



## The Effect of Monetary Policies on Stocks Price Index of Banks; VAR-BEKK Model

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### ABSTRACT

The monetary policy in the frame of monetary transaction through stocks market affects the stocks' price that these prices also affect the economy with impacting consuming and investing expenses. In another word, based on the importance of monetary part in commercial banks, the effect of these policies on bank stocks has a great importance that is studied in his project. For this purpose, the data of instrument related to monetary policy and bank stocks index are evaluated monthly from 2006 to 2015 through VAR-BEKK method.

These results have presented the obvious effects from money market to capital market among banks and monetary policies of the central bank has a direct effect on stocks index of commercial banks in the way that the liquidity amounts and frequencies respectively have caused the increasing and frequency of stock price

### Keywords:

Monetary policy, Banks Stocks Index, Frequency, VAR-BEKK Model.



## 1. Introduction

The policies of central bank can be used as the criterion for evaluating monetary policies such as change of rate of legal deposit, banks debts to central bank and debt of private department to banks that shows the liquidity. According to the analysis of monetary policies shocks, the react of stocks price index against the changes based on legal deposit is reverse. It means through decrease of legal deposit in other word Expansionary policy, stocks index will be increased and vice versa. In another word, the decrease of legal deposit proportion increases the ability of giving banks loan and through the increase of money supply, the demand for stocks will be increased and market price index will be increased too. The increase in two variables, banks debts to central banks and private department debt to banks are two signs for increase of liquidity volume in economy. The increase in two variables means tensional monetary policy that increases the stock price index. Studying the shocks from liquidity changes also shows its positive impacts on stocks index. According to the importance of this subject in this research, the changes in monetary policy on index of banks members of Iran stock exchange are studied.

The stocks market (stocks exchange) is considered one of the most important financial markets because this market reflects the price of the assets in economy more than the other markets and usually it is so much sensitive according to economical situation. In the framework of monetary transaction through stocks market, monetary policy affects stocks price that these prices themselves affect the economy through consuming and investing expenses. Actually, people look to stock market as a source that is independent from macroeconomic frequencies that policy makers are trying to answer to these frequencies. The stock prices usually show obvious frequencies that can be led to worries in relation to stable deviation of stock price from its original value. So, this condition has improper results for economy. Therefore, the exact study of monetary policy changes on stocks market has much importance. In another word, the assets price is one of the other important variables in forming people's inflated expectations and forecasting central bank inflation. So, it cannot be left on the monetary policies based on inflations or exchange rate targeting. Achieving monetary policy based on the flexible inflation targeting through central bank will be

successful when the changes of assets price (such as stocks price) are mentioned in forecasting the rate of central bank inflation. Also, assets price is effective in money transaction in the determinant role of future inflation and the effect of wealth in consuming and assets effects on investing, on the volume of economical activities and fixing prices. From another side, according to the important role of banks in commercial ages, the changes of assets price has the most effect on balance sheet and the lake of financial balance of banks. Based on mentioned options, it is necessary that the central bank to consider the assets price changes (stock price) or their instabilities for determining its monetary instruments and applying its monetary policies. Therefore, studying the relation of monetary policy and financial assets price for achieving a better attitude about transferring monetary policy has a significant importance. This fact in relation to banking department and stocks index of existed banks in stock exchange market can extremely reflect this react to monetary policies in itself. Because the industry of banking is one of the important and propounded industries in the world and people's ever-increasing development knowledge in the field of being in stock exchange market has caused that this industry has gotten great interests. Nowadays, banks in developed countries playing role as a solution, professional and expert consultant in increasing financial sources of companies and saving and exchanging necessary information for their clients and they are considered one of economical movable motors for each country.

Therefore, this question will be answered in this research through the performed studies in the field of monetary policy, stocks market and especially commercial banks stocks relation in Iran economy that if there is a positive and meaningful relation between monetary policy and commercial banks stock index in Iran. If the answer of this question is positive, the result will show that the central bank can struggle with bubble of assets price in stocks market through applying monetary exchange and interference in assets market (stocks market).

## 2. Literature Review

Banks as the most important sources for providing financial requirements of economical institutions have an especial position in Iran capital market and bank abilities in providing financial needs are effective

considerably on economic activities and proceeds of Iran institutions. Therefore, considering efficiency and effectiveness of these financial systems have an especial importance in economy. Unfortunately, increasing process of producers' dissatisfaction has been experienced about lack of liquidity and ability of banks in providing their financial requirements in recent years while the present liquidity volume has been more than the last years in Iran.

Nowadays, banks' profitability is necessary and determinative for economical stability that can be considered based on macroeconomics and microeconomics. Financial markets are a good place for leading people's idle deposits toward product and providing economical companies and institutions capital through providing liquidity, decreasing transaction expense by dropping search and data expenses. One of the most important and popular financial markets in almost countries is stock market. Always, the behavior of stock market fluctuations has been studied and discussed. Because of importance of stocks markets in attracting small and big deposits, the subject of determining the effective factors on stocks market fluctuation has been considered always.

Financial markets are the effective ones in economy of every country. The downturn and prosperity of stock market in some countries have affected not only national economy but also world economy. For instance, economical crisis in 1929 (big crisis) started from New York stock exchange that confronted almost European and American capital countries to unexpected downturn and unemployment until 1933. Also, the crisis in 1997 that circumscribed eastern-south countries of Asia and affected the world economy especially Iran through reducing the mentioned countries demand for Iran petroleum and fall of oil price and started from mentioned countries stock exchange markets and led to other economical departments and the other countries economy. So, there is a significant relation between downturn and stock revelations and economical prosperity and mutually, macro policy makings in every country especially macroeconomics such as monetary variables affect the stock exchange of that country. In Iran economy, when efficiency of capital risk from fluctuation of economical macro variables is changed especially monetary variables for any reason, it can extremely affect capital options. The general proof in Iran economy shows the fact that investment in stock

exchange market generally shows reaction quickly against macroeconomics changes. Obviously, this is the factor that it can affect investment in stock exchange extremely. This fact paves the way for the field in expanding underground economy as much as possible and investment movement from financial markets to other unhealthy markets.

The effective factors on stock price can be classified to internal and international groups; the internal factors are as followed: the policy of dividing profit, bonus stocks and analyzing stocks, the quality of financial data, management and industry. The international factors are as followed: cultural factors, social-political factors, technical factor (technologic), executers and stock attenders, profitability of other assets and economic macro variables. Economical macro variables mean GNP variables, financial and monetary policy, taxes, inflation, profits, deposit, international debts and exchange rate. Based on discount model of liquidity process under stocks prices are equal to present value of stocks profit:

There are conditional expectations based on accessible information of stock partners in time T and profit rate R that are used by stock market partners for discount future stock profits and K is time horizon of investment. The monetary policy affects stocks market profitability by two methods:

First, a direct effect on stock profitability with change of discount rate, for example contractionary monetary policy caused the increase of discount rate that this increase will decrease stock price and then lesser economical activity in future, second, an indirect effect on institution stocks value by changes of expected future liquidity process. It is predictable that distention monetary policy increases the economical activity level and stock prices will react in positive direction. So, the hypothesis based on the relation between monetary policies and real economy collection. Because expansionary monetary policy has increased economical activities, stocks price, stocks profit and contractionary monetary policy is reverse, therefore, participants in stock market considers extremely contractionary and expansionary monetary policy in stocks market. Theoretically, there is a positive relation between money volume and general index of stocks price because by rising liquidity, demand will be increased for assets and for example stocks, so, by increasing demand for stocks, its price will be increased. Every decision making or direction

for future planning of each institution needs to be informed from exist situation. It is natural that future policy makings should be performed based on present situation. For proving this fact, applying time series information of different variables is necessary to test stable relations between variables and evaluate the achieved result. So, acknowledge of effective factors for stocks market can help to direct investors in capital market considerably. Researches done in this area are as follows:

Ibrahim (2003) has studies the effect of macroeconomics indexes over stocks price index for period from January 1977 to August 1998 through using a vector serial correlation pattern. The results have shown that there is a co-integration relation among the Malaysia stock price index, macroeconomics variables and stock price index markets in Japan and America. There is a positive relations among variables of money supply, consumer and industrial productions price index and negative relations in exchange rate. There is a positive relation between stock market of Malaysia and Japan and a long-time negative relation between America and Malaysia (a positive relation in short term).

Naghavi Kaljahi (2004) has studied the impact of cash changes on products of industrial department and industrial products price index in Iran in his essay. In this research, exchange rate and the volume of liquidity are studied through VAR model and analyzing of variance between variables of industry products and index of industrial products price. The achieved results from variance analyzing show that the volume of cash has a significant impact on the products of industry department and index of industrial products price.

Taghavi and Lotfi (2007) have considered the hypothesis of existing services credit through studying the effect of monetary policies over the granted credits of banks from 1995 to 2003. Their used model has been based on Kashyap and Estine' theoretical model. It is evaluated based on table data. The achieved results through this study show that monetary policy index (bank reserves rate) has a negative effect but worthless on balance of granted debt instruments of banks. Findings of this study have affirmed the existence of credit channel of monetary policy in Iran that its rate is so worthless theoretically.

Ionnidis and Kontonikas (2008) have studied the effect of monetary policies over stock prices in thirteen

countries of OECD from 1972 to 2002. The results show that the monetary policy has a considerable effect over stock efficiency. In this way, that if the monetary policy is expansionary, it will decrease the discount rate and then the stock price will increased and future economic activities will be increased too and vice versa.

Sharifi Ranani and et.al (2009) has studied the money transfer in Iran through structural vector auto-regression model. In this study, the efficiency of some transferring channels of money is investigated. Two variables, the proportion of banks reserves and debts as two political instruments have been given to central bank. The results have shown when the banks reserves are used as political variables, in mid-term and long-term, exchange rate channel is one of the most effective channels in transferring monetary policy on nominal gross domestic products. However, in short-term, the role of construction price channel in transferring monetary volume changes has been more effective. In another model that banks debt to central bank is used as a political instrument, in short-term and mid-term, the channel of construction price index has been the most effective channel in monetary transferring but in long-term none of these channels has a role in monetary transferring.

Subair and Salihu (2010) have studied the effect of exchange rate fluctuation on Nigeria stock market from 1981 to 2007 through GARH models and error detection and correction model. The results present that exchange rate fluctuations have a negative and meaningful effect on stock price while the profit and inflation rate have not a long-term relation with stocks market.

Chinzara (2011) has studied the uncertainty relation of macroeconomics variables and stock price through GARCH-VAR models for South Africa. His findings show there is a mutual relation among these variables. Also, uncertainty of macroeconomics variables has a meaningful effect on stock market fluctuations.

Nounejad and et.al (2012) has studied the effect of monetary policies on stock price index in Iran. The results are as followed:

1. The changes of monetary volume have a positive impact on the index of stock nominal price. So, the first hypothesis is accepted in relation to positive relation between monetary policy and the index of stocks nominal price.

2. The changes of money volume have a positive effect on the index of stocks real price. So, the second hypothesis is accepted in relation to positive relation between monetary policy and index of stock real price.

For increase of money volume, the liquidity will be increased and this fact causes people to invest their idle money in stocks exchange market and therefore the demand for purchase stocks will be increased and this will be led to rising of nominal and real price of stocks.

Paetz and Gupta (2014) have estimated the effects of general index of stock price on commercial cycle in the South Africa through approach of DSGE. Based on the achieved results, about 9percentages of products fluctuations can be explained by financial shocks, the central bank does not show the positive reaction to the gap between general index of stock price, and it has not an obvious effect over profit rate fluctuations.

Lopez (2015) has developed the economy model of Bernanke and Gertler (1999) based on small open economy in his essay to calculate the effect of asset price bubble on macro economy. According to the results of this study, Bernanke and Gertler's results are applied to presents this fact that the central bank should not show any reaction to asset price in the close economy but the open economies is more sensitive to asset price bubble because of capital flow and the mechanism of exchange rate of monetary policy. Therefore, the commercial cycles are deeper in the small open economies. In addition, the macro economy fluctuation will be reduced through encountering with prosperity for following the breaking the asset price bubbles if the monetary administrators concentrate on inflation.

Bayat et al (2016) has studied the monetary policy and general index of stock price in the framework of model DSGE. The achieved results of functions in auto-reactions of variables shows this fact that the situation of stock price shock, the gentle reaction of central bank to general index deviation of stock price of its equilibrium level will be led to the decrease of economic frequencies and increase of general stability of macro economy. As well, the comparison of present variables moments in the model and real data moments of Iran economy presents the approximate success of the model in simulation of realities in Iran economy.

Abbassnejad et al. (2017) has studied the dynamisms of relations in macro-variables and stock

market index in their research. The pattern of econometrics VARX-DCC-GARCH is used for development of studying in this field. Based on the results of this pattern, the variables of exchange rate, distension and oil cost have positive effect in long time over stock index and the exchange rate has more effect. In addition, the short time shocks of oil cost have more effect on stock price. Moreover, studying the correlation among flexibilities has shown that the flexibility of exchange rate has a positive relation on flexibility of stock indexes.

### 3. Methodology

The present research is considered descriptive, applied and pseudo-independent based on classification of researches according to method, identity and direction respectively and according to its type is a correlation research. In correlation research, the main purpose is to determine that is there any relation between two or several quantitative variables (valuable) and if there is such a relation, how much is its size and amount. The purpose of correlation research may be creating a relation or lake of it and applying relations for forecasting. The correlation studies will analysis some variables that it seems they are in relation with a general complex variable.

**Hypothesis 1:** The monetary policy changes affect the stock price of banks.

**Hypothesis 2:** The liquidity changes affect the stock price of banks.

The statistical population in this research is variables of Iran stock exchange market and variables of monetary policy in Iran between 2006 and 2015 monthly.

### 4. Results

**Descriptive Statistics of Data-** The liquidity data from central bank is accessible and Tehran stock exchange applies for evaluation of price index for every industry too that all of them can be evaluated by a same formula of general index of price. Price index of commercial banks is calculated by followed formula:

$$Pbank_t = \frac{\sum_{i=1}^n p_{it} q_{it}}{D_t} \times 100$$

$P_{it}$  = the stock price of  $i^{th}$  bank at time  $t$

$q_{it}$ = the number of published stocks of  $i^{th}$  bank at time  $t$

$D_t$ = the base number at time  $t$  that in the origin time has been equal to  $\sum p_{io}q_{io}$

$P_{io}$ = stock price of  $i^{th}$  bank at origin time

$q_{io}$ = the number of published stocks of  $i^{th}$  bank at origin time

$n$ = the number of all inclusive sock banks

Table 1 shows the descriptive statistics related to two variables of money market (liquidity) and stocks (Bank stocks). The statistic results of Jarque-Bera present that affirmation of hypothesis 0 based on normality is existed for all series; therefore, in studying variance of variables the normal distribution is used.

**Durability Test-** In this part of the research, for preventing false regression, the single root in variables of the research is studied in the mode. The bellosed table shows the achieved result of tests related to single root of Augmented Dicky Fuller (ADF).

**Table 2: the result of durability test of research variables**

Variable	Test-Static	Probable Level
Liquidity Logarithm	0.51	0.82
Liquidity Logarithm Differential	-9.8	0.00
Banks Index Logarithm	-3,15	0.33
Banks Index Logarithm Differential	-7.23	0.00

Source: Research results

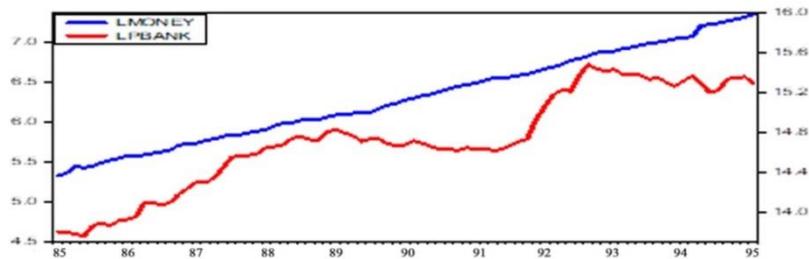
**Table 1: The descriptive statistics of data with results of Jarque-Bera test**

	Liquidity Logarithm	Bank Index Logarithm
<b>Average</b>	15.02362	5.095241
<b>Median</b>	15.04384	5.32609
<b>Maximum</b>	15.76175	6.625321
<b>Minimum</b>	14.12765	4.262962
<b>Standard Deviation</b>	0.419864	0.842301
<b>Skewness</b>	0.162765	-0.32377
<b>Kurtosis</b>	1.862073	2.233367
<b>Jarque Bera</b>	4.326062	3.093365
<b>Probability</b>	0.203540	0.302316

The chart investigation of these two times in studied period is presented obviously.

The results present this fact that both studied variables in this research have single root and after differentiation become durable.

**Determining Optimal Lag-** The method of vector auto-regression and conditional variance BEKK are used for studying the mutual effect of stock index and monetary policy. For this purpose, first, the optimal lag number of model is determined. In this stage, it is necessary the level of optimization of vector regression model to be determined through factors for determining lag. Calculating optimal lag should be done based on numbers of model variables and the volume of sample. In table 3, the optimal lag is presented based on different criteria of choosing optimal lag for selected model. Because applying the criteria of Schwartz causes the lost of less freedom degree than other criterion, so, the optimal lag is selected based on Schwartz, Akaike and Hanan Queen in this research.



**Chart 1: The process of index changes of monetary policy and monetary index**

**Table 3: the results of studied optimal lag for VAR model**

Lag	LagL	LR	FPE	AIC	SC	HQ
0	293.8885	NA	1.06e-04	-9.196365	-8.323202	-8.32366
1	295.9247	15.32955	8.32e-05*	-9.362716*	-7.992022*	-8.021332*
2	297.8154	4.665205	8.31e-05	-9.099306	-8.662213	-8.021323
3	305.5376	3.523159	1.02e-05	-9.08615	-8.023264	-7.565405
4	308.7290	3.964832	1.03e-04	-9.065355	-8.9696	-7.1233
5	310.0249	8.96330*	1.03e-04	-9.090263	-8.039906	-7.74795
6	315.9863	5.631922	1.04e-04	-9.019270	-8.363624	-7.093612
7	318.0199	5.323457	1.04e-04	-9.023138	-8.560029	-7.555323

Source: Research Results

Based on achieved results in table, it is obvious that the number of optimal lag in the model is 1 based on Schwartz and Hanan Queen Statistics.

**Model Estimation-** Based on the identity of time series data and types of studies, the direction of evaluation shows the effect of monetary policy on stocks market and especially commercial banks stocks accepted in Tehran stock exchange through VAR-BEKK model.

The average part of estimated model shows the positive effect of monetary policy index well on studied banks stocks because the coefficient of C(5) is positive and significant and for each percentage

increase in monetary policy, bank stocks index will be increased 0.21%. While the bank stocks market does not have any significant effect on monetary policy index (Variable C(3)).

In addition, in this study it is evaluated that the lag coefficients of monetary policy variables and bank stocks index have a significant effect on these variables. (Coefficient C(2) and C(6)).

It is necessary to mention that in the mentioned study in this equation, the numbers have high coefficient of determination and statistic number of Durbin Watson are high between 1.9 and 2.3 for both equations.

**Table 4: The results of Studied VAR-BEKK model**

Variable	Coefficient	Static t	Probable
C(1)	-0.053	-1.076	0.245
C(2)	1.066	843.214	0.001
C(3)	0.022	0.315	0.662
C(4)	-0.044	-0.077	0.556
C(5)	0.215	0.401	0.000
C(6)	0.845	25.844	0.000
LMONEY = C(1)+C(2)*LMONEY(-1)+C(3)*LPBANK(-1)			
R2=0.99 DW=2.16			
LPBANK = C(4)+C(5)*LMONEY(-1)+C(6)*LPBANK(-1)			
R2=0.98 DW=1.75			
Estimating Variance Model			
C(7)	0.001	1.212	0.153
C(8)	0.000	-0.952	0.423
C(9)	0.000	1.515	0.099
C(10)	-0.075	-1.099	0.153
C(11)	0.467	3.066	0.022
C(12)	0.954	8.397	0.001
C(13)	0.865	4.364	0.001

The variance equation of model shows also the existence of GARCH significant effect in coefficients. In the way that C(11), C(12) and C(13) variables show the effect of different variance in evaluated. The evaluation of matrix and variance of model are shown based on BEKK model in table 5.

**Table 5: The studied results of matrix and variance of VAR-BEKK model**

Matrix Coefficient	Coefficient	Statistic t	Probable
M(1,1)	0.001	1.068	0.098
M(1,2)	0.022	-0.790	0.516
M(2,2)	0.026	1.526	0.226
A1(1,1)	-0.038	-1.005	0.095
A1(2,2)	0.546	3.671	0.004
B1(1,1)	0.745	14.096	0.000
B1(2,2)	0.623	6.845	0.000

As it is shown in studied time series, the effect of transmission from one index to another is presented. The significance of coefficients shows that the automation and fluctuation in two time series are effected by each other. The coefficient A studies the profitability of each time series on each other. A(I,i) shows 1% effect of increase in time series  $i^{\text{th}}$  in previous time on present time of index. A(i,j) shows the effect of j index on i. Therefore, according to general significance, A(i,j) shows bank stock index equation that the effect of index of this time series on previous times has positive and significant effect. In another word, the created fluctuations in each time cause the increase of fluctuation of commercial banks stock market index in the future time.

In relation to coefficient B, this fact is true too and it shows that the fluctuations in money market are transferred to stocks market and this situation is true in reverse situation. It means that the created fluctuation in money market is transferred to bank stocks market and this transfer is increasingly. So, distinctive effect from money market to capital market is existed among banks and monetary policies of central bank affects stocks index in addition to commercial banks directly.

## 5. Discussion and Conclusions

- These points are presented through studying the hypothesis of this research:

- The changes of liquidity have effects on banks stocks price.
- The changes of liquidity fluctuation have effects on banks stocks price fluctuation.
- The changes of banks stocks price have no effects on liquidity.
- The changes of banks stocks price fluctuations have no effects on liquidity fluctuation.

Based on "Real Balance Effect" view, the increasing of liquidity causes the lake of equality of real balance of money. But, because people tend to keep their real balance of their money, they try to lead the volume of extra money to purchase other financial assets such as stocks. Therefore, it is obvious from this point of view that the increase of money volume causes the increase of demand and also the increase of stock price and therefore the results of this research affirm this view about studied data.

In Iran economy, when the efficiency of investment risk driven from fluctuation of economical macro variables such as monetary variables is changed for any reason, it can affect extremely investment options.

Proves of this research present that investment in stock exchange market have reacted against economical macro changes generally. In the way that results show that this effect presents itself in a month.

In addition to above options, results of this research express the fact that based on discounting model of liquidity process, monetary policy affects the market profitability in two ways:

First, a direct effect on stock profitability with changing discounting rate, for example expansionary monetary policy (increasing liquidity in this research) has reduced the discount rate that it will lead to increase of stocks price and then more economical activity in stocks index in the future. Second, an indirect effect on stocks value of institutions by changes of liquidity process are expected in the future that expansionary monetary policy will increase economical activity levels and stock prices will react positively.

In addition to these points, the results express this fact that expansionary monetary policy increases economical activities, stock price and stock profitability and contractionary monetary policy is against it. Therefore, participants in stocks exchange market pay attention so much to expansionary or

contractionary of monetary policy. Theoretically, there is positive relation between money volume and general index of stocks price because increasing liquidity will increase the demand for assets and especially stocks and therefore through increasing of the demand for stocks, its price will be raised.

Also, this research is an affirmation on Tobin's Q theory because results show that it can be said generally each change in monetary policy will be led to changes to families' consuming pattern and investments projects of institutions and changes in real activities of economy and finally, this subject will affect the inflation. The method of confronting of stocks market against inflation is depended to time horizon and it is hard to determine it before. In another word, this subject is depended on the shocks that affect the economy.

It is necessary to mention that the research results are parallel to previous research results such as Noferesti (2005) Zenouzi (2008) Nonejad and et.al (2012) and unparallelled with Keshavarx and Mahdavi (2005) and Naqavi Kaljahi (2011). In relation to international studies, they are parallel with Moradoghlo and Matin (1996), Madsen (2002), Ionnidis and Kontonikas (2008) and Chinzara (2011).

Based on stated discussions in previous parts, the political suggestions are suggested here:

Regarding to this point, it is suggested to central bank to avoid from emotional strategies and decisions (liquidity changes, adjustments in bank profitability rate, several rates for currency etc..) for controlling and managing stock market inflations of banks in Iran that will lead to fluctuation in capital market through effective industry of these decisions. Because these fluctuations cause the emotional changes of investment fund and transferring these funds among parallel markets will be different and this subject will be resulted to extensive fluctuations in parallel markets such as stock markets of banks.

It is necessary to mention, although this fluctuation transferring is performed in a short time of one month, knowing monetary policy efficiency on banks is obvious in stock market in short time and they can use it in monetary policy and cannot wait for long time effects to control it in a short time necessarily.

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