

Business targeting in Iran: a hybrid simulation-optimization approach

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Abstract

In order to calculate the employment trend in Iran, the aim of the article is to optimize the employment trend in Iran for the years of implementation of the sixth economic, social and cultural development program (2017-2021). For this purpose, first, using the Gauss-Seidel algorithm, the system of dynamic and non-linear macrometric equations and the quantitative goals of the sixth development program; the employment process in the country was simulated. Then, the optimal trend of the working population was calculated from the minimization of the welfare loss function of the policymaker by programming and implementing an open cycle algorithm and solving the Bellman equations. The obtained results showed that achieving higher employment requires controlling inflation at lower rates as well as achieving a higher economic growth rate. The findings of this research are compatible with the theory of new Keynesians such as Gerish, Clarida, Gertler, Menkiu, Walsh and Taylor regarding the necessity of simultaneously reducing inflation and increasing production. Hence, the jump in production and curbing inflation can make possible the optimal control of employment and business at the targeted level. Based on this, the targeting of macroeconomic indicators in the available (possible) territory, complete monetary and financial discipline, independence of the central bank, and the use of stochastic optimal control theory in the targeting of development programs are among the policy recommendations of this article.

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Extended Abstract

Introduction

"Inflation" and "Production" have a privileged position among the economic variables that are used as indicators in evaluating the performance of the economy. In a theoretical approach, Keynesian economics after the Great Depression of 1929 establishes an alternative relationship between inflation and production within the framework of demand-oriented economics. This theoretical achievement was confirmed by Fisher in 1926 using statistical data (Fisher, 1926).

After Keynes and in the 1950s, Phillips, using statistical data from England, showed that in the short run Keynes's idea about the substitution between inflation and unemployment is valid (Phillips, 1958). In the early 1960s, Friedman and Phelps showed, based on the model of adaptive expectations, that there is no relationship between inflation and unemployment in the long run, and that there is a substitution relationship only in the short run (Friedman, 1968; Phelps, 1967).

In a situation where Keynes' views were involved in a theoretical challenge by the traditional Chicago monetarist school led by Friedman and his followers such as Schwartz and Phelps, Lucas' criticism of econometric models and emphasis on the importance of deep coefficients and relationships resulting from rational optimization, along with scientific efforts by Svensson and Woodford on the need to provide models with time consistency in the 1970s led to the definition of a new monetary rule by Taylor in the early 1990s (Svensson, 1997; Woodford, 2001; Taylor, 2000).

Gali, Clarida, Gertler and Walsh derived the monetary rule from the minimization of a welfare loss function for the policymaker with respect to the constraint functions (Gali & Gertler, 1999; Clarida et al, 1999). Observing the inability of the monetary policy of inflation targeting and market fundamentalism to deal with the economic consequences of the 2008 financial crisis and the "resumption of Covid-19", as well as the failure of economic neoliberalism to automatically achieve the economic growth rate to goals such as a significant reduction in inequality and poverty has proposed the new economic policy called employment targeting as a solution in early 2019 (Ghate & Mazumder, 2019). As examples to be mentioned in this article, we can mention the active inclusion policy by the European Union that has started in the last few years. In this way, which is known as active labor market policy, the government tries to increase the employability of citizens and help increase the number of employees (Fredriksson, 2020).

In the country of Iran, a 10-year strategy for the period of 2021-2031 has been designed and implemented so that people with different degrees of desirability are employed.

Theoretical Framework

In researches related to the relationship between inflation and unemployment, Phillips theory is mentioned as one of the leading theories. His research showed that there is an indirect relationship from inflation to unemployment (Fisher, 1926). In 1958, Phillips reached results that show that there is an indirect relationship between these two variables in the short term (Phillips, 1958).

In 1960, Lipsey conducted his empirical research during the period 1857 to 1962 for England and used the traditional theory of "price behavior in the market" for this purpose. According to this theory, in the conditions of excess demand, prices increase; and in conditions of excess supply, prices decrease. (Lipsey, 1960). In 1960, Samuelson and Solow hypothesized that firms set their pricing based on a fixed law (average cost of production) in which price is calculated based on unit labor cost plus profit.

In the 1960s, the Phillips curve theory was developed by Friedman and Phelps with an emphasis on expectations. One of the important steps in the development of Phillips' relationship was the addition of expectation factors to the initial relationship by Friedman and Phelps (Friedman, 1968; Phelps, 1967). Phillips' goal in the late 1960s was to explain the relationship between inflation and unemployment through the behavior of prices and wages. In the 1970s, by combining the Phillips curve and expectations with the learning-by-error process, the famous hypothesis of accelerated inflation was formed, which influenced policy debates.

In the 1960s, the research results of Thomas Sargent and Neil Wallace showed that monetary policy is not directly related to the production and employment trends (Sargent & Wallace, 1973).

Taylor (1979) was the first person who, using dynamic optimization methods, presented an optimal monetary rule in the direction of optimal control of the amount of money, which is considered a simple instrumental rule (Taylor, 2000). Svensson and Woodford (1997) expanded the discussion of the optimal monetary rule and use an inter-period optimization process to find the optimal monetary rule (Svensson, 1997; Woodford, 2001).

Galli, Clarida, Gertler and Walsh in 1999 derived the monetary rule from the minimization of a welfare loss function for the policymaker with respect to constraint functions. They found that the inflation rate is related to its lag, inflationary expectations, and excess demand, suggesting that there is a rate of unemployment that, if maintained, would correspond to a sustainable rate of inflation (Gali & Gertler, 1999; Clarida et al., 1999).

Since 2019, targeted programs have been created, including the Australian Disability Strategy (2021-2031), designed to advance the employment and financial security of people with disabilities. In Latin America, Africa and Asia, employment guarantee schemes have been proposed for anti-poverty policies. In India, there is a so-called twin problem in the labor market; one of which is job loss and the other is that employees change contracts from permanent to temporary.

Research methodology

In this article, to calculate the optimal trend of employment in Iran, the combined approach of simulation based on stochastic dynamic optimization is used. For this purpose, a policymaker's welfare loss function of linear quadratic and inter-period type including the deviation of inflation rate and economic growth from their targeted and approved values in the country's sixth plan of economic, social and cultural development, with regard to the system of dynamic and non-linear equations of Keynesian macrometrics, is minimized by stochastic dynamic programming method. The system of dynamic and stochastic macrometric equations includes behavioral equations and defining equations. These equations have been estimated using the statistical data related to the years 2017-2021 of the Central Bank of the Islamic Republic of Iran and based on the maximum available information using the ordinary least squares regression method.

Research findings

EViews software was used for data analysis. First, the employment process in the country was simulated by using the Gauss-Seidel algorithm, the system of dynamic and non-linear macrometric equations and the quantitative goals of the sixth development program. Then, the optimal trend of the working population was calculated from the minimization of the welfare loss function of the policymaker by programming and implementing an open cycle algorithm and solving the Bellman equations. The results of this research showed that

achieving the optimal and planned growth rate requires curbing inflation and growth with economic stability.

Conclusion

The obtained results showed that achieving higher employment requires controlling inflation at lower rates as well as achieving a higher economic growth rate. The findings of this research are compatible with the theory of new Keynesians such as Gerish, Clarida, Gertler, Menkiu, Walsh, and Taylor regarding the necessity of simultaneously reducing inflation and increasing production. Hence, the jump in production and curbing inflation can make possible the optimal control of employment and business at the targeted level.

According to the results of the research, the following suggestions were made:

Targeting macroeconomic indicators in the available (possible) territory, complete monetary and financial discipline, independence of the central bank, and the use of stochastic optimal control theory in targeting development programs are among the policy recommendations of this article.