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Taylor Rule: A Model for the Mechanism of Monetary Policy and Inflation Control in the Framework of the Interest-Free Banking Act

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ABSTRACT

The ultimate goal of monetary policy is to achieve price stability and high output. In this regard, central banks usually change the interest rate, liquidity, and money base in order to apply monetary policies. The John B. Taylor rule is one of the rules known in the transmission of monetary policy.[1] Based on this rule and given the output gap and inflation gap, the central bank increases or decreases the interest rate. Using library references and theoretical foundations, the current paper employed a descriptive-analytical research method to explain the hypothesis stating, "Taylor rule can be used to redefine an optimal monetary rule in the central bank for the mechanism of the stable monetary policy in the framework of Iranian economy and the Interest-Free Banking Act (approved in 1983) to enforce monetary policy and control inflation." According to the research results and the fact that Taylor rule was successful in some developed and developing countries, it can be redefined in the framework of the Interest-Free Banking Act of Iran. It can also be used as a highly flexible and appropriate monetary rule and a stable model for the mechanism of monetary policy and inflation control.

1. Introduction

Nowadays a monetary policy is a systematic method for the governments to influence macroeconomics. The monetary policy-making authority, which is the central bank in each country, uses policy tools to achieve the desirable goals such as low inflation and real output close to potential output in order to implement monetary policies. Therefore, the two tasks of price stability and economic growth are traditionally fulfilled because the ultimate goal of the monetary policy is to achieve price stability and high output.

In this regard, central banks usually change the interest rate, liquidity, or money base to enforce monetary policies. Taylor rule is one of the rules known in the transmission of monetary policy. Based on this rule and given the output gap and inflation gap, central bank decreases or increases the interest rate to control inflation and help economy grow.

Employing a descriptive-analytical research method and using library references and theoretical foundations, the current paper was intended to explain the hypothesis stating, "Taylor rule can be used to redefine an optimal monetary rule in the central bank for the mechanism of stable monetary policy in

[1] *A monetary rule is a plan which stipulates that the monetary policy-maker (central bank) should change the intermediate goals of monetary policy.*

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the framework of Iranian economy and the Interest-Free Banking Act to enforce monetary policy and control inflation."

The main research question is as follows:

In the framework of the Interest-Free Banking Act in Iran, how can Taylor rule be used to enforce monetary policy and control liquidity and inflation as a result?

In addition to reviewing the literature and research background, this paper investigated the current monetary policies applied by central banks to control inflation. Then Taylor rule was studied. Finally, the necessity of introduction a monetary rule was discussed, and Taylor rule was redefined in the framework of interest-free banking operations. Given the success of Taylor rule in some developing and developed countries, it can therefore be redefined in the framework of the Interest-Free Banking Act and used as a highly flexible and appropriate rule and a stable model for the mechanism of monetary policy and inflation control.

2. Literature and Research Background

With the development of interest-free banking and activities in economy, the topics pertaining to monetary policy, the application of relevant tools, and the rules of applying it in this newly-established system along with impacts on economic goals have been studied in banking research. Therefore, various studies have been conducted on the enforcement of optimal monetary policies in different models. The majority of such studies were about Taylor rule. Some of the most important ones, which were available, are pointed out as follows:

2.1. Domestic Studies

Khatai and Seighipour [4] studied the goals of monetary policies, introduced new tools for it, and dealt with the difficulties of using it in Iranian economy. In the empirical section, then they investigated monetary policies and tools used in the Third Plan. Reviewing monetary policies and stating Taylor rule, they evaluated the use of this rule in monetary policies and the application of different tools including the interest rate and liquidity in the Third Plan quantitatively [4].

Khalili et al. [3] used the optimal control methods to extract a monetary policy rule for Iranian economy, assuming that the policy-maker would use the interest rate as a policy tool [3]. In their paper, Dargahi and Sharbatoghli, considered the growth rate of liquidity to be the policy-making tool for the central bank to estimate the relationship between the growth rate of liquidity, inflation, and economic growth. They used the optimal control method to achieve the optimal policy-making rule of the central bank [1].

Taghinezhad [8], discussed the bases of microeconomics and expanded Taylor rule. Then they used two GMMs, Johansen-Juselius cointegration vector and the data of Iranian economy from 1979 until 2008to investigate the compatibility of central bank reaction function with Taylor rule. They concluded that monetary authorities were compatible with the expanded Taylor rule in comparison with output deviation; however, this reaction was not compatible with the deviation of inflation [8]. Reviewing different economists' opinions, Khorsandi and Islamluian [5], investigated the topic of rule against

discretion for monetary policy in a theoretical way. They concluded that although the use of predetermined monetary rules can prevent inflation from soaring, the power of predicting and avoiding unexpected shocks would necessitate these rules to have discretion and flexibility to some extent. [5]
Raising the theoretical discussions on monetary rules and analysing the Five-Year Development Plansin a doctoral dissertation, Tavakolian [9], compared the moderated optimal Taylor rule with three methods including Markov switching method, Kalman filter, and dynamic stochastic general equilibrium modelling (DSGE). It was concluded that the intensity and weakness of following the discretion rule or approach changed in different periods, and the moderated rule could explain the Third Plan more. It was more explanatory of the First and Second Plan in comparison with the discretion approach. The DSGE model could also explain the policy-maker behaviour function of rule or discretion in the study period.
In a paper, Komeijani et al. [6], investigated Taylor and McCullum rule. Considering the fact that these two rules were successful in the empirical works in some developing countries, the researchers concluded that they could be used as appropriate and flexible rules considered to be the long-term guidelines for monetary policy [6].
Erfani and Moradi [2] stated that the inflation gap was not stable in any of the First to Fourth Development Plans, and there was not a significant relationship among the stability of inflation gap, weights of inflation gap, and output in the monetary policy of the central bank. In other words, increasing the parameter of stability was influenced by the economic structure of the country. The lack of a significant relationship indicated the inaccuracy of monetary policies adopted by the central bank and the futility of the impact of such policies [2].

2.2. Foreign Studies

In a study, Taylor, investigated the relationship between inflation targeting and policy rules. It was concluded that inflation targeting in a country having floating exchange rate system was necessary for making appropriate monetary decisions in order to prevent monetary policy from increasing inflation rate and causing economic instability.
Orphanides, thought of Taylor rule as a rule for the enforcement of monetary policies by central banks using it to determine the interest rate.
In a book entitled *Economy, Money, Banking, and Financial Markets*, Fredric S. Mishkin, made some introductions for Taylor rule in American banking system.
Murray, Papell, and Rzhevskyy investigated the relationship between the behaviour of monetary policy and inflation stability. Markov switching and Taylor rule models were used to study the stability or unity of inflation root. It was concluded that inflation was a result of unit root variable process, and there was no general agreement on the matter.
In a simple model of new Keynesians, Conrad and Eife, extracted weighted policies for the parameters of stability of the inflation gap in Taylor rule adopted by central bank. According to the weights estimated and attributed to the output gap and inflation gap by the central bank, it was concluded that changes in the stability of American inflation gap from 1975 until 2010 could explain the changes in the behaviour of monetary policy well.
Reviewing previous studies, it is now clear that the abovementioned research works introduced and investigated Taylor rule comprehensively. However, the studies conducted in the framework of Iranian economy used econometrics methods and statistical topics to calculate this rule and investigated in

Iranian economy. Therefore, the application of this rule in the mechanism of monetary transmission has not been directly addressed in the framework of Iranian economy and the Interest-Free Banking Act. Including the experiences of all previous studies, the current paper was intended to localize the monetary rule in the framework of the Interest-Free Banking Act, a fact which distinguishes it from previous studies and makes it to be an effective step taken to complete the task.

3. The Current Monetary Policies Adopted by Central Banks to Control Inflation

Monetary policy is a general concept meaning the ability of the policy-making institution to control the level of prices and also keep economic activities high. In other words, monetary policy means a process or set of operations by which monetary authorities of a country (central bank) control and restrain the supply of money often to adjust the interest rate, achieve economic growth, stability, and relative steadiness of prices, and decrease unemployment. Therefore, many economists agreed upon the impact of monetary policies on output and inflation [7].

In this regard, the literature of monetary policy has been directing towards designing policy rules since the 1980s. Accordingly and considering the previous statistics of real and monetary variables, economists are attempting to discover rules which the monetary-policy maker would follow over time in order to design the future plan of monetary policy more certainly based on results. It is because the measures taken by central banks influence the interest rates, credits, and the supply of money. Not only do these factors influence the financial markets directly, but also they affect the total output and inflation. Thus, the necessary control and surveillance would be enforced on high-power money, the ratio of reserves for different types of savings, and the maximum sum of assets which banks can allocate to cooperative activities to achieve the policy-making goals. By performing surveillance, control, and supervision tasks and also playing the role of the lender of last, central banks can have a major impact on the financial system.

Nowadays central banks use direct and indirect tools like legal reserves, overdraft facilities, credit maximum, and the tools activated in the market such as open market operations, open market-type operations, and discount rate in order to implement monetary policies in countries.

In developed countries, the interest rate plays a major role in directing, implementing, and fulfilling the goals of monetary policies. Put another way, central banks change the short-term interest rate in the market in most developed countries as an operational goal, then they use open market operations and other monetary policy tools to keep the rates in the range of operational goal and to adjust monetary policies. In addition to operational goal in these countries, goals such as the growth rate of liquidity is determined to achieve the price stability and growth. Therefore, the operational goal pertaining to the short-term interest rates depends not only the intermediate goals, but also on the available information and the inference of central bank regarding the mechanism transmission monetary completely.

In countries in which non-monetary indirect tools are widely used and their rates are flexible enough, implanting monetary policies had a considerable impact on the volume of banks and the interest rate in the market not including money. This problem influences the cost of people's availability and institutes to banking credits and also the rate of savings and supply the money. Therefore, and this way,

the real economic variables such as private output, investment, investment flow, productions, and all prices are influenced. On the other hand, the changes in the variables pertaining to output and price can have impacts on the borrowing and investment rates. Therefore, balance is automatically established in this system. The balance hybrid of interest and inflation rates should be provided for in the adjustment and implementation of monetary policies.

In addition, there will be spaced provided for the central bank to directly invest in the real economy on the cooperation and sharing in the activities with other banks. The policy-makers of the central bank study the economy conditions carefully to achieve the goals of appropriate economic growth, full employment, the stability of public levels of prices, and the balance of foreign payments. They use monetary policy tools along with qualitative and quantitative tools to pursue the abovementioned goals. Therefore, as mentioned, central banks set a goal for the short-term interest rates to direct the monetary policy.

4. The Necessity of Introducing a Monetary Rule in the Framework of the Interest-Free Banking Act

Nowadays the studies conducted on macroeconomics have presented much evidence that it is necessary to have a policy rule instead of applying various policies. In other words, after the development and prevalence of the role of monetary policy in causing stability or instability at the public levels of prices and output in recent decades and according to the empirical and theoretical studies on the relationship between inflation and economic growth, many efforts have been made to introduce a stable model to direct monetary policy.

In this regard and due to the long-term relationship between the supply of money and the liquidity with inflation as a result, it is considered to be the most important concern and action taken by policy-makers and monetary authorities to control inflation and liquidity. Due to the instability of demand for money and instability of the relationship between inflation and liquidity because of financial innovations and the role of expectations, economists have prioritized the introduction of a stable monetary model emphasizing the mechanism of monetary transmission and the presentation of an appropriate monetary rule during recent decades.

It is because the selection of inappropriate monetary policies in recent decades and the emergence of new economic problems made the problem of finding an optimum in the selection of appropriate monetary policies and concepts such as the cost of decreasing inflation, temporal incompatibility, the balance between the credibility and reputation of central bank have been taken into account. The process of finding an optimum would result in policy rules and reaction functions which central banks are required to follow and announce publicly in order to achieve a target function [6].

The most known monetary rule in this regard is the John B. Taylor rule, a professor of the Stanford University, which is based on the theory of new Keynesians. Based on the data of the United States, he achieved a mathematical relationship and named it *Policy Rule*.

According to this rule, the short-term interest rate is moderated with respect to the scale of inflation and output gap. Basically, the basis of introducing this policy rule is to understand this reality that a monetary rule should be able to show reactions in the following terms:

- An appropriate monetary rule should be sensitive both to the changes in real gross domestic product (GDP) and inflation.
- The policies applied along with the goals of controlling inflation and maintain the output stability should never emphasize the stability of the nominal exchange rate and depend on the interventions of monetary authorities.
- The interest rate should be flexible as a key policy tool.

Therefore, Taylor considered the policy rule to be a possible plan which specified the conditions under which the central bank should change the monetary policy tools as clearly as possible. By this definition, the policy rule is used when those possibilities are fulfilled in the future; thus, it will be used for some periods in the future. To investigate the practical application of this rule, Taylor introduced a particular formula including all the features. Put another way, the target interest rate (r^*) should be equal to the inflation rate (p) plus the real balanced interest rate (full employment) (r^e) plus the weight average of inflation gap (the current inflation rate subtracted from the target inflation rate) ($p-p^*$) and output gap (the real GDP growth rate subtracted from the potential GDP growth rate) ($Gdp-Gdp^*$) (Taylor, 1993). The following formula can be considered:

$$r^* = p + r^e + \alpha(p - p^*) + \beta(Gdp - Gdp^*)$$

Target Interest Rate = Inflation Rate + Real Balanced Interest Rate+ α (Inflation Gap) + β(Output Gap)

In this rule, Taylor assumed that the real balanced interest rate was 2% and the appropriate target for inflation was also 2%. He selected α and β weights for output and inflations gaps and considered them to be ½. Therefore, the inflation targeted by central bank in the long term, the real natural interest rate moderated with inflation rate, determination of the nominal long-term interest rate out of the summation of the two above factors, the current inflation rate and output level.

The existence of output gap and inflation gap in this rule can be due to the fact that central banks should not only be careful about controlling inflation, but also they should pay attention to the minimization of fluctuations in the business cycle of output about the potential value and adjust their monetary policies and interest rate in reaction to the inflation and deviation from the potential output (output gap). This is because controlling inflation, stabilizing real output and taking care of them is compatible with many plans developed by central banks; therefore, the inflation rate is controlled at low levels, and severe fluctuations are stopped at the output level.[2]

Another interpretation of the presence of output gap in this rule is based on the fact that according to the theory of Philips empirical curve, output gap is an index of future inflation because the changes in inflation are influenced by the economic conditions compared with its productivity and other factors. This capacity of productivity can be measured by potential GDP which is a function of the unemployment rate. In other words, the unemployment rate which is completely compatible with full employment is the nonaccelerating inflation rate of unemployment. It means that the unemployment rate in which inflation does not tend to change.

Therefore, according to this monetary rule and the experience of some countries including the US, Taylor rule is an appropriate guide to implement proper monetary policies in other countries such as

[2] *This policy was adopted by FOMC of the American Central Bank (Federal Reserve), producing positive results.*

Iran. The use of this rule provides the requirements of increasing credits for monetary policy-maker and more control over the general level of prices (inflation) because nowadays inflation is considered to be one of the major global economic problems in the eyes of econometrists.

Having a long record, inflation has influenced different economic-social sectors of society in our country. It has made the path of development difficult and put the vulnerable classes of society under pressure. It has also diminished the social justice and decreased the competition ability of Iranian goods in global markets.

On the other hand, the necessity of maintain economic independence and the existence of difficulties on the way of developing capital requires that the domestic resources should be relied on to provide the necessary resources for investments. In such cases, considering the small size of capital market in our country (lack of large financial markets), the necessary investments are mainly provided in different economic sections through banking network and attracting and equipping small savings (or sometimes big savings) in the society.

On the other hand, one of the main flaws and disadvantages encountered in this method of financial supply is the low interest rates provided by banks in comparison with the inflation rate. Put another way, inflation exceeded the banking interest rate in some years, and those having savings accounts, who are mainly among the poor and medium social classes, think that the only way of investment is to put their money in the banks due to inexperience and insufficient financial capacity.

Therefore, they face negative interest rate. However, banks are forced to give loans with higher rates to cover the expenditures of their money, a fact which increases the production cost among economic agencies, leading to an increase in inflation.[3] On the other hand, some economic and political officials believe that the interest rates of banking facilities should be at a high level and it is necessary to decrease it to help investment and output.

It is worth mentioning that the saving level of a society bears special importance in the process of economic growth and development. It actually provides the bedrock of output capacities in an economy because saving is the most important resource of supplying investment. Now if the inflation rate is high, it will have undesirable impacts on the stability of economy, especially interest rates, in the country[4] and decrease the deposit rate. A low deposit rate would increase inflation, a fact which makes the most of banking system in each economic system to achieve the goals of macroeconomics in the monetary policy. Banks are able to play this role effectively when they have more financial resources.

In this regard, experiences indicated that if the monetary discipline is followed, inflation can be haltered so that prices can be stabilized. In such situations, economy will grow and stable employment will increase. The experience of economy policy making in Iran during recent years in the perspective of monetary and banking policies and intensive emphasis on the role of liquidity and formation of optimistic expectations in comparison with its efficiency on the economic growth, employment creation and negligence of previous experiences in the economy of Iran and other countries have revealed the fact that the growth of liquidity would increase the public levels of prices (inflation) rather than increasing investment and growing economy.

[3] *The banking interest rate is considered to be a part of investment expenditures (financial costs), and increasing this rate decreases the investment and leads to a decrease in the output and an increase in the prices of goods; therefore, inflation is increased and vice versa.*

[4] *The real interest rate of limited deposits is calculated with respect to the expected inflation rate: Depo=R-P_{t-I} in which P_{t-I} is the inflation rate in the previous period, and R is the interest rate of the limited deposit.*

It should also be mentioned that monetary policies are usually passive and influenced by financial policy-making in Iranian economy, insofar as the changes in two important parts of money base, meaning the net debt of governmental sector to the central bank and the net foreign assets of central banks, are considered to be the components dominating money base in order to provide the budget shortage of government. Therefore, they are known as the factors influencing the growth of liquidity and the public level of prices.

It should be taken into account that in the nominal sector of economy, the inflation rate is the most important variable in the reflection of real imbalances in the real economy and the most appropriate econometrics in evaluating the short-term performance of this sector.

Other important characteristics of the inflation trend in Iranian economy include its high average with many fluctuations, both of which can be considered the indices for economic instability. On the other hand, empirical studies indicate that inflation is sustainable in Iranian economy [1]; [5].

For many years, a two-digit inflation rate has been witnessed in the economy of Iran, and the limitation of the interest-free banking system in applying the traditional tools of monetary policy based on the interest and low efficiency of tools based on the interest rate and financial and monetary markets in the countries with newly-emerged and developing markets such as Iran made the monetary policies be designed and implemented in the traditional form meaning base money.

In such situations, it would be very hard to select goals and monetary tools to implement monetary policies. Therefore, the rules of monetary policy as a plan by which central bank should change the tools of monetary policy to direct monetary policy makers in order to achieve the long-term economic goals.

It came in the political monetary literature in order to extract mathematical rules with the necessary flexibility to reach the long-term goals because although expansion policies can result in the economic growth in short term, they may decrease the output trend of in the long term with the gradual advent of inflation effects. On the other hand, although contractive policies may decrease the short-term growth, they help economy grow in the long term by gradually decreasing inflation.

Therefore, it is highly important to design an optimal monetary policy making rule to control inflation and create output stability with respect to the nature of inflation in Iranian economy and the frame of the Interest-Free Banking Act. The reason is that the use of monetary policy reaction functions based on the growth rate of money base and liquidity will be more efficient due to the high power of central bank and the fact that Iranian economy is money-based.

5. The Redefinition of Taylor Rule in the Framework of the Interest-Free Banking System

The first studies conducted on the monetary policy in the interest-free banking system dealt with the goals of this system having not significant difference with the goals of other studies with respect to macroeconomics. However, the studies dealing with monetary policy tools, focused on the theoretical topics and the design of monetary policy tools in a cooperative system, were mainly based on the cooperation rate because the banking system was based on the cooperative system. Therefore, the interest rate was replaced with the cooperation rate as an efficient tool, and it was attempted to prove its efficiency in comparison with the usury system.

Due to usury sanction, some studies proposed and introduced the legal savings rate as the monetary policy tools and the money base and money volume as the operations goals or intermediate goals which are appropriate to achieve macroeconomic goals.

Therefore, the position of interest in this banking system make the introduction of monetary policy tools to be highly important in the interest-free banking system. Thus, it is necessary that the monetary policy making authorities of the country be flexible enough to adjust the variables of monetary policy.

Using the redefinition of Taylor rule in this section, a stable model of mechanism of implementing monetary policy is explained to control inflation with respect to the economic conditions of Iran and the framework of the Interest-Free Banking Act.

Considering the enforcement of the Interest-Free Banking Act in Iranian Economy and unlike other countries in which the interest rate is selected as the monetary policy tools. The growth rate of liquidity tool and money base bear importance and can be used as the monetary policy tool. If the Philips' curve of new Keynesians is considered logarithmic, then we have:

$$logGdp_t = logGdp_t^* + \left\{logP_t - \frac{1}{N}\sum_{i=1}^{N} E_{t-1}[\log(P_t)]\right\} \quad (1)$$

Gdp_t: Current Gross Domestic Product

Gdp_t^*: Potential Gross Domestic Product

P_t: General Level of Prices

E_{t-1}: Mathematical Expectation Operator

Now considering the equation of consumption, which is $C_t = Gdp_t - (I_t+G_t)$, the limitation of lifetime budget in the long term can be considered to be the part of GDP which is not allocated to the expenditures of investment and government. Therefore, the equation of consumption in the budget shortage during the lifetime will be as follows:

$$\sum_{i=0}^{\infty}\left(\frac{1}{1+r_t^*}\right)^i C_{t+1} = \sum_{i=0}^{\infty}\left(\frac{1}{1+r_t^*}\right)^i (Y_{t+1} - (l_{t+1} + G_{t+1})) \quad (2)$$

$$\sum_{i=0}^{\infty}\left(\frac{1}{1+r_t^*}\right)^i C_{t+1} = \sum_{i=0}^{\infty}\left(\frac{1}{1+r_t^*}\right)^i \bar{C}_{t+1} \quad (3)$$

$$\sum_{i=0}^{\infty}\left(\frac{1}{1+r_t^*}\right)^i \left(\beta^i(1+r_t^*)^i C_{t+1}\right) = \sum_{i=0}^{\infty}\left(\frac{1}{1+r_t^*}\right)^i C_{t+1}(1+g)^i \bar{C}_t \quad (4)$$

In (4), g refers to the stable growth of consumption, and r_t^* represents the long-term interest rate which will be as follows in the complete prediction situation:

$$\log C_{t+1} = log\beta + \log(1+r_t) + logC_t \quad (5)$$

Now if the equation is simplified and logarithms of the sides are calculated, there will be:

$$\sum_{i=0}^{\infty}\beta^i C_{t+1} = \sum_{i=0}^{\infty}\left(\frac{1+g}{1+r_t^*}\right)^i \bar{C}_{t+1} \quad (6)$$

$$\frac{1}{1-\beta} C_{t+1} = \frac{1+r_t^*}{r_t^*-g}\bar{C}_t \quad (7)$$

$$logC_{t+1} = \log(1-\beta) - logC_t + \log(1+r_t^*) - \log(r_t^* - g) \quad (8)$$

Now when Equation (5) is rewritten after replacement, there will be:

$$logC_t = \log(1-\beta) - log\beta + \log(1+r_t^*) + log\bar{C}_t - \log(r_t^* - g) \quad (9)$$

Now the equation of Philips curve for new Keynesians can be rewritten as follows:

$$logM_t = (logGdp_t - Gdp_t^*) + \log(1-\beta) + log\beta + \log(1+r_t^*) - \log(1-r_t) + log\bar{C}_t - \log(r_t^* - g) + log\left(\frac{1}{1-\beta(1+\mu)^{-1}}\right) + \frac{1}{N}\sum_{i=1}^{N} E_{t-1}[\log(P_t)] \quad (10)$$

Using the approximation log(1-x)=x and subtracting $\log M_{t-1}$ from the both sides of Equation (10) and making necessary changes and also considering θ in it, we have:

$$\theta = \log(1-\beta) + log\beta - \log(r_t^* - g) + log\bar{C}_t + log\left(\frac{1}{1-\frac{\beta}{1+\mu}}\right) \quad (11)$$

$$g_{M_t} = \theta + (logGdp_t - Gdp_t^*) + (r_t^* - r_t) + \frac{1}{N}\sum_{i=1}^{N}(E_{t-1}[\log(P_t) - \log(P_{t-N})]) - (logM_{t-1} - logP_{t-N}) \quad (12)$$

In which $(logGdp_t - Gdp_t^*)$ refers to the output gap (deviation of product) while $(r_t^* - r_t)$ refers to the deviation of interest rate from the long-term level. Moreover, $\frac{1}{N}\sum_{i=1}^{N}(E_{t-1}[\log(P_t) - \log(P_{t-N})])$ represents the inflation, and $(logM_{t-1} - logP_{t-N})$ refers to the target inflation. Therefore, it can be said that $\frac{1}{N}\sum_{i=1}^{N}(E_{t-1}[\log(P_t) - \log(P_{t-N})]) - (logM_{t-1} - logP_{t-N})$ indicates the inflation deviation (inflation gap).

Thus, it can be stated that Equation (12) is an expanded version of Taylor rule allocated for the Interest-Free Banking Act with only one difference which is the fact that operational variable for the application of monetary policy is the growth rate of money base instead of the interest rate. Therefore, the target function of central bank in the framework of the Interest-Free Banking Act can be defined as follows and with respect to inflation gap, output gap, and the money base tool in order to enforce monetary policy and control inflation:

$$g_{M_t} = \theta + \alpha(p_t - p_t^*) + \beta(Gdp_t - Gdp_t^*) + \varepsilon_t$$

In which the rate of target function (g_{Mt}) of central function (the growth rate of money base) is equal to the inflation gap in period t subtracted from the target inflation (p_t-p_t^*) plus the real output gap subtracted from the potential output (real GDP subtracted from potential GDP) (Gdp_t-Gdp_t^*) which will be almost equal to Taylor rule in which the coefficients α and β are equal to ½ (α indicates the variable of policy growth rate of money base in response to the deviation of inflation rate from the target inflation rate, and β refers to the reaction of growth rate of money base in response to the deviations of real output from the potential output level (output gap), and ε_t is the error term). The only difference is that the aim of Taylor rule was to control the interest rate; however, this rule is aimed at controlling the growth of money base (instead of the interest rate).

Therefore, if the interest rate exceeds the target interest rate, central bank should enforce monetary contractive policies to decrease the growth rate of money base and vice versa in order to respond to

these deviations. Moreover, if economy is in recession, in a way that output is at a lower natural level, central bank should adopt monetary expansive policies and the stimulation of general demand to return the output level to normal. In fact, central bank reacts to the deviations of output, inflation and even the interest rate by moderating liquidity and money base. Therefore, Taylor rule can be followed in the transmission of monetary mechanism and enforcement of monetary policy, and compatible reactions can be shown to the deviations in economy to stabilize them.

Therefore, if central bank wants to moderate the changes in inflation severely, it should first moderate the inefficiency caused by the changes in inflation severely, so it ought to accept such inefficiency. In this regard, it is optimal for the central bank to use a gradual monetary policy to even the inflation rate because inflation can be directed back to target with in this way.

Similarly, output gap is always important in the reaction function of central bank to stabilize output in the monetary policy making.

Thus, considering the balance between interests and expenditures of enforcing monetary policies to achieve the target inflation, output stability should be taken into account so that inflation can be tamed with optimal monetary policies, and appropriate make-up policies can be taken for the output sector and supply side. Then output will be improved, and output gap will be prevented from becoming wider. Therefore, not only should monetary authorities react to the deviation of output, but also they should be sensitive to the inflation deviation. The reason is that the stability of inflation gap indicates the success of monetary policy adopted by central bank, a fact which will result in no distance from the target inflation and no output gap.

Given the success of Taylor rule in some developed and developing countries, this rule can be redefined in the framework of the Interest-Free Banking Act. It can also be used as an appropriate rule with high flexibility and a stable model for the mechanism of monetary policy to control inflation. Therefore, the framework of the Interest-Free Banking Act can follow the Interest-Free Banking Taylor rule to adjust the variables of monetary policy such as the growth rate of money base (or liquidity) because money base, money volume and liquidity can be appropriate monetary policy tools in Iranian economy. Consequently, this policy rule is appropriate in the interest-free banking system, and plans can be based on it to stabilize macroeconomic variables.

6. Conclusion and Policy Recommendations

Central banks usually change the interest rate, liquidity and money base to enforce monetary policies. Taylor rule is one of the known rules in the transmission of monetary policy based on which the central bank decreases or increases the interest rate to control inflation and increase economic growth with respect to output gap and inflation gap.

On the other hand, the studies conducted on macroeconomics provided much evidence indicating the necessity of having a policy rule instead of enforcing variable and miscellaneous policies. In other words, after the development of role of monetary policies in recent decades to create stability or instability at the public levels of prices and products and with respect to the empirical and theoretical studies conducted on the relationship between inflation and economic growth, many efforts have been made to introduce a stable model to direct monetary policies.

In this regard and due to the long-term relationship between the supply of money and liquidity as a

result of inflation, the most important concern and action taken by monetary authorities and officials to control inflation was controlling the liquidity. Due to the instability of demand for money and instability of the relationship between inflation and liquidity caused by financial innovations and role of expectations, economists have introduced a stable monetary model emphasizing the mechanism of monetary transmission and presented an appropriate monetary rule in recent decades. On the other hand, monetary policies are usually passive and influenced by financial policies in Iran. Inflation is stably hidden in Iranian economy, and two-digit inflation rates have long been witnessed in Iranian economy for years. The constraints made by the interest-free banking in the application of traditional in using the traditional tools for monetary policies based on low interest and efficiency are the tools based on interest. They cause monetary policy tools to be designed and implemented in a traditional form, meaning money base or liquidity. In such situations, it is really hard to select goals and monetary tools to enforce monetary policy.

The current paper was conducted to investigate the theoretical foundations of Taylor rule in order to redefine an optimal monetary rule for the central bank to have a mechanism of implementing stable monetary policies in the framework of the Interest-Free Banking Act for the enforcement of monetary policy and inflation control.

The only difference is that the goal of Taylor rule was to control the inflation rate; however, the current rule was aimed at controlling the growth rate of money base (instead of interest rate). Considering the success of Taylor rule in some developed and developing countries, it was then concluded that this rule could be redefined in the framework of the Interest-Free Banking Act. It can also be used as an appropriate rule with high flexibility and a stable model for the mechanism of monetary policy and inflation control. Based on this rule, plans can be made to stabilize macroeconomic variables.

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