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Investigate the impact of financial market risks on the value of financial assets

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Abstract

The present study aims to investigate the impact of financial market risks on the value of financial assets. In this study, first, by studying the research literature, financial market risk indicators including bad economic uncertainty and good economic uncertainty were identified. Then, the most important indicators from the perspective of experts were determined by the pairwise comparison questionnaire and AHP method. In the next step, the uncertainty indices were calculated by GARCH regression and derivation of conditional standard deviation. Then, the effect of financial market risks on the value of financial assets was examined by VAR regression. The statistical population of the data is related to the financial market and macroeconomy of Iran in the period 1986-2020. The results showed that the response of consumption of financial assets to the uncertainty of the stock index in different periods is high and increasing and the reaction of consumption of financial assets to the uncertainty of economic growth is negative. The production of financial assets is not affected by stock market uncertainty and economic growth uncertainty. Stock market profits are not initially affected by stock market uncertainty, but in later periods this effect increases and stock market profits react negatively to economic growth uncertainty. The reaction of stock market income to stock market uncertainty and economic growth uncertainty is very small. The reaction of stock market investment to stock market uncertainty and economic growth uncertainty is very strong and negative. Also, the stock market risk rate does not have much effect on stock market uncertainty and economic growth uncertainty.

Keywords: financial market risks, value of financial assets, good economic uncertainty, bad economic uncertainty
2020 MSC: 91B05, 91G45

Introduction

The global financial crisis in 2008 and the other next financial crises in Europe proved that the impact of uncertainty on financial markets should be investigated more. Federal Open Market Committee (FOMC) in 2009 and the International Monetary Fund (IMF) in 2012 claimed that uncertainties regarding tax, cost, monetary and regulatory policies in the United States and Europe occured in some extent during the recessions in 2007-2009 [3]. As a result, researchers have since examined a variety of uncertainties to examine its impact on the economy [30].

It is important to identify the components of financial risk for effective risk management. In recent years, there have been lots of regional financial crises, such as the threatening US crisis and the European debt crisis, some of which

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have even turned into global financial crises and have had negative impact on international financial markets. In 2020, the COVID-19 epidemic resulted in a global market downturn. In this regard, assessment of financial transmission has become a major concern for applicants and academics. However, the available studies are mainly conducted with focus on a specific time horizon and does not consider the significant prevalence of risk by using information from different time zones that it can provide a more valuable basis for investors and regulatory bodies for decisions regarding risk management at different long-term and short-term frequencies [39]. Erb et al. [25] studied various risk measures and found that financial risk is the most important factor in predicting stock returns. Therefore, in this study, we investigate financial risk. The Economic Policy Uncertainty Index (EPU) introduced by Baker et al. [3] consists of three components: tax code expiration data, economic forecasting disagreement and the availability of articles in famous newspapers containing a combination of words reflecting economic policy uncertainties such as "economy", "uncertainty" and "regulations".

Fluctuations regarding asset prices and their related uncertainty are one of the most important macroeconomic variables that affect the value of financial assets in different parts of the economy in different aspects. Since the fluctuations and their related uncertainty do not have the same effect on all values of financial assets and sectors of the economy, it is important to study how these changes affect. Good and bad uncertainties have different effects on risk-taking, and the effects will have different behavioral consequences for economic actors. Therefore, distinguishing between good and bad uncertainties, as well as examining their effects on risk fluctuations and examining the effect of the fluctuations on the value of financial assets would allow economic actors to have better investment or consumption when they determine policies [45].

Therefore, this study aims to investigate the impact of financial market risks on the value of financial assets. In the next section, we will discuss the research literature, research methodology, findings, and conclusions and recommendations.

Literature and research background

The effect of uncertainty on the economy has been studied using various criteria of policy uncertainty. According to Preliminary studies on this topic by Bloom [9], policy uncertainty resulted in a rapid decline, and then, rapid increase in total production and employment rate. When there is policy uncertainty, companies stop investing and refuse to employ workers, because these actions are relatively irreversible. Many studies were conducted on macro uncertainty by Bijsterbosch [7] and Jurado et al. [32] and many studies were conducted on employment uncertainty by Leduc [35] and Caggiano [15], who have emphasized that periods of high uncertainty would be associated with declined stock prices and declined economic development. There is evidence of declined stock prices as a result of government policy uncertainty in another study conducted by Pastor & Veronesi [41] on changes in government policy. The Economic Uncertainty Index (EPU) has been usually used in related studies. Wang et al. [47] examined whether commodity prices predict the EPU. According to Li [36], the EPU can explain the period of stock returns in China; Gao et al. [28] concluded the same for the UK. In addition, economic policy uncertainty and stock market returns have also been studied using various methods, such as dynamic conditional correlation [2]; quantitative regression and wavelet coherence have also been studied by Das and Kumar in 2018.

Segal et al. [44] demonstrated that the set of uncertainties is divided into "good" and "bad" fluctuations; that is, do shocks improve macroeconomic indicators or is the impact of the shocks on the economy and macroeconomic indicators negative? Examining the positive and negative effects would result in predicting good and bad uncertainties; because economic actors make changes in the rate of their consumption, savings and investment based on their predictions of the future; it would determine their level of risk-taking.

In addition, the studies conducted by by Longin and Solni [37], Ang and Chen [1], Patton [42], Hong et al. [31], Elkamhi and Stefanova [23] and Engle and Mistry [24], Bali et al. [4], Bollerslev and Todorov [10], Kelly and Jiang [33], Cremers et al. [19], Bollerslev et al. [11], Bollerslev et al. [12], Chabi-Yo et al. [17], Farago and Tedongap [27], Barunik and Nevrla [6], Bondarenko and Bernard [13], Chabi-Yo et al. [17], Lu and Murray [38] and Orlowski et al. [40] are related to the recent literature in terms of pricing or the value of financial assets, and good risk and bad risk.

Researchers such as Serven [46], Bredin & Fountas [14], Kumo [34], Cronin et al. [20], Guglielminetti [29], Binder [8] and Ceylan [16] identified bad economic uncertainty in financial markets including inflation uncertainty, interest rate uncertainty, monetary growth uncertainty, stock index uncertainty, bad news and economic policy uncertainty. In addition, Dzielinski [22] introduced good economic uncertainty in financial markets including good news, economic development uncertainty, financial development uncertainty and production uncertainty. In other studies, good economic uncertainty including financial market liberalization [3], open capital accounts, and open trade have also been introduced [4].

In Iran, Sadeghi et al. [43] demonstrated that financial globalization according to the current situation in the studied countries would not result in a reduced stock market fluctuation due to the inefficient financial structure of oil-producing countries in the Middle East. Fallah Shams and Bani Sharif [26] concluded that in Iranian banks, there is market risk contagion, liquidity risk and credit risk, and the assets of banks with less liquidity are more exposed to liquidity risk than other banks. In addition, banks with delinquent claims have a greater role in the contagion of credit risk, and banks with positive open foreign exchange position (that their foreign exchange assets are more than foreign currency debt) have less market risk than banks with negative open foreign exchange position. Therefore, when we examine domestic and foreign studies, we find out that no study has been conducted so far on good and bad economic uncertainty and its impact on the value of financial assets in the country, which it indicates the gap between previous studies and the present study including the innovation.

Methodology

This research is an applied research in terms of purpose and is a descriptive-correlational research in terms of data collection. In this study, the indicators of good economic uncertainty and bad economic uncertainty (financial risks) have been identified using the research literature according to Table 1. According to the results, the indicators of bad economic uncertainty include inflation uncertainty, monetary growth uncertainty, stock index uncertainty and bad news. Indicators of good economic uncertainty also include good news, economic growth uncertainty, and the liberalization of financial markets.

In the next section, a questionnaire for pairwise comparison of the identified indicators was developed. These indicators were then ranked using AHP method and Expert Choice software to identify the most important indicators of good economic uncertainty and bad economic uncertainty. The statistical population in this section included professors and PhD students in the field of economics; 30 people of them were selected by random sampling; the statistical samples included 15 female and 15 male people as well as 10 university professors and 20 PhD students.

The most important indicators of good economic uncertainty and bad economic uncertainty were selected and then the indicators were measured using GARCH regression. Then, the AR regression Equation (0.1) of each index was estimated and the conditional criterion deviation in each model was considered as an index for the relevant variable.

Finally, in order to evaluate the purpose of the study, the impact of financial market risks on the value of financial assets was examined using VAR regression. The statistical population for regression analysis included capital market variables, national accounts and macroeconomic variables in Iran from 1986 to 2020. Regression analyzes were also performed using Eviews11 software.

Table 1: Indicators of good economic uncertainty and bad economic uncertainty

Variables	Indicators	References
Bad economic uncertainty	Inflation uncertainty	Serven [46], Bredin & Fountas [14], Kumo [34], Cronin et al [20], Guglielminetti [29], and Binder [8], Ceylan [16].
	Monetary growth uncertainty	Serven [46], Bredin & Fountas [14], Kumo [34], Cronin et al [20], Guglielminetti [29], and Binder [8], Ceylan [16].
	Stock index	Serven [46], Bredin & Fountas [14], Kumo [34], Cronin et al [20], Guglielminetti [29], and Binder [8], Ceylan [16].
	Bad news	Serven [46], Bredin & Fountas [14], Kumo [34], Cronin et al [20], Guglielminetti [29], and Binder [8], Ceylan [16].
Good economic uncertainty	Good news	Dzielinski [22]
	Economic development uncertainty	Dzielinski [22]
	Liberalization of financial markets	Baker et al. [3]

GARCH model

If an autoregressive average model (ARMA) model is assumed for the error variance, the model is a generalized autoregressive conditional heteroskedasticity (GARCH) model.

In that case, the GARCH (p, q) model (where p is the order of the GARCH items σ^2 and q is the order of the

ARCH items ϵ^2), following the notation of the orginal paper, is given by

$$y_t = x_t' b + \epsilon_t$$
$$\epsilon_t | \psi_{t-1} \sim \mathcal{N}(0, \sigma_t^2)$$
$$\sigma_t^2 = \omega + \alpha_1 \epsilon_{t-1}^2 + \cdots + \alpha_q \epsilon_{t-q}^2 + \beta_1 \sigma_{t-1}^2 + \cdots + \beta_p \sigma_{t-p}^2 = \omega + \sum_{i=1}^{q} \alpha_i \epsilon_t^2 + \sum_{i=1}^{p} \beta_i \sigma_{t-i}^2$$

Generally, when testing for heteroskedasticity in econometric models, the best test is the white test. However, when dealing with series data, this means to test for ARCH and GARCH errors.

Exponentially weighted moving average (EWMA) is an alternative model in a separate class of exponential smoothing models. As an alternative to GARCH modelling it has some attractive properties such as a greater weight upon more recent observations, but also drawbacks such as an arbitrary decay factor that introduces subjectivity into the estimation.

GARCH (p, q) model specification

The lag length p of a GARCH (p, q) process is stablished in three steps:

1. Estimate the best fitting $AR(q)$ model
$$y_t = a_0 + a_1 y_1 + \cdots + a_q y_{t-q} + \epsilon_t = a_0 + \sum_{i=1}^{q} a_i y_{t-i} + \epsilon_t.$$
2. Compute and plot the autoccorrelations of ϵ^2 by
$$\rho = \frac{\sum_{t=i+1}^{T} (\hat{\epsilon_t}^2 - \hat{\sigma_t}^2)(\hat{\epsilon}_{t-1}^2 - \hat{\sigma}_{t-1}^2)}{\sum_{t=1}^{T} (\hat{\epsilon_t}^2 - \hat{\sigma_t}^2)^2}$$
3. The asymptotic, that is for large samples, standard deviation of $\rho(i)$ is $\frac{1}{\sqrt{T}}$. Individual values that are larger than this indicatee GARCH errors. To estimate the total number of lags, use the Ljung-Box test until the value of these are less than, say, 10% significant. The Ljung-Box Q-statistic follows χ^2 distribution with n degrees of freedom if the seqared reslduals ϵ_t^2 are uncorrelated. It is recommended to consider up to $\frac{T}{4}$ values of n. The null hypothesis states that there are no ARCH or GARCH errors. Rejecting the null thus means that such errors exist in the conditional variance.

VAR regression

VAR models (vector autoregressive models) are used for multivariate time series. The structure is that each variable is a linear function of past lags of itself and past lags of the other variables. As an example suppose that we measure three different time series variables, denoted by $X_{t,1}, x_{t,2}$ and $X_{t,3}$. The vector autoregressive model of order 1, denoted as VAR(1), is as follows:

$$x_{t,2} = \alpha_1 + \phi_{11} x_{t-1,1} + \phi_{12} x_{t-1,2} + \phi_{13} x_{t-1,3} + \omega_{t,1}$$
$$x_{t,2} = \alpha_2 + \phi_{21} x_{t-1,1} + \phi_{22} x_{t-1,2} + \phi_{23} x_{t-1,3} + \omega_{t,2}$$
$$x_{t,3} = \alpha_3 + \phi_{31} x_{t-1,1} + \phi_{32} x_{t-1,2} + \phi_{33} x_{t-1,3} + \omega_{t,3}.$$

Each variable is a linear function of the lag 1 values for all variables in the set. In a VAR(2) model, the lag 2 values for all variables are added to the right sides of the equations, In the case of three x-variables (or time series) there would be six predictors on the right side of each equation, three lag 1 terms and three lag 2 terms.

In general, for a VAR(p) model, the first p lags of each variable in the system would be used as regression predictors for each variable.

VAR models are a specific case of more general VARMA models. VARMA models for multivariate time series include the VAR structure above along with moving average terms for each variable. More generally yet, these are

special cases of ARMAX models that allow for the addition of other predictors that are outside the multivariate set of principal interest.

$$x_t = \Gamma u_t + \phi x_{t-1} + w_t$$

where $u_t = (1, t)'$ includes terms to simultaneously fit the constant and trend. It arose from macroeconomic data where large changes in the data permanently affect the level of the series.

There is a not so subtle difference here from previous lessons in that we now are fitting a model to data that need not be stationary. In previous versions of the text, the authors separately de-trended each series using a linear regression with t, the index of time, as the predictor variable. The de-trended values for each of the three series are the residuals from this linear regression on t. The de-trending is useful conceptually because it takes away the common steering force that time may have on each series and created stationarity as we have seen in past lessons. This approach results in similar coefficients, though slightly different as we are now simultaneously fitting the intercept and trend together in a multivariate OLS model.

Results

In this section, the results of AHP method, GARCH regression and VAR regression are analyzed.

AHP method

At this stage, the indicators of bad economic uncertainty and good economic uncertainty are ranked according to Figures 1 and 2, respectively. The incompatibility rate of both outputs is 0.05, which indicates the validity of the results. The ranking results suggest that stock index uncertainty with a weight of 0.391 and inflation uncertainty with a weight of 0.276 have the first and second ranks among the indicators of bad economic uncertainty. In addition, economic development uncertainty with a weight of 0.493 and financial market liberalization with a weight of 0.311 have the first and second ranks among the indicators of good economic uncertainty, respectively.

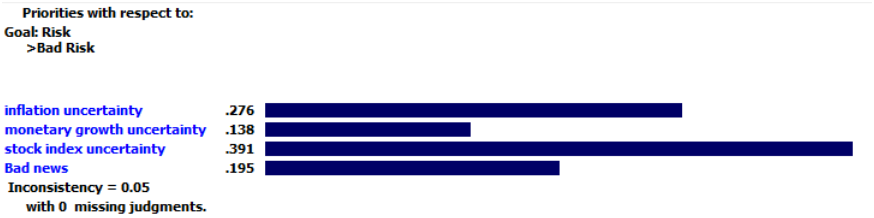

Figure 1: Ranking of indicators of bad economic uncertainty (Source: Research Findings)

Figure 2: Ranking of indicators of good economic uncertainty (Source: Research Findings)

GARCH regression

After selecting the final indicators for regression, these indicators must first be measured using the correct method. The models estimated as GARCH are as follows:

$$S = \beta_0 + \beta_1 S(-1) \tag{0.1}$$

$$\text{INF} = \beta_0 + \beta_1 \text{INF}(-1) \tag{0.2}$$

$$\text{EG} = \beta_0 + \beta_1 \text{EG}(-1) \tag{0.3}$$

$$\text{FL} = \beta_0 + \beta_1 \text{FL}(-1) \tag{0.4}$$

In the above equations, S indicates annual stock index according to the World Bank website. INF indicates annual inflation rate based on the growth rate of the CPI index according to the World Bank website. EG indicates annual economic growth according to the World Bank website. FL indicates Liberalization of financial markets, which was considered as a virtual variable of establishing private banks in Iran.

Therefore, it was considered zero for the years before 2001, when there was no private bank in Iran, and it was considered one for the years after 2001. Statistical data were collected for the variables related to 1986 to 2020.

The e LM Arch test was used to prove the variance heterogeneity of these variables according to Table 2. According to the results of Arch LM test, only the equations related to stock index and economic growth have inequality of variance and therefore only the uncertainty index can be created for these two variables. In the following, the GARCH regression will be estimated for Equations (0.1) and (0.3).

Table 2: LM Arch test results

Results	Probability level	F statistic	Equation index
Variance inhomogeneity	0.00	12.31	Stock Index (S)
Variance homogeneity	0.87	0.025	Inflation Rate (INF)
Variance inhomogeneity	0.00	5.061	Economic Growth (EG)
Variance homogeneity	0.86	0.030	Liberalization of financial markets (FL)

Source: Research Findings

To accurately estimate the models, different GARCH models were first tested at different levels, and the values of the Akaike and Schwartz criteria were recorded for each model. The model that provides the lowest value of the Akaike and Schwartz criteria is the most appropriate GARCH model. Accordingly, the GARCH model (2,1) for the stock index model and the GARCH model (1,1) for the economic development model have the lowest Akaike and Schwartz rates and are therefore selected as the appropriate models. Figures 2 and 4 show the time series related to the conditional standard deviation of stock index uncertainty and the conditional standard deviation of economic development uncertainty, respectively. Therefore, the time series of these two indices were entered into VAR regression.

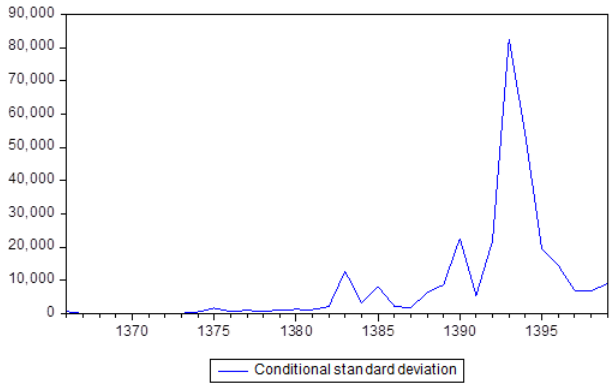

Figure 3: Conditional standard deviation for stock index uncertainty (Source: Research Findings)

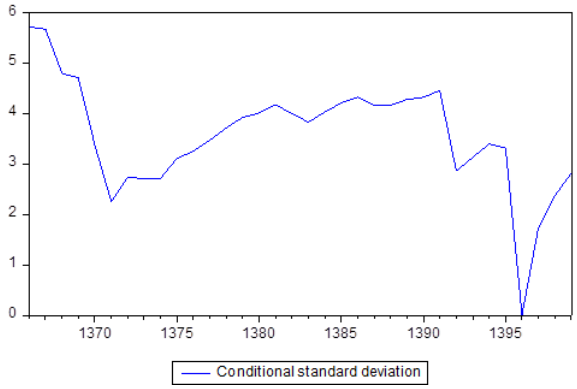

Figure 4: Conditional standard deviation for economic growth uncertainty (Source: Research Findings)

VAR Regression

In this section, the VAR model is used to investigate the relationship between financial risks and the price of financial assets. Financial risks include bad economic uncertainty (stock index uncertainty) and good economic uncertainty (economic growth uncertainty) as measured by GARCH regression. According to the study of Segal et al. [44], the value of financial assets includes consumption of financial assets, production of financial assets, stock market profit, stock market income, investment in stock market and stock market risk rate. The regression models estimated in this section are as follows:

$$C = \beta_0 + \beta_1 \mathrm{SR} + \beta_2 \mathrm{EGR} + \varepsilon_t \tag{0.5}$$

$$\mathrm{Pr} = \beta_0 + \beta_1 \mathrm{SR} + \beta_2 EGR + \varepsilon_t \tag{0.6}$$

$$\mathrm{Re} = \beta_0 + \beta_1 \mathrm{SR} + \beta_2 EGR + \varepsilon_t \tag{0.7}$$

$$\mathrm{Rev} = \beta_0 + \beta_1 \mathrm{SR} + \beta_2 EGR + \varepsilon_t \tag{0.8}$$

$$I = \beta_0 + \beta_1 SR + \beta_2 EGR + \varepsilon_t \tag{0.9}$$

$$\mathrm{RR} = \beta_0 + \beta_1 \mathrm{SR} + \beta_2 EGR + \varepsilon_t \tag{0.10}$$

According to the above equations:

Dependent variables are

C indicates the consumption of financial assets which is according to the Central Bank. Pr indicates the production of financial assets which is according to the World Bank as a production index at a fixed price in 2004. Re indicates stock market profits which is according to the Central Bank. Rev indicates stock market earnings which is according to the World Bank in proportion to GDP. I indicate investment in the stock market which is according to the World Bank in dollars. RR indicates the stock market risk rate, which is measured as a virtual variable by the financial crises from 1986 to 2016. Thus, number one was considered for the years of financial crisis in the stock market and number zero was considered for other years.

Independent variables are

SR indicates stock index uncertainty that was calculated in the previous step. EGR indicates economic growth uncertainty that was calculated in the previous step.

In this section, to determine the degree of co-integration of the VAR model, the variables were examined to find out that if they are static using the Augmented Dickey–Fuller (ADF) test in accordance with Table 3. If the probability level is higher than 0.05, the variables will be non-static and if the probability level is less than 0.05, they will be static. According to the results, the probability level of ADF statistic in all variables is higher than 0.05 and therefore all variables are non-static and are accumulated from the first degree. Therefore, co-integration models such as the VAR model can be used.

Table 3: ADF test results

Variable	ADF statistic	Level probability	Result
C	7.498	1.00	I(1)
Pr	0.538	0.87	I(1)
Re	3.912	1.00	I(1)
Rev	0.732	0.99	I(1)
I	-2.196	0.21	I(1)
RR	-2.842	0.06	I(1)
SR	-2.658	0.12	I(1)
EGR	8.854	0.96	I(1)

Source: Research Findings

In the next step, the optimal lag was measured based on the lowest criteria of Akaik, Schwartz and Hannan Quinn in all 6 models according to Table 4. According to the results, each lag that its value of the mentioned criteria is less, it is selected as the optimal lag. In the fifth model, each criterion represents an optimal lag. Therefore, lag 1 is considered as the optimal lag or the standard lag. At the end, the following lags are selected for each model: First model: lag 1; Second model: interrupt 2; Third model: lag 2; Fourth model: lag 2; The fifth model: lag 1 and the sixth model: lag 1.

Table 4: Optimal lag selection

Model	The dependent variable	Lag	Akaik	Schwartz	Hannan Quinn
First	Consumption of financial assets (C)	Zero	53.645	53.78	53.691
		First	*52.500	53.48*	52.68*
		Second	52.569	53.521	2.889
Second	Production of financial assets (Pr)	Zero	36.013	36.149	36.059
		First	32.442	32.98	32.626
		Second	*32.132	33.084	32.45*
Third	Stock Market Profit (Re)	Zero	46.00	46.138	46.068
		First	40.216	40.760 *	40.399
		Second	*40.035	40.988	40.356*
Fourth	Stock market revenue	Zero	31.854	31.990	31.900
		First	29.557	30.102	29.741
		Second	*29.020	29.972*	29.340*
Fifth	Investment in the stock market	Zero	71.360	71.496	71.406
		First	70.959	71.503	71.142*
		Second	*70.939	71.891	71.259
Sixth	Stock market risk rate	Zero	28.067	28.477	28.116
		First	27.933	28.203*	28.113*
		Second	*27.837	28.789	28.157

Source: Research Findings

In the following, the stimulus response functions are used to investigate the impact of financial market risks on the value of financial assets. Figures 5 to 10 show the stimulus response function for the first to sixth models in Equations (0.5) to (0.10).

The response of the consumption of financial assets to the uncertainty of the stock index in the first period is zero. But this reaction has increased from the second period and it has an increasing trend up to the fourth period. Then it decreases in the fifth period and its upward trend continues from the sixth to the tenth period. Therefore, in general, the reaction of financial assets consumption to stock market uncertainty is positive. The response of the consumption of financial assets to the uncertainty of economic growth in the first period is zero. But in the second period, this reaction is negative, and this reaction becomes less and more until the fourth period, respectively. From the fifth period onwards, this reaction increases negatively. Therefore, in general, the reaction of the consumption of financial assets to the uncertainty of economic growth is negative.

The response of the production of financial assets to the uncertainty of the stock index in the first period is zero. But from the second period, this reaction is not significant. In addition, except for the third and fourth periods, the reaction of the production of financial assets to the uncertainty of the stock index is negative. The response of the production of financial assets to the uncertainty of economic growth in the first period is zero. In this case, the reaction in next periods is also insignificant, and except for the second period, the reaction of the production of financial assets to the uncertainty of economic growth is positive.

The stock market profit response to stock index uncertainty in the first period is zero. In the second period, this reaction is negative and insignificant and in the third period, this reaction is positive and insignificant. From the fourth to the tenth period, the reaction increases with an upward trend, so that in the tenth period, the stock market profit response to the stock index uncertainty becomes 23.071. The response of stock market profits to the uncertainty of economic growth in the first period is zero. In the next periods up to the tenth period, there is a negative reaction with an increasing trend.

The response of stock market income to stock market uncertainty in the first period is zero. From the second to the tenth period, the reaction is very insignificant. The response of stock market income to the uncertainty of economic growth in the first period is zero. In next periods, this reaction is very insignificant.

The response of stock market investment to stock market uncertainty and economic growth uncertainty in the first period is zero. But from the second to the tenth period, the reaction is negative and very significant. These reactions are very significant in the first period and gradually decrease. Therefore, the reaction of investment in the stock market to the uncertainty of the stock index and the uncertainty of economic growth is very significant.

The response of the stock market risk rate to the uncertainty of the stock index and the uncertainty of economic growth in the first period is zero. From the second period onwards, the reaction is very insignificant.

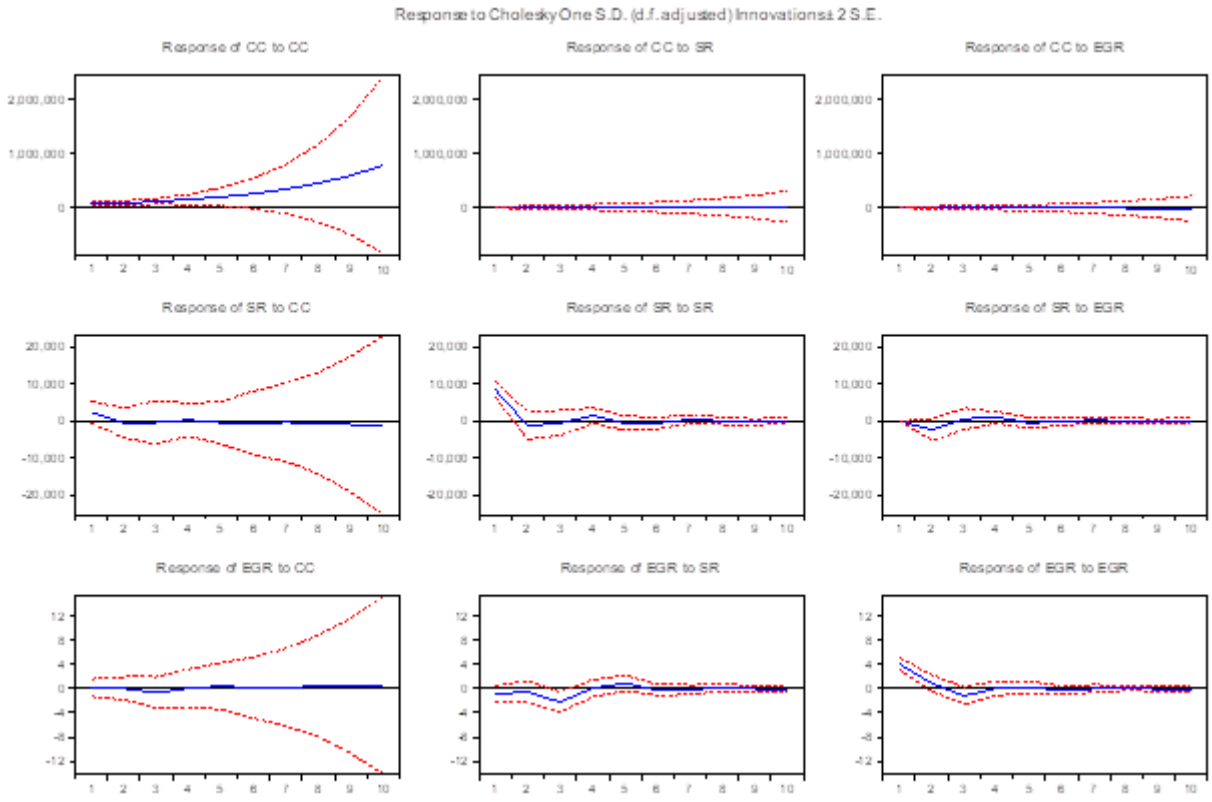

Figure 5: Stimulus reaction functions in the first model (Source: Research Findings)

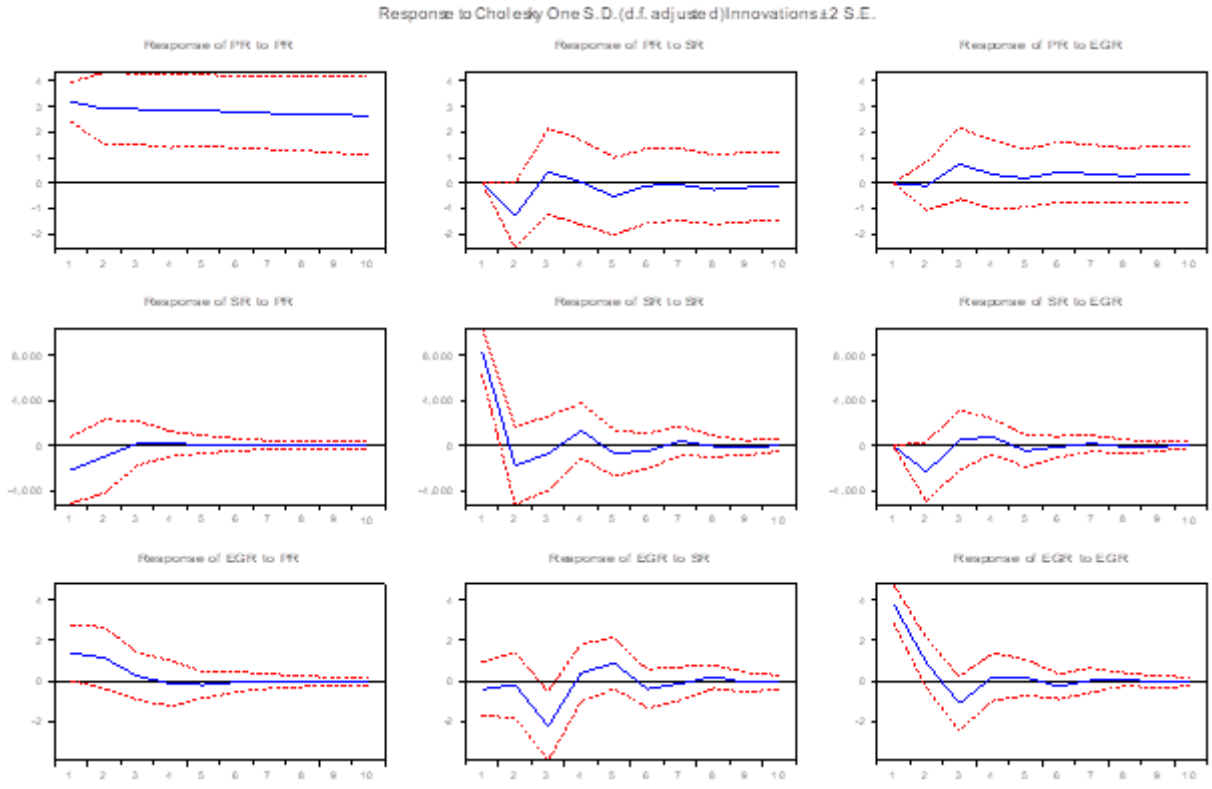

Figure 6: Stimulusreaction functions in the second model (Source: Research Findings)

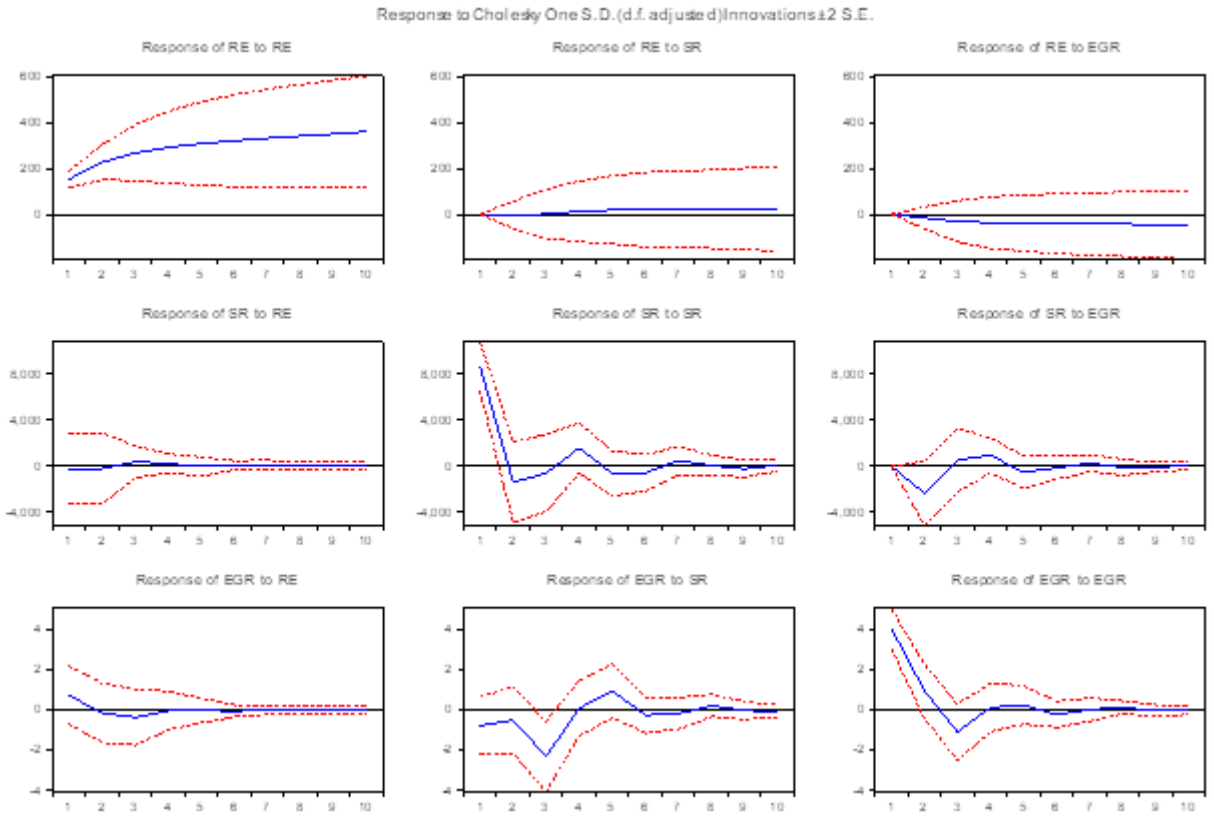

Figure 7: Stimulus reaction functions in the third model (Source: Research Findings)

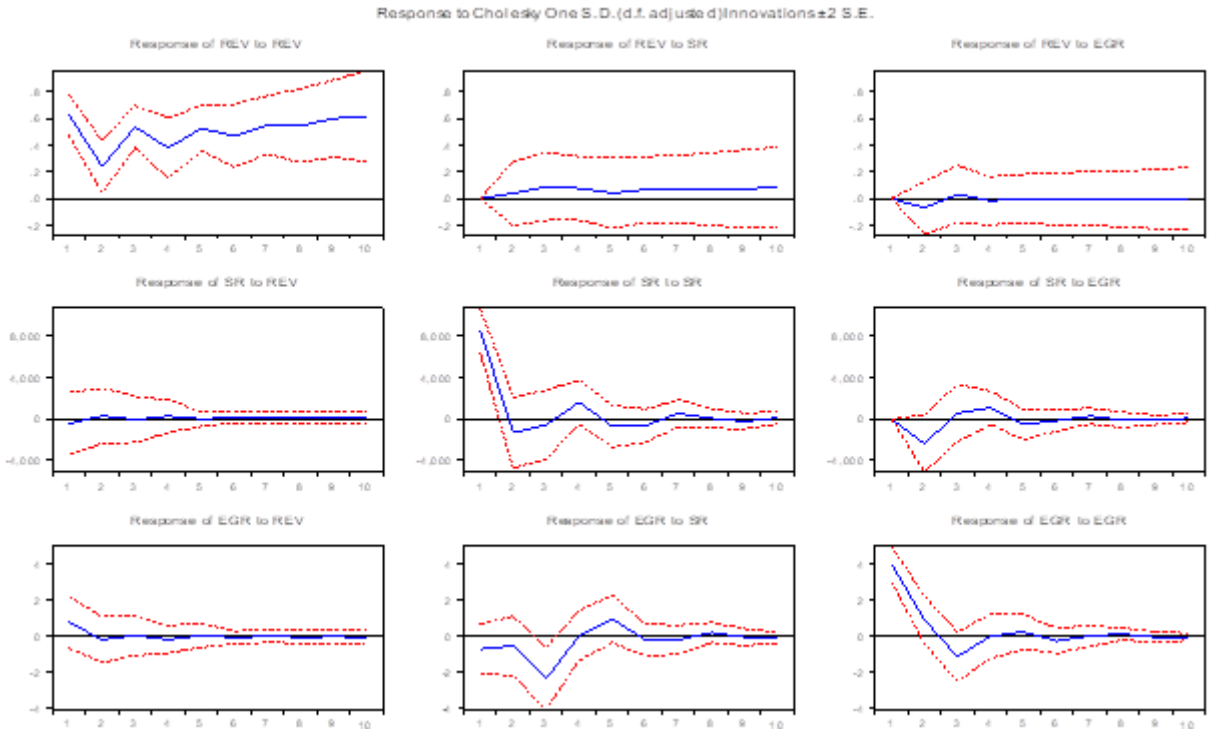

Figure 8: Stimulus reaction functions in the fourth model (Source: Research Findings)

Conclusion and discussion

Fluctuations in asset prices and its related uncertainty are one of the most important macroeconomic variables that affect the value of financial assets in different parts of the economy in different ways. Since the fluctuations and

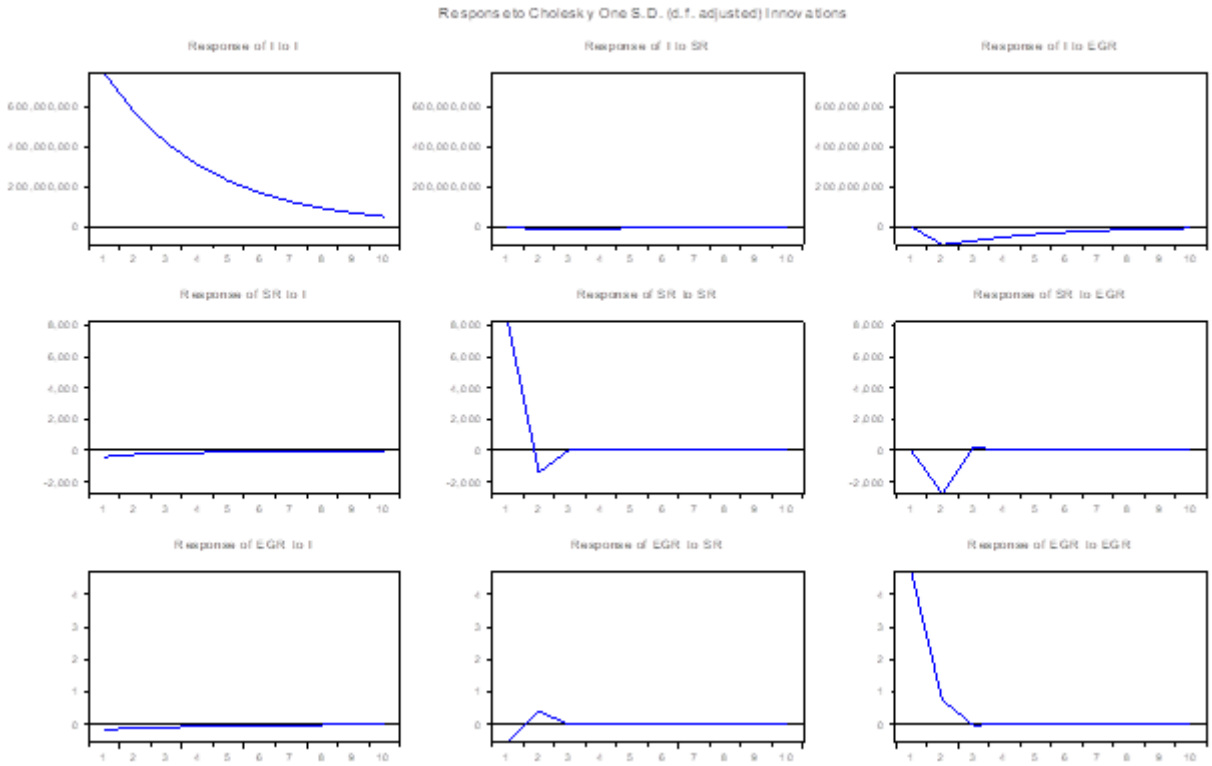

Figure 9: Stimulus reaction functions in the fifth model (Source: Research Findings)

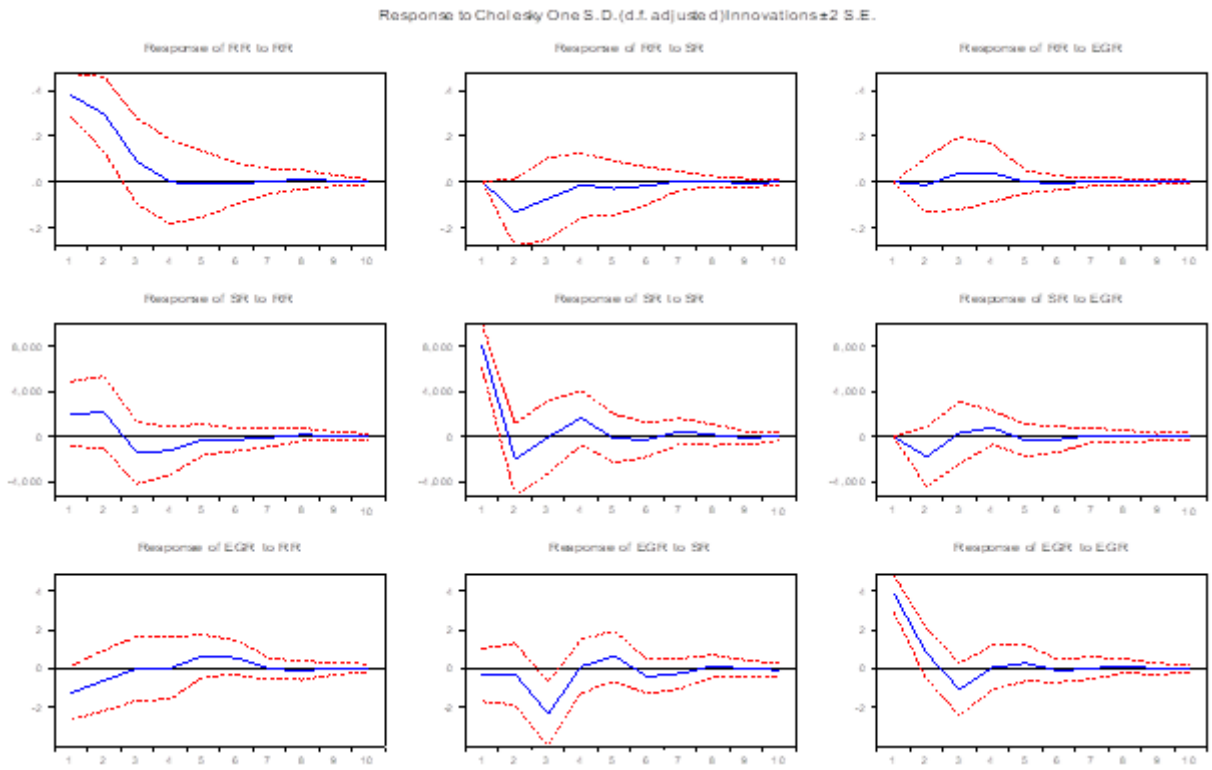

Figure 10: Stimulus reaction functions in the sixth model (Source: Research Findings)

its related uncertainty do not have the same effect on all value of financial assets and sectors of the economy, we should study how these changes affect. Accordingly, the present study was conducted to investigate the impact of financial market risks on the value of financial assets.

This research was conducted in three sections: AHP, GARCH and VAR. At first, after reviewing the research literature, the identified indicators for good economic uncertainty and bad economic uncertainty were ranked and the most important indicators entered the next stage. Then, the time series of conditional standard deviation of the indices was extracted using GARCH regression for entering VAR regression. Finally, the purpose of the study was evaluated using VAR regression.

According to the results of this study, the response of financial assets consumption to stock index uncertainty in different periods is significant and increasing. The results also suggest that the uncertainty of the stock index has a great role in the reaction of investors to the consumption of financial assets because it shows the changes in the price of the stock index and its risk during different periods. If stock prices are uncertain and investors are not accurately aware of the stock price situation, the consumption of financial assets will be significantly changed. However, the consumption of financial assets is positive in response to the uncertainty of the stock index, which shows that if stock prices are changed, investors of stock companies are more willing to consume financial assets, and it is a result that is not consistent with economic theories. However, since the price expectations is a very important issue in our country and investors and consumers always consider increased prices possible in the future, so the risk and uncertainty of the stock index would result in more consumption of assets. In addition, the reaction of the consumption of financial assets to the uncertainty of economic growth is generally negative. This result suggests that the uncertainty and fluctuations would reduce the consumption of financial assets due to economic growth because the uncertainty of economic growth would also create expectations for investors that prevent them from consuming financial assets.

The production of financial assets is not affected by the uncertainty of the stock index, because the production of financial assets is not generally affected by the stock price, because in any case, financial assets are generated and this trend be steady. In addition, the production of financial assets is not affected by the uncertainty of economic growth, which, as in the previous case, it is due to the stabile production of financial assets.

Stock market profits are not initially affected by the uncertainty of the stock index, but in next periods this will be affected significantly. Therefore, stock market profits in the long run may be for investors because of the risk they take. Stock market profits also react negatively to economic growth uncertainty and the negative reaction rate would increase over time. Therefore, due to fluctuations in economic growth, stock market profits would be reduced, and stock market profits would be affected by macroeconomic variables.

The reaction of stock market income to stock market uncertainty is very insignificant, which can be due to the fact that the production of financial assets does not react significantly in response to stock uncertainty, and stock market income is not changed significantly. In addition, the stock market response to the uncertainty of economic growth is very insignificant due to the stock market income, as in the previous case.

The reaction of stock market investment to stock market uncertainty and economic growth uncertainty is very significant and negative. These results may be due to the fact that the uncertainty of the stock index as well as the uncertainty of economic growth can encourage investors to invest in other sectors such as housing, bank deposits and the like. Therefore, investing in the stock market would be decreased significantly in response to the stock market uncertainty and economic growth uncertainty.

In addition, stock market risk rate is not affected significantly due to stock index uncertainty and economic growth uncertainty, and it may be due to the high impact of other factors on stock market risk rate, such as exchange rate fluctuations, inflation and the like.

According to the results, it is suggested that investors should not invest based on expectations of possible price increases in future and should consider other conditions for investment in order to prevent losses in the stock market. Since the production of financial assets is not affected by the uncertainty of the stock index and economic growth, uncertainty in other indicators such as inflation and exchange rates should be considered to generate financial assets. Since stock market profits in the long run are affected by the uncertainty of the stock index, investors should finance in various ways in order to increase their profits in the long run. In addition, since the reaction of investment in the stock market to the uncertainty of the stock index and the uncertainty of the economic growth index is very significant and negative, investors should invest in housing and capital goods when there is crisis or uncertainty.

References

[1] A. Ang and J. Chen, *Asymmetric correlations of equity portfolios*, J. Financ. Econ. **63** (2002), no. 3, 443–494.

[2] N. Antonakakis, I. Chatziantoniou, and G. Filis, *Dynamic co-movements of stock market returns, implied volatility and policy uncertainty*, Econ. Lett. **120** (2013), no. 1, 87–92.

[3] S. Baker, N. Bloom, and J. Davis Steven, *Measuring economic policy uncertainty*, Quart. J. Econ. **4** (2016), no. 131, 1593–1636.

[4] T. Bali and H. Zhou, *Risk, uncertainty, and expected returns*, J. Financ. Quantit. Anal. **10** (2016), no. 51, 707–735.

[5] T.G. Bali, K.O. Demirtas and H. Levy, *Is there an intertemporal relation between downside risk and expected returns?*, J. Financ. Quant. Anal. **44** (2019), no. 4, 883–909.

[6] J. Barunik and M. Nevrla, *Quantile spectral beta: A tale of tail risks, investment horizons, and asset prices*, Working Paper, Charles University, Czech Republic, 2019.

[7] M. Bijsterbosch and P. Guérin, *Characterizing very high uncertainty episodes*, Econ. Lett. **121** (2013), no. 2, 239-243.

[8] C.C. Binder, *Measuring uncertainty based on rounding: New method and application to inflation expectations*, J. Monetary Econ. **90** (2017), 1–12.

[9] N. Bloom, *The impact of uncertainty shocks*, J. Economet. **77** (2009), no. 3, 623–685.

[10] T. Bollerslev and V. Todorov, *Tails, fears, and risk premia*, J. Finance **66** (2011), no. 6, 2165–2211.

[11] T. Bollerslev, S.Z. Li, and V. Todorov, *Roughing up beta: Continuous vs. discontinuous betas, and the cross-section of expected stock returns*, J. Financ. Econ. **120** (2016), no. 3, 464–490.

[12] T. Bollerslev, S.Z. Li, and B. Zhao, *Good volatility, bad volatility and the cross-section of stock returns*, J. Financ. Quant. Anal. **55** (2020), no. 3, 751–781.

[13] O. Bondarenko and C. Bernard, *Option-implied dependence and correlation risk premium*, Working Paper. University of Illinois, Chicago, 2020.

[14] D. Bredin and S. Fountas, *Macroeconomic uncertainty and macroeconomic performance: Are they related?*, Manchester School **73** (2005), no. 1, 58–76.

[15] G. Caggiano, E. Castelnuovo, and N. Groshenny, *Uncertainty shocks and unemployment dynamics: An analysis of post-WWII US recessions*, Tech. Rep., Dipartimento di Scienze Economiche "Marco Fanno", 2013.

[16] O. Ceylan, *Time-varying risk aversion and its macroeconomic and financial determinants: A comparative analysis in the U.S. and French financial markets*, Finance Res. Lett. **41** (2021).

[17] F. Chabi-Yo, M. Huggenberger, and F. Weigert, *Multivariate crash risk. Working Paper*, University of Massachusetts, Amhurst, 2019.

[18] F. Chabi-Yo, S. Ruenzi and F. Weigert, *Crash sensitivity and the cross section of expected stock returns*, J. Financ. Quant. Anal. **53** (2018), no. 3, 1059–1100.

[19] M. Cremers, M. Halling and D. Weinbaum, *Aggregate jump and volatility risk in the cross-section of stock returns*, J. Finance **70**, no. 2, 577-614.

[20] D. Cronin, R. Kelly, and B. Kennedy, *Money growth, uncertainty and macroeconomic activity: A multivariate GARCH analysis*, Empirica **38** (2011), no. 2, 155–167.

[21] D. Das and S. B. Kumar, *International economic policy uncertainty and stock prices revisited: Multiple and partial wavelet approach*, Econ. Lett. **164** (2018), 100–108.

[22] M. Dzielinski, *Measuring economic uncertainty and its impact on the stock market*, Finance Res. Lett. **9** (2012), no. 3, 167–175.

[23] R. Elkamhi and D. Stefanova, *Dynamic hedging and extreme asset co–movements*, Rev. Financ. Stud. **28** (2018), no. 3, 743–790.

[24] R.F. Engle and A. Mistry, *Priced risk and asymmetric volatility in the cross-section of skewness*, J. Econ. **182** (2014), 135–144.

[25] C.B. Erb, C.R. Harvey and T.E. Viskanta, *Political risk, economic risk, and financial risk*, Financ. Anal. J. **52** (1996), no. 6, 29–46.

[26] M. Fallah Shams and A. Bani Sharif, *Contagion of Financial Risks in Banks Listed in Tehran Stock Exchange*

Using MGARCH Approach, Financ. Res. **23** (1400), no. 61, 87-107.

[27] A. Farago and R. Tedongap, *Downside risks and the cross-section of asset returns*, J. Financ. Econ. **129** (2018), no. 1, 69–86.

[28] J. Gao, S. Zhu, N. O'Sullivan, and M. Sherman, *The role of economic uncertainty in UK stock returns*, J. Risk Financ. Manag. **12** (2019), no. 1, 5.

[29] E. Guglielminetti, *The Effects Of Uncertainty Shocks on the Labor Market: A Search Approach*, 2013. `Http://Econ.Sciences-Po.Fr/Sites/Default/Files/Elisa.Pdf`.

[30] M. Helseth, S. Krakstad and P. Molnar, *Can policy and financial risk predict stock markets?*, J. Econ. Behav. Organ. **176** (2020), 701–719.

[31] Y. Hong, J. Tu, and G. Zhou, *Asymmetries in stock returns: Statistical tests and economic evaluation*, Rev. Financ. Stud. **20** (2006), no. 5, 1547–1581.

[32] K. Jurado, S.C. Ludvigson, and S. Ng, *Measuring uncertainty*, Amer. Econ. Rev. **105** (2005), no. 3, 1177–1216.

[33] B. Kelly and H. Jiang, *Tail risk and asset prices*, Rev. Financ. Stud. **27** (2014), no. 10, 2841–2871.

[34] W.L. Kumo, *Macroeconomic uncertainty and aggregate private investment in South Africa*, South Afr. J. Econ. **74** (2006), no. 2.

[35] S. Leduc and Z. Liu, *Uncertainty shocks are aggregate demand shocks*, J. Monetary Econ. **82** (2016), 20–35.

[36] X. M. Li, *New evidence on economic policy uncertainty and equity premium*, Pacific-Basin Finance J. **46** (2017), 41–56.

[37] F. Longin and B. Solnik, *Extreme correlation of international equity markets*, J. Finance **56**, no. 2, 649–676.

[38] Z. Lu and S. Murray, *Bear beta*, J. Financ. Econ. **131** (2013), no. 3, 736–760.

[39] C. Luo, L. Liu and D. Wang, *Multiscale financial risk contagion between international stock markets: Evidence from EMD-Copula-CoVaR analysis*, North Amer. J. Econ. Finance **58** (2021): 101512.

[40] P. Orlowski, P. Schneider, and F. Trojani, *On the nature of jump risk premia*, Working Paper, University of Lugano, 2019.

[41] L. Pastor and P. Veronesi, *Uncertainty about Government Policy and Stock Prices*, J. Finance **67** (2012), no. 67, 1219–1264.

[42] A.J. Patton, *On the out-of-sample importance of skewness and asymmetric dependence for asset allocation*, J. Financ. Econ. **2** (2004), no. 1, 130–168.

[43] S.K. Sadeghi, F. Bagherzadeh Azar and S. Mousavi, *Investigation of factors affecting stock market risk with emphasis on financial globalization in the form of dynamic behavior of stock market*, Asset Manag. Financ. **4** (2016), no. 1, 87–100.

[44] G. Segal, I. Shaliastovich and A. Yaron, *Good and bad uncertainty: Macroeconomic and financial market implications*, J. Financ. Econ. **117** (2015), 369–397.

[45] K. Sekścińska, J. Rudzinska-Wojciechowska, and D. Jaworska, *Self-control and financial risk taking*, J. Econ. Psycho. **85** (2021), 102386.

[46] L. Serven, *Macroeconomic Uncertainty And Private Investment In Developing Countries: An Empirical Investigation*, World Bank Policy Research Working Paper **2035** (1998), 1–34.

[47] Y. Wang, B. Zhang, X. Diao, and C. Wu, *Commodity price changes and the predictability of economic policy uncertainty*, Econ, Lett, **127** (2015), 39–42.