty, limited access to credit and corruption in distribution of the resources, which have a negative impact on financing SMEs.

Moreover, any inefficiency in a banking system can also lead to many problems for different sectors of the economy. According to the empirical studies, uncertainty and instability have negative effects on economic activities. More uncertainty makes authorities unable to predict the future well. As a result, the short-term benefits will overcome the long-term benefits and resources can lead to risky projects. According to conventional theories and economic analyses, a change in real interest rate, affects changes in deposits and loan causing fluctuations (Talavera, et al., 2012).

According to statistics of Iran, due to the high inflation rate, the real interest rate on deposits have been negative in many years. Decreasing interest rates on the banks' deposits has negative effects on the status of banks, without considering the macroeconomic indicators such as production and inflation. In this regard, if the interest rate on deposits decreases, the owners of the long-term deposits faced with a reduction in the received interest will seek to change their portfolio. For example, they will transfer their assets to the visual deposits and use them for profitable activity in the parallel markets (such as stock markets, real estate, gold, etc.) or use their resources to gain more profits in the

unorganized market of money and other investment opportunities. Such a process will result in the creation of price bubbles in the stock market, real estate, gold, etc., and ultimately inflationary pressures in the country. This change in the composition of the portfolios and deposits for more liquidity can increase the turnover rate, which in turn exacerbates inflation (Baum, et al., 2006).

Uncertainty in macroeconomic indicators, such as economic growth rate, will have a large impact on financing and investment of SMEs. With regard to the impact of the economic uncertainty on the banks' lending behavior, Bernanke and Gretler (1995) believe that inappropriate monetary policy, as an important factor affecting the macroeconomic stability, reduces the lending of the commercial banks. Bernanke and Blinder (1992) also indicate that such monetary policy could lead to an indirect reduction in expenditures arising from a reduction in bank loan supply. It is because inflating liquidity reduces the deposits on the banks' balance sheet debts.

One of the main challenges of the current Iranian economy is the existence of uncertainties in some economic indicators, making the SMEs unpredictable financially. Thus, this study seeks to explain the role of the economic growth uncertainty in financing SMEs in the Iranian economy.

3- The Literature Review

Tayebi, et al. (2013) have examined the effect of supply of the banking facilities on financing 20 fieldworks of the SMEs operating in the Iranian economy through designing a panel investment econometric model and its apply GMM for estimation throughout 1994-2011. Based on the estimation results, banking facilities have a significant and positive effect on the financing investment of SMEs. However, they have not investigated the role of macroeconomic uncertainties in financing SMEs.

Karimi Takanloo (2013) investigated the impact of the credit granted to the SMEs on entrepreneurship and job creation during 2005 to 2010 using the Panel Data method. The results of this study showed that the employment rate and the number of cooperative enterprises were affected negatively because of fluctuations in financing economic corporation. Ghazi Noori et al. (2017) stated that knowledge-based companies play a major role in the competitiveness of the countries. Proper financing is one of the most important challenges for the survival and growth of such companies, which use various financial tools in order to finance their investment and production. The study analyzed the clusters of 251 knowledge-based companies, as a new structure including four clusters of small manufacturers, small and old service providers to identify the financial characteristics of these clusters.

Fidrmuc, et al. (2006) investigated the effect of bank loans on financing SMEs. They concluded that banks face numerous risks in granting loans to SMEs in which one of major risks is uncertainty in the re-payment of the loans. The

sample was cross section of 700 short-term bank loans granted to SMEs from 2000 to 2005 in Slovakia. The results showed that 6% of SMEs have failed in repayment of the loans. Using the probit panel methods, they showed that liquidity and profitability were two important determinants in granting a loan to the SMEs. Tambunan (2006) investigated the financing problems of the SMEs in Indonesia using the Delphi method in 2005. Indicating that the main problem for these enterprises was the lack of financing. He explained that the small and medium-sized enterprises were not only factors for tackling the unemployment problem, but also a driving force for the economic growth. In two studies, Beck et al. (2008 and 2009) explained how facilities of 90 banks financed SMEs in 45 different countries, focusing on the SMEs' financing characteristics. They concluded that lending to these enterprises were beneficial, in which the relevant return was different in developed and developing economies. Accordingly, the developed economies achieved higher returns because of the greater efficiency of the corporations.

Apoga (2014) reported that access to financial resources represents one of the most important challenges of the entrepreneurs in small and medium-sized enterprises. Understanding the financial needs of these enterprises and entrepreneurs was critical to ensure the growth and development of small and medium-sized enterprises. This study investigated the problems of financing of the small and medium-sized enterprises in the three Baltic countries and highlighted the importance of alternative sources for external financing for developing countries, such as supporting the design and evaluation of the policy measures and monitoring the consequences of financial reforms on the access of the small and medium-sized enterprises.

Yoshino and Taghizadeh (2018) argued that the problem of access to financial resources was one of the critical factors limiting the development of the small and medium-sized enterprises in Asia. Presenting a theoretical model and empirical analysis, they study examined the factors that determine the optimal reliability ratio. This ratio was at a level that achieved the government's goal of optimizing the bank loans to SMEs and achieved the government's goal of supporting policies for these SMEs by reducing the information asymmetry.

Consequently, the findings of the literature show that three factors determine the optimal credit guarantee ratio: the government policy, the macroeconomic conditions, and the banks' behavior. Moreover, to prevent the moral hazards and ensure the stability of granting a loan to SMEs, governments should set the optimal credit guarantee ratio based on the macroeconomic conditions and define it for each bank or a group of banks. The review of the literature implies many studies have shown the significant roles of SMEs in economies, with a special focus on job creation and increasing the economic growth, and the ways of financing these enterprises. However, a limited number of studies have examined

the uncertainty of the economic growth rate and the financing of SMEs through banking facilities. Such studies refer to the effects of uncertainty on investors' decisions and macroeconomic indicators in most countries, but they have not referred to the effects of such uncertainty on financing firms.

Hence, the current study seeks to evaluate the effect of the economic growth uncertainty on financing of Iran's SMEs to provide policy recommendations for financing this type of enterprises based on the empirical findings.

4- The Model

Following the literature such as Nazarpour et al. (2017), Hajidolabi (2018) and Palachinsanchez et al (2010), a functional form of the SMEs' Financing model for Iran is defined as follows:

$$Y = f(X, W, Z) \quad (1)$$

where *Y*, a dependent variable, stands for financing the selected SMEs. Accordingly, the amount of credits and credit loans that companies receive from banks for production and investment is shown as a proxy of the dependent variable. *X*, *W* and *Z* denote three different sets of the explanatory variables.

Z denotes the variable of the growth rate uncertainty, which is the main explanatory variable in the model to explore the effect of such uncertainty on financing SMEs. Accordingly, we measure it by the method of Geometric Brownian Motion (GBM), used mostly in the literature (Paddock et al., 1988; Brennen and Schwartz, 1985; McDonald and Siegel, 1985). In this sense, an uncertainty variable is expected to grow at a constant rate, so that the variance of future values of the variable increases proportionally to an increase in time. If the value of the variable increased is less (more) than expected values, all future predictions will decrease (increase) at the same rate.

Other explanatory variables are classified into two parts consisting of W (as inter-organizational variables) and X (as macroeconomic variables). W variables are defined as:

W_1 = Profitability (pre-tax ratio of profits to total assets)
W_2 = Debt ratio (total debts to total assets)
W_3 = Company age (time passed from the activity of the company)
W_4 = Return on assets (net assets to total assets)
W_5 = Cash inventory and deposits to total assets
W_6 = Size (total assets)
W_7 = Asset structure (ratio of the assets to total assets)

In addition, the set of X variables are defined as follows:

X_1 = GDP
X_2 = Inflation rate

We estimate an econometric model using the panel approach to explore the effects of the aforementioned explanatory variables, including economic growth rate (denoted by *Z*) on the finance variable of the selected Iran's SMEs (denoted

by *Y*) through the bank credits. Equation (2) re-specifies Equation (1) in form of a panel framework as follows:

$$Y_{it} = \alpha + \alpha_i + \sum \beta_{k1} W_{k1t} + \sum \beta_{k2} X_{k2t} + \gamma Z_{it} + U_{it} \quad (2)$$

where *k1* = 1, 2, …and 7 and *k2* = 1 and 2. *i* and *t* stand for individual (each SME) and time, respectively. α_i and *U* denote individual effects and the error term of the regression equation, respectively.

There are some debates in the literature over the most appropriate stochastic models for the uncertainty assessment. Some studies conducted in this area assume that the measurement of an uncertainty variable is a stochastic step and is represented by Geometric Brownian Motion (Pindyck, 1999; Postali and Picchetti, 2007). In such models, the relevant variable is expected to grow at a constant rate, so that the variance of the future variable increases proportionally to an increase in time. If the growth rate increases less (more) than the expected value, all future predictions will decrease (increase) at the same rate. The Brownian motion model is defined as $dZ = \mu dt + \sigma d\varepsilon$. The variable that includes a stochastic component, a part of its changes is affected over time by the expected mean μdt, and another part of its changes is stochastic $\sigma d\varepsilon$. Thus, the first component implies that the expected rate of Z growth for each time period is μ, while the second component is considered as a disturbance defined to the variable motion. The value of this disturbance σ is equal to the Wiener process, so in a small period, the change in p-value is as follows:

$$\Delta Z = \mu \Delta t + \sigma \varepsilon \sqrt{\Delta t} \quad (3)$$

Indeed, ΔZ has a normal distribution with a mean of $\mu \Delta t$ and variance of $\sigma^2 \Delta t$ (Postali and Picchetti, 2007).

To calculate the uncertainty using the Brownian method, the differential Equation *S* is as follows:

$$dS_i = r S_i dt + \sigma_i S_i dW \quad (4)$$

where it can be re-specified as follows:

$$S_i(T) = S_i(0) \exp\left(\left(r - \frac{1}{2}\sigma_i^2\right) T + \sigma_i W_i(T)\right) \quad (5)$$

where $W_i(T)$ has been distributed normally with a mean of zero and T variance. Using MATLAB, we measure the results of the Brownian uncertainty in different scenarios as shown in Figure 1.

These scenarios are extracted from relevant time paths by simulating 1000 states, and then are formed by changing the mean of the Iran's growth rate and its hange in the variance or residual mean (mean of $\mu \Delta t$ and variance of $\sigma^2 \Delta t$). More specifically, by modifying the mean and variance, MATLAB considers different scenarios for the variable in order to reach its smoothed trend.

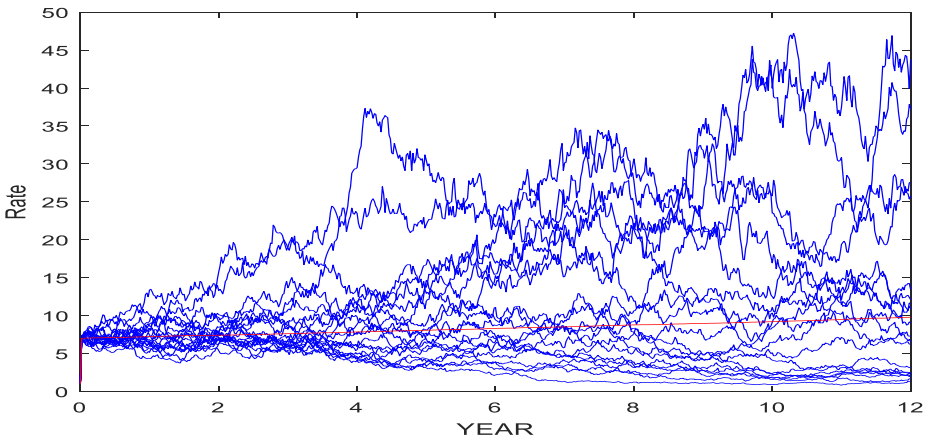

Figure 1: Simulation of the time paths using the Brownian method

Source: Authors

According to different definitions and criteria of the SMEs in different countries, we have considered those companies with less than 100 employees as the selected SMEs and collect the relevant data based on screening and the active companies over the period 2011-2017. For this purpose, we select a group of the Iranan SMEs in such a way the Comprehensive Database of All Listed Companies (CODAL) system has published their financial data during the period and extracted in accordance with the systematic elimination procedure through applying the following conditions:

1- The data have been published in the CODAL system from 2011 to 2017.

2- Each SME should not be among the investment and financial intermediary companies.

3- The availability of data seems to be significant.

4- The financial year of the companies is the last day of a given year and it does not change during the period under consideration.

According to Table 1, the sample size includes totally 70 Iranian companies, which have been determined under the procedure already described.

Table 1: The procedure of selecting the Iranian companies as the number of the SMEs

Description	Number of companies
Total number of small and medium-sized companies listed in the stock exchange in 2017	180
The financial year of the companies has not ended in the last day of a given year and it has been changed during the study period	42
The companies that are among the investment and financial intermediary intermeditary ones	38
The companies whose information is incomplete	30
Number of the sample companies	70

Source: Compiled by Authors

5- Empirical Results

It is necessary to test the stationarity of all the variables used in in Equation (2) for the reliability of the model estimation. Using Levin-Lin-Chu (LLC) test, the null hypothesis rejects the stationarity of the variables while the alternative hypothesis cannot reject the stationarity. Table 2 presents the results of the stationarity test on the research variables, in which all variables of the model are stationary at the 5% significant level.

Table 2: The results of the stationarity LLC test on the model variables

Variable	Levin–Lin–Chu Statistic	Probability	Result
Y	-90.542	0.000	Stationary
Z	-10.997	0.000	Stationary
W_1	-4.641	0.000	Stationary
W_2	-8.069	0.000	Stationary
W_3	-23.98	0.000	Stationary
W_4	-14.772	0.000	Stationary
W_5	-4.245	0.000	Stationary
W_6	-4.452	0.000	Stationary
W_7	-4.457	0.000	Stationary
X_1	-4.865	0.000	Stationary
X_2	-4.201	0.000	Stationary

Source: Authors

Table 3 summarizes the results of the selected diagnostic tests applied to the model. Due to the use of pooled data, the F-Leamer test is used to select between the panel data method and pooled data method in the process of the model estimation. Based on the results of the test shown in Table 3, the use of panel data method is accepted for model estimation. In addition, the result of Hausman test applies the method of "Fixed Effects" against the "Random Effects" method, in which the use of fixed effect is adopted for the model estimation. According to the result obtained by Wooldridge test, there is no autocorrelation of the model residuals. In addition, the result obtained by the Modified Wald Test implies no variance heteroscedasticity in the model.

Table 3. Results of the selected diagnostic tests applied to the model

F-Leamer Test		
Statistic	Probability	Result
3.471	0.000	Panel Data
Hausman Test		
Statistic	Probability	Result
54.205	0.000	Fixed Effects
Wooldridge Test		
Statistic	probability	Result
1.332	0.2782	No Autocorrelation

Source: compiled by Authors

Table 4 reports the estimation results of the SMEs finance model, which has been obtained by the Fixed Effects method over the period 2012-2017

Table 4. Empirical results of the listed Iranian SMEs finance model (Dependent variable: bank financing)

Variables	**Coefficient**	**SD**	**Statistic t**	**P-value**
W_1**: Profitability**	3.655	1.334	2.738	0.006
W_2**: Debt Ratio**	-0.099	0.050	-1.961	0.050
W_3**: Company Age**	0.161	0.069	2.337	0.019
W_4**: Asset Return**	0.027	0.005	4.760	0.000
W_5**: Cash Inventory**	-0.00786	0.000	-2.626	0.001
W_6**: Size**	0.454	0.141	3.213	0.001
W_7**: Asset Structure**	0.0000251	0.0000812	0.309	0.757
X_1**: GDP**	0.002	0.000	2.291	0.022
X_2**: Inflation Rate**	-3.133	0.920	-3.402	0.000
Z**: Uncertainty of Economic Growth Rate**	-0.00287	0.000948	-3.027	0.004

Source: Authors

Based on the empirical results reported by Table 4, the estimated coefficient of the economic growth rate uncertainty has a significant and negative sign at the 5% significance level, indicating the negative effect of Iran's growth rate uncertainty on financing of the listed SMEs during the period 2011-2017. Hence, such uncertainty causes changes in the decision-making of the economic agents that ultimately affect their investment and entrepreneurial activities. Uncertainty in the economy leads to a reduction in the investment and makes the economy less stable. However, due to a certain situation, the investors will show a higher tendency to use the banking facilities, because when the economic growth is positive, the investors will be more able to repay the facilities through an increased income.

The result also shows that the uncertainty in economic growth leads to an investment risk followed by increasing credit risk for the company and reduced access to banking facilities. In addition, volatility in the growth rate will lead to increasing macroeconomic risk and ultimately reducing production and sales of

the SMEs in practice. This result confirms the results of the studies conducted by Yushino et al. (2018) and Tambunan (2006).

In addition, the results reported in Table 4 show that intra-organizational variables, except for debt ratio, have had positive and significant effects on the financing of the listed Iranian SMEs. Hence, strengthening of the factors such as the age and experience of the enterprise, cash inventory, size, profitability of the enterprise operations, returns and structure of the enterprises can lead to improvements in financing of the enterprises for investing. Improvement of the country's economic capacity, as reflected in economic gross production growth, has also a significant effect on the financing of the selected SMEs. In contrast, a significant increase in inflation jeopardizes economic security and investment and limits the financing of the Iranian firms. The adjusted coefficient of determination value is 0.71 and the variables used in the model show that the explanatory power of the model is 71%, which is considered as an acceptable value as the panel data method was used.

6- Conclusion

Our empirical findings have indicated that the uncertainty of economic growth rate has significant and negative effect on bank financing of the selected Iranian SMEs. It suggests that increasing the volatility and the uncertainty of the economic condition leads to an investment risk that ultimately results in a rise in credit risk of a firm and a reduction in availability of the bank facilities. These results have been consistent with the financing theories and the results of the studies conducted by Yoshino and Taghizadeh (2018) and Apoga (2014). The uncertainty of macroeconomic indicators, such as economic growth, will have a great impact on financing and investment in the companies.

With regard to the effect of the economic uncertainty on the bank lending behavior, Bernanke and Gretler (1995) argue that contractionary monetary policy (an important factor affecting the macroeconomic stability) reduces the lending of the commercial banks. Bernanke and Blinder (1992) also show that contractionary monetary policy leads to an indirect reduction in the expenditures through a reduction in banking loan supply, since monetary contractions reduce deposits on the side of banks' balance sheet debts. Hence, the implication is the uncertainty may result in contractionary monetary and fiscal policies disturbing the Iranian SMEs financing.

According to the empirical results obtained by this study, we recommend the managers and authorities in the field of small and medium-sized enterprises in Iran to take a step in conjunction with the growth and development of these enterprises in order to reduce the volatility and uncertainty in the economic growth rate of the whole economy. This issue can result in improved financing and growth of the SMEs in Iran. The most important finding of the present study

indicated the negative impact of uncertainty of economic growth on financing in the Iranian SMEs. This may imply that it is necessary to adopt sustainable strategy to strengthen Iran's manufacturing organizations by reducing financial obstacles, fighting against the economic corruption, improving the economic relationships with the world economy could make such firms benefited from the financial and investment resources to continue their economic activities more efficiently.

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اثر نااطمینانی رشد اقتصادی بر تامین مالی بنگاه‌های کوچک و متوسط در ایران

چکیده

امروزه بنگاه‌های کوچک و متوسط هم در اقتصادهای در حال توسعه و هم در اقتصادهای توسعه یافته از جایگاه ویژه‌ای برخوردارند. هر چند نااطمینانی شاخص‌های کلان اقتصادی همچون رشد اقتصادی، تاثیرات فراوانی بر تامین مالی و سرمایه‌گذاری بنگاه‌های کوچک و متوسط در هر اقتصاد خواهد داشت. پژوهش حاضر به‌دنبال آن است تا به طور مشخص به موضوع نقش نااطمینانی نرخ رشد اقتصادی بر تأمین مالی بنگاه‌های کوچک و متوسط بپردازد. برای این منظور از رهیافت حرکت براونی برای محاسبه و ارزیابی اثر نااطمینانی نرخ رشد اقتصادی استفاده شده است. جامعه آماری مطالعه، شرکت‌های کوچک و متوسط ایرانی است که اطلاعات مالی آنها در سامانه جامعه اطلاع‌رسانی ناشران (کدال) منتشر می‌شود. این شرکت‌ها با تعریف تعداد کارمندان کمتر از ۱۰۰ نفر طی دوره زمانی ۱۳۹۰ تا ۱۳۹۶ بررسی شده‌اند. نتایج تجربی تحقیق نشان می‌دهد که اثر نااطمینانی نرخ رشد اقتصادی بر تامین مالی بنگاه‌های کوچک و متوسط در ایران منفی و معنادار بوده است، به طوری که یک چالش اثربخش برای بنگاه‌های کوچک و متوسط در تامین مالی آنها برای سرمایه‌گذاری مولد به حساب می‌آید.

کلمات کلیدی: ایران، بنگاه‌های کوچک و متوسط، تامین مالی، رشد اقتصادی، نااطمینانی.

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