Effects of Inflation and Employment Inverse on Economic Growth in Iran (1992-2012)

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ABSTRACT

This study attempted to explore the role of inflation and unemployment inverse on the Iranian economic growth during 1992-2012. Moreover, the effects of inflation and unemployment inverse on economic development were examined within short and long-term periods through an autoregressive distributed lag (ARDL) model. The model was assessed through Microfit 4.0 and Eviews 6. The results indicated that inflation and unemployment inverse left a negative impact on the long-term economic growth. It implies that inflation and unemployment inverse in the long-run led to lower economic growth, which can more than ever propel the Iranian authorities to pay greater attention to the importance of inflation, unemployment and devising new plans for mitigation of the two trends. The results can be employed by all Iranian officials, especially those involved in economic and social institutions and organizations, so as to take measures for mitigation of inflation and enhancement of employment rate, and eventually realize maximum economic growth.

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INTRODUCTION

In recent decades, the main factors of economic growth have become a key subject matter explored in numerous research projects. In this respect, it is crucial to understand the effects of inflation and unemployment economic growth, because these trends seem absolutely tangible for developing countries including Iran, due to the current imbalance of economic, social and political structures. Nevertheless, many scholars believe that employment, inflation control and unemployment can play an essential role in the economic growth of any society. In fact, it is a debate often discussed by economists, even though there is little insight into how inflation and unemployment inverse impact economic growth, as well as the effective mechanisms and short and long-term effects of such variables on economic development. Therefore, this study intended to provide a better understand of inflation, employment and unemployment and their economic effects within two decades spanning from 1992 to 2012.

2. Research significance

Working builds the core value of any society. It has always been a major concern of planners how to eliminate unemployment and mitigate inflation as destructive social, economic and cultural trends. Thus, the issue of employment and perfect manpower productivity needs to be considered a strategic objective in Iran. What ultimately determines the characteristics and socioeconomic development trend of any nation is not capital and material resources, but human resources.

With a high unemployment rate, a large part of active workforce has been wasted rather than being hired in various activities, bringing about growth and prosperity of national production. On the other hand, poverty, corruption, unfair income distribution and other negative consequences have plagued the society. Furthermore, curbing the unemployment rate through appropriate policies can be conducive to reduction of many adverse economic, social and cultural effects, setting the ground for realization of economic growth and preplanned objectives. However, implementation of these policies in the short and long-term may provide different outcomes. This study attempted to examine the short-term and long-term effects of inflation and unemployment inverse on Iranian economic growth.

3. Methodology

At the first stage, a desk review of relevant literature was conducted on concepts of inflation, employment and unemployment, as well as their roles in economy. Then, data were collected through Data Pre-processing Subsystem (DPS), annals provided by Statistics Center of Iran and Central Bank balance sheets. At the next stage, the effects of inflation and unemployment inverse on economic growth were investigated through several econometric models. For this purpose, conventional tests were used to evaluate the static quality of model variables[*]. Then, the long-term and short-term relationships between inflation, unemployment inverse relationship economic growth were analyzed through an Autoregressive Distributed Lag (ARDL) model.

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[*] Since the number of variables involved in the model is static, it was impossible to adopt Johansen cointegration test, which was inevitably replaced by ARDL.

This study was organized as follow. In the introduction, the research objectives and methodology were outlined. Then, the role of inflation and employment was examined in the theories of economic growth and previous studies. At the next stage, an analytical paradigm was described and the outcomes were explored.

4. The role of inflation and unemployment inverse on economic development

It is critical to identify and explain inflation, unemployment and employment rate involved in economic decisions. A significant portion of economic literature has been dedicated to that particular topic. Defined as the constant escalation of prices, inflation can leave an impact on economic growth, employment and distribution of income and wealth, thus affecting almost all aspects of a nation. Employment and individual achievement of a desired job are the most basic needs of any society, where unemployment is discussed as a destructive socioeconomic trend, leading to concerns among authorities how to tackle the issue (Karbasi et al. 2008).

Involuntary, long-term interruptions in an individual's job, in a way that cannot be replaced, occurs when wages in the labor market fail to serve as equilibrium prices (Aram, 2003). In other words, when the cost of labor (wages) is for any reason above final output, there would not be any employment. Under such circumstances, unemployment rate practically becomes aggravated by population growth (Kinamehr, 2006).

Given the importance of economic development, it is crucial to identify the reasons and contributing factors. The economic growth literature suggests there are a variety of factors, most notably capital, labor and technological progress. Throughout the process of development, there are different goals set in various quantities and qualities, where the initial level of underdevelopment, ideals and culture of a nation are among the factors contributing to realization.

Experience of high development rate in the past decades somehow managed to keep inflation at a low level, improved social welfare and provided citizens with high level of living standards. Seemingly, the requirements for targeted control of inflation rates in Iran can be fulfilled through adopting necessary monetary measures and fiscal policies.

Independence of Central bank and building public confidence in the monetary system through transparency and creating a stable monetary policy have continuously been major factors contributing to inflation rates by adjusting the government financial system and appropriate fiscal policies (Pirayee and Dadvar, 2010).

5. Literature review

Marcelino and Mizan (2001) examined the relationship between real wages, per capita GDP, inflation rate and unemployment rate through cointegration vectors in Italy during 1970-1994. They asserted that European countries managed to curtail inflation by a shift from Keynesian policies aimed at high employment toward contraction monetary policies. Moreover, they took measures for expansion of financial and monetary periods. Therefore, the economy-based modeling of these sectors will be faced with certain problems unless changes are made in economic priorities and policies. Vaona and Chiava (2007) examined the long-term relationship between inflation and economic

growth through instrumental variables for 167 developed and developing countries during 1960-1990. For this purpose, the study focused on the effects of inflation, share of gross fixed capital formation in GDP, population growth, education level and government spending share of GDP on economic growth. The results showed that inflation threshold was achieved by 12 percent. At rates lower than the threshold, inflation tended to be safe to economic growth while at rates higher than the threshold, it tended to be harmful to economic growth.

Fizari et al. (2011) reviewed and analyzed time series and employment with GDP for 1982-2006. Their study employed multivariate time series analysis in STATA through the following logarithmic model.

$$L_n(GDP_1) = \alpha + B_1 L_n(INF_1) + B_2 L_n(EMP_1) + u_t$$

Where GDP_1 is Gross Domestic Production, INF_1 is inflation rate, EMP_1 is unemployment rate and u_t is the stochastic term.

The results indicated that long-term inflation rate did not affect the GDP, while the employment rate was negatively correlated with GDP. Furthermore, both independent variables in the short term both were in one-sided correlation with GDP. The researcher managed to identify the progress of variables using time series data, where the Granger Causality was adopted to examine the causality between variables.

Ortansa (2014) investigated the relationship between inflation and unemployment over time, and especially the role of such relationship among Romanian young people 20 to 24 years of age. In order to identify such relationship, the Phillips curve was analyzed based on collected data. According to the data provided by that study, the relationship between inflation and unemployment in the age group 20 to 24 years was not direct or inverse. In some years, however, the Philips inverse relationship was confirmed. In fact, these two disparities had different reactions to economic policy measures. That was why focus could not be shifted only on one disparity. Finally, the following results were obtained:

1. There was no relationship between those indicators at the stage where there was an inverse relationship between the two variables (Phillips inverse curve).

2. In the long-run, Phillips curve is vertical.

3. In analyzing the relationship between inflation and unemployment, it was concluded that the curve resembled a spider's web[†].

In Iran, only Chaffee (2012) examined the issues concerning employment and unemployment and the negative role of unemployment trend on the Iranian societal development. The results showed that provinces of South Khorasan and Semnan had minimal 6.3 and 7.2 percent unemployment rates, respectively. Moreover, provinces of Fars and Lorestan had extreme unemployment rates at 21.1 and 20.5 percent, respectively. With a high unemployment rate, a large part of active workforce has been wasted rather than being hired in various activities bringing about growth and prosperity of national production. On the other hand, poverty, corruption, unfair income distribution, divorce and

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[†] It implies that the supply and demand curves were not in harmony, thus disrupting the trend of prices.

other negative consequences have plagued the society. The results indicated that job opportunities are vital in regions that suffer more from unemployment and poverty.

In a study titled "Unemployment Rate, Inflation and Potential Production Growth", Zabihi and Lotfi (2012) estimated the unemployment rate with inflation and potential production growth through unobserved components model, proposing a new method consisting of Okun's law equations and Phillips curve, where key unobservable economic variables were randomly adopted within a system entailing three variables of unemployment, production growth and inflation. The findings suggested that production gap was in a negative correlation with deviation of unemployment rate from unemployment accompanied by inflation. Moreover, the effect of business cycles on unemployment rate and inflation was negative, which means that if the actual unemployment rate reaches the unemployment rate accompanied by inflation, the economy would experience maximum production free of inflationary pressure.

6. Overview of model selected for Iranian economy

Considering the previous studies conducted on insertion of inflation rate, unemployment and employment in production functions, the model proposed in this study is based on Shahid (2014). In this regard, effort was made to adopt this function and the proposed model, so as to analyze the Iranian economy in terms of the effects of inflation and employment inverse relationship on growth during 1992-2012.

Methodology involved Cobb-Douglas function.

$$Y = B_0 \, INF^{\alpha 1} \times UNP^{\alpha 1}$$

$$Y = B_0 + B_1 \inf + B_2 unemp + e_t$$

Inf Inflation, $Unemp$ Unemployment

$$LogY = 10GB_0 + B_1 Log \inf + B_2 Lognnemp + et$$

7. Model overview

Since the variables used in the model involved time series, spurious regression was prevented through first testing the variables in static terms during analysis of the model. At the next stage, the relationship between the model variables was investigated within two long-term and short-term intervals through ARDL.

It should be noted that cumulative degree of explanatory variables were not important in ARDL, since an appropriate model could be achieved by specifying the right lags.

8. Statistical data

In this study, GDP, GNP and variables such as INF, EMP, inflation and unemployment rate were adopted during 1992-2012. Although effort was made to as much as possible derive statistical data from one single source, it was inevitable to involve different sources of annals from Statistics Center of Iran and Central Bank's balance sheets etc. due to insufficient data. The software programs used to analyze the model were Microfit 4.0 and Eviews.

9. Results of model evaluation

This section explores the static quality of variables involved in the model as well as their long-term interrelationships. Then, the results of long-term relationships and error correction model (ECM), CUSUM, and CUSUM OF SQVARES were involved.

10. Testing the static quality of model variables

The application of traditional methods in econometrics is based on the assumption of static variables. However, relevant studies have indicated such assumption is incorrect in many cases of time series, since most of these variables are not static. Therefore, it is necessary to evaluate the cointegration of model variables so as to ensure they are static. For this purpose, the Augmented Dickey–Fuller (ADF) unit root test was used.

If the results of ADF are determined, Ln GNP for GDP would be non-static, because the ADF value for variables is 1.104, which is lower in terms of absolute than MacKinnon critical values at three levels of one, five and ten percent. After a differentiation, it reached -6.04 becoming static, which is higher than the MacKinnon critical values at all three levels. As ADF determined, Ln INF was non-static, which reached -5.90 after double differentiation becoming static. In terms of absolute value, it was higher than MacKinnon critical values at all three levels. Moreover, Ln REM for employment inverse was also non-static, which reached -3.29 after double differentiation. In terms of absolute value, it was higher than MacKinnon critical values at all three levels. Given that all endogenous variables of the model are required by Johansen's cointegration to be cumulative I (1), it was impossible to adopt Johansen's method. At the next stage, the long-term relationships and short-term dynamics between inflation, employment inverse and economic growth in Iran were analyzed through an ARDL model.

11. Evaluation of long-term relationships and short-term dynamics

This section explores the long-term equilibrium relationship and short-term dynamic relationship between the model variables. However, before examining the long-term equilibrium relationship between the variables, the final equation intended for the Iranian economy is reformulated through ARDL.

The ARDL modes examined in this study include:

$$Y = B_0 \, INF^{\alpha 1} \times UNP^{\alpha 1}$$

$$Y = B_0 + B_1 \inf + B_2 unemp + e_t$$

$$Inf \ \text{Inflation}, \ Unemp \ \text{Unemployment}$$

$$Log Y = 10 GB_0 + B_1 Log \inf + B_2 Lognnemp + et$$

This section presents the results of determining the optimal frequency of lags, diagnostic test, cointegration relationship between variables, long-term relationship between the variables and the results of error correction model (ECM).

Table 1: Selection of appropriate lags for model variables

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
L_n GNP(-1)	0.5466	0.1399	[0.003]4.079
L_n INF	-3.551	1.539	[0.036]-2.306
L_n REM	-63.72	70.89	[0.384]-0.898
L_n REM (-1)	-142.53	65.43	[0.047]-2.178
C	-236.84	134.58	[0.100]-1.759
TREND	-0.71976	0.9833	[0.476]-0.7319
R-Squared	0.9640	R-Bar-Squared	0.95126
S.E. of Regression	4.514	(5 and 14)F-Stat. F	[0.000]75.164
DW-statistic	2.327	Durbin's h-statistic	NONE

*Source: Calculations

Due to the limited time period from 1992 to 2012, the Bayesian-Schwarz criterion was adopted to determine the optimal number of lags for variables[‡]. The results of diagnostic test, serial autocorrelation, residuals in specified functional form, normality of residuals, heteroskedactisity[§] as well as statistics concerning R^2 and F indicated the suitability of model for analyzing the interrelationships between the variables. Since the sum of lagged coefficients of dependent variable is smaller than one ($\sum_{i=1}^{p} Q_i < 1$) and according to Banerjee test, Dolado and Mestre (1992), the relationship between can evaluate the long-term and short-term relationships. According to the results, one unit of increase in inflation curtails GDP by 3.5 units. Moreover, one unit of increase in employment inverse can curtail GDP by 142.5 units.

11-1 Long-term results of model

[‡] Due to the limited time period, the Bayesian-Schwarz criterion was adopted so as to consider minimal lag.

[§] The Godfrey test was used to investigate the consecutive correlation between the residuals.

Table 2: Long-term coefficients

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
L_n INF	-0.5151	0.1583	[0.008]-3.252
L_n REM	-0.7614	0.2377	[0.557]-3.203
C	-1544.0	2611.9	[0.564]-0.5911
TREND	-4.692	13.1391	[0.727-0.3556
(001/)4.221=(5 & 10)stat-F			

*Source: Calculations

According to the results, the sign of all estimated coefficients corresponds with theory.

Table 2 displays the long-term coefficients of growth pattern by through ARDL based on Schwazer-Bayesian criterion. The results generally suggested that inflation in the long-run had a significantly negative impact on GDP. Based on the results, one percent increase in inflation reduces GDP by 0.515 percent. Moreover, the employment inverse has a significantly negative impact on GDP. The results indicated that one percent increase in employment inverse curtailed GDP by 0.761 percent.

11.2 Results of model analysis in the short-term or error correction model

The cointegration between the set of economic variables can provide the statistical ground for error correction model. The error correction model was employed mainly because it linked short-term fluctuations to their long-term values.

To adjust the error correction model, the residuals from the cointegration relationship were inserted into the model within a time lag as an explanatory variable alongside first and second order differences. Then, the ordinary least squares (OLS) was used to estimate the model coefficients. After obtaining a long-term equilibrium model in Microfit, the corresponding error correction model was presented.

According to the results, the sign of all estimated coefficients corresponds with theory. The results obtained from the error correction model were similar to those obtained from the cointegration relationship between the model variables, with the exception that the results of short-term dynamic relationship between the variables represented lower impact of model variables on economic growth.

Table 3: Results of ECM

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
L_n INF	-3.551	1.539	[0.046]-2.306
L_n REM	-3.7286	0.8955	[0.003]-4.163
(1-)ecm	-0.4534	0.1339	[0.522]-0.6555
R-Squared	0.4878	R-Bar-Squared	0.3049
DW-statistic	2.3276	(4 & 15) F-stat. F	[0.038]3.3336

*Source: Calculations

In the above table, F-statistic is 33.3 confirming the significance of all the estimated coefficients. Moreover, the coefficient of error correction (-1) is -0.4534, significant at the confidence level. This confirms the rapid functioning of adjustment mechanisms in economic progress toward balance.

12. Results of CUSUMSQ, CUSUM tests

This section explores the stability of model parameters through cumulative sum (CUSUM) and Cumulative Sum of Square Recursive Residuals (CUSUMSQ). The first test examines the systematic changes in estimated coefficients while the second test examines whether there are sudden random changes in stability of coefficients. If the statistics fall within the two parallel boundary lines, the null hypothesis regarding the stability of parameters will not be rejected. The results of these tests for the model have been illustrated in Figure 1 and Figure 2. As is clear from the graph, the parameters are sufficiently stable. Hence, it can be argued that the null hypothesis regarding stability is not rejected, i.e. the parameters are sufficiently stable.
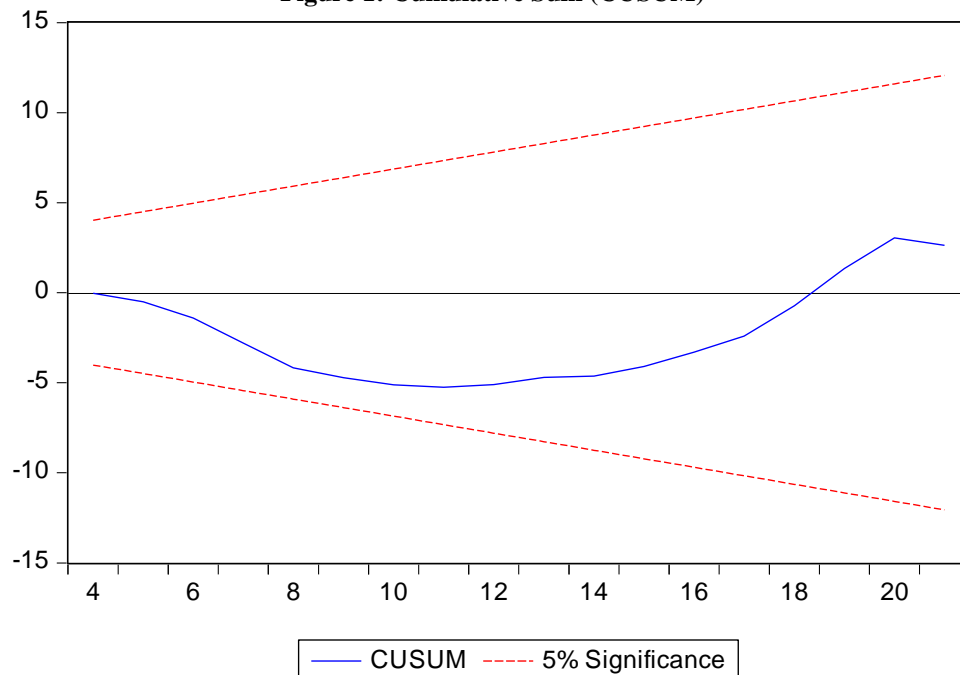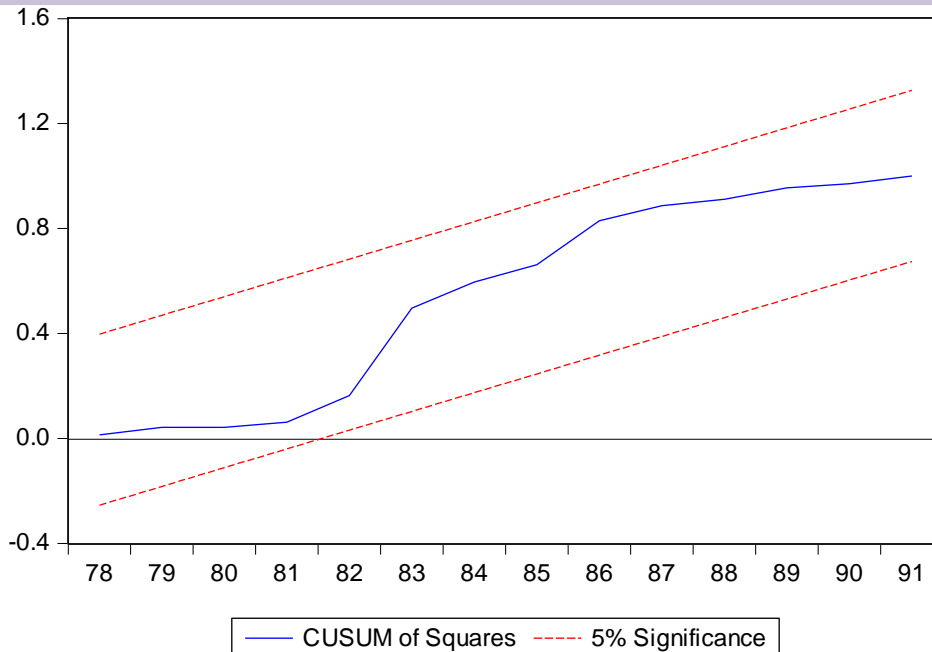
Figure 1: Cumulative Sum (CUSUM)

Figure 2: Cumulative Sum of Square Recursive Residuals (CUSUMSQ)

CUSUM of Squares ----- 5% Significance

13. Conclusions

A review of relevant literature on the impact of inflation, employment, employment inverse and unemployment on economic growth is suggestive of negative effects and significance of curtailing burden on economic growth. However, the strength of such effects have been highly variable in different studies, subject to much change depending on the model and data input. It should be noted that the effects of inflation and employment inverse on economic growth is extremely extensive. The majority of previous research highlighted there was a nonlinear direct relationship between inflation and economic growth. Nevertheless, it can be argued that inflation and unemployment are two key factors contributing to economic growth.

The results of analyzing the impact of both factors on the Iranian economic growth indicate the significantly negative impact of inflation and employment inverse on GDP within short and long-term spans. The effect of long-term inflation was -0.51 while the short-term effect was -3.55. This can compel the Iranian authorities to pay further attention to the importance of inflation, employment and unemployment on economic growth, so as to make great efforts to realize economic progress.

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