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On the Relationship between Central Bank's Independence and Inflation Rate in Iran

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ABSTRACT: The purpose of present paper was to examine the relationship between central bank independence and inflation rate in Iran over 1960-2008. First, central bank independence has been accomplished through three indices including legal and real CBI indices and turnover rate of central bank governor index. Then, Augmented Dickey-Fuller test for model stationary of variables has been done by applying Eviews software. In addition, the relationship among the central bank independence indices and average inflation rate and its variability in Iran's economy has been investigated using Eviews and Microfit softwares. Necessary data for calculating CBI index were obtained from Cukierman criteria (LCBI). Furthermore, real CBI index was gathered via standard questionnaire and turnover rate of central bank governor index data were collected through library survey. The results showed a negative relationship among real CBI and inflation and its variability. The relationship between legal CBI and inflation was also negative, but its relationship with inflation variability was not statistically significant. Also, a positive relationship between turnover rate of central bank governor index and inflation rate was observed, but negative relationship was seen between turnover rate of central bank governor index and inflation rate variability.

Keywords: *Central Bank Independence (CBI), CBI indices, Central Bank of Islamic Republic of Iran, Inflation, Inflation variability*

INTRODUCTION

Central bank independence (CBI) has become one of the central concepts in monetary theory and policy. Central bank independence refers to the freedom of monetary policymakers from direct political or governmental influence in the conduct of policy. During the 1970s and earlier 1980s, major industrialized economies experienced sustained periods of high inflation. To explain these periods of inflation, one must account for why central banks allowed them to happen. One influential line of argument pointed to the inflation bias inherent in discretionary monetary policy if the central bank objective for real output (unemployment) is above (below) the economy's natural equilibrium level or if policy makers simply prefer higher output levels (Barro and Gordon, 1983). Under rational expectations, the public anticipates the central bank will attempt to expand the economy; as a consequence, real output is not systematically

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affected but average inflation is left inefficiently high. This explanation for inflation raises the question of why central banks might prefer economic expansions or have unrealistic output goals. Economists have frequently pointed to political pressures as the answer. Elected officials may be motivated by short-run electoral considerations or may value short-run economic expansions highly while discounting the longer-run inflationary consequences of expansionary policies. If the ability of elected officials to distort monetary policy results in excessive inflation, then countries whose central banks are independent of such pressure should experience lower rates of inflation. Beginning with Bade and Parkin (1982), an important line of research focused on the relationship between the central bank and the elected government as a key determinant of inflation. In the economy of developing countries such as Iran, political factors are very effective in inflation rate increase. As it is known, inflation rate was stable during the period 1979-2008 in Iran and this factor is very important in economic growth and development. Therefore, it is so crucial to find some ways in order to control the inflation. To do so, the relationship between central bank independence and inflation and also its variability is investigated in this article.

Bade and Parkin (1982) investigated the relationship between central bank independence and price stability in 12 developed countries after Bretton Woods period and found that central bank's independence is an important factor in determining the inflation level. To support the argument, they highlighted Germany and Switzerland as two important examples of countries with central bank independence. These two countries showed lower levels of inflations in comparison to average inflation level of the sample. Alesina (1988) added Denmark, New Zealand, Norway and Spain to Bade and Parkin sample and showed a reverse relationship between central bank's independence and average inflation during the period 1973-1985. Grilli, Masciandaro and Tabellini (1991) applied a scale for evaluating central bank independence in 18 developed countries during the period 1950-1989. The scale had two independence parts: economic independence and political independence. The time period divided into four decades in order to analyze the relationship between central bank's independence and inflation in different countries. The results showed that the central bank independence leads to inflation reduction. Despite of these researches, a question always proposed about the issue. Are the proposed samples accurate or does the bigger sample will have the same result as smaller samples? Cukierman et al. (1992) investigated the relationship between independence and inflation scales in 72 countries and found that the results are compatible with previous studies. In other words, a negative relationship exists between central bank independence and inflation in industrialized countries and also a positive relationship exists between inflation and substitution rate of central bank headquarter. Alesina and Summers (1993) studied the relationship among central bank independence and other economic variables such as growth, unemployment rate and real interest rate in 16 countries during the period 1955-1988 and found that although central bank independence will lead to price stability but it does not have a significant effect on economic variables. Cukierman and Webb (1995) studied the political effects of the possibility of substitution of central bank headquarter in a short period of time (6 months) after government change. The sample contained 67 countries during the period 1950-1989 and they divided it to two smaller periods: 1950-1971 and 1972-1989. The results showed that if the government change was due to a military coup or breaking the constitutional law or democratic changes, then the possibility of substitution of central bank headquarters after 6 months of government change is about 50 percent. Maxwell Fry (1998) studied the relationship among central bank independence, budget deficit and government reliance on internal banking system and argued that it is possible to determine central bank independence in developing countries via government's budget deficit and how to prepare it. He applied the data of 70 developing countries during the period 1972-1995 using a scale based on central bank reaction to the central government credit demand increase and mentioned that financial policy in developing countries limited the central bank activities and also it will determine the central bank independence. In addition, it is found that central bank's independence has a reverse relationship

with government budget deficit and its reliance on internal banking system. It is also found that, in average, developed countries recover 50 percent of their budget deficit through voluntary Non-banking internal resources, which are used to recover only 8 percent of the budget deficit in developing the countries, as they are the least harmful budget deficit recovery methods in comparison to other methods. Ilieva and Gregoriou (2005) investigated the effect of central bank's independence on average inflation and its variability in 22 developing countries during the period 1991-2003 and found that central bank independence reduces the average inflation and its variability. Obben (2006) studied the central bank independence in 29 industrial and 56 developing countries and argued that central bank independence assisted the economic growth indirectly and through price stability in the long run. Schowdiauer, Komarov and Akimova (2006) mentioned that economic liberty, political system's order, scanning the financial institutions, financial disagreement with inflation and general opposition with inflation are the most important political and economic components regarding to central bank's independence. Crowe and Meade (2008) studied central bank independence and objectivity and their evolutions in 96 countries during two different periods of 1987-1991 and 2002-2006. They found that central bank independence is increased during the time in the majority of countries under study. In addition, the results showed that central bank's independence was increased, at a higher pace, in countries with higher democratic standards and higher inflation backgrounds and also in countries with lower central bank independence and fixed inflation rate systems. Farrag and Kamaly (2007) analyzed the legal and behavioral features of central bank's independence in Egypt since the central bank foundation in 1961 until 2004.They divided the study period to four equal eleven years. The average central bank's independence was 7.5, 11, 10 and 10 in the periods of 1961-1971, 1972-1982, 1983-1993 and 1994-2004, respectively. Also, the central bank headquarter substitution rate was 0.27, 0.18, 0.27 and 0.2 for the four periods, respectively. Jacome and Vazquez (2005) investigated the relationship between central bank's independence and inflation in 24 countries of Latin America and Caribbean area in 1990s. They used three central bank's independence tools and showed a negative relationship between central bank independence and inflation in this region. The analysis showed that central bank independence is 0.66 for these countries using Cukierman method. In addition, the region trends tend to increase the central bank independence. Panagiotidis and Triampella (2005) investigated the central bank independence in Greece and argued that there is a relationship exists between inflation and central bank headquarter substitution rate. The results showed that the inflation can be reduced through less headquarter substitutions rate and higher central bank's independence. They showed a negative relationship between legal independence of central bank and inflation variability in Greece. Hayo and Hefeker (2007) stated that central bank's independence is only useful as a means of potential monetary policy mechanism. If a significant relationship found between central bank independence and inflation, then it is crucial to search for underlying factors with lower inflation rates. Arnone, Laurens, Segalotto and Sommer (2007) calculated the central bank's independence in 163 countries (28 developed countries, 32 emerging economies and 103 developing countries) until the end of 2003. The obtained results were compared to those of 68 countries in 1980s and concluded that a significant advancement has occurred in central bank economic and political independence in recent decades. In addition, central bank independence in developed countries is higher than developing countries and emerging economies. De Haan and Kooi (2000) used a sample that contained 89 developing countries and found a significant relationship between inflation and central bank headquarter substitution rate in countries with higher inflations. In contrast, Lybek (1999) used a sample of former Soviet Union and Latin America countries and did not found any relationship between central bank headquarter substitution rate and inflation. The same results also found in Jacome (2001) research. Meisel and Barron (2009) analyzed the central bank's independence in Colombia since its foundation in 1923 until 2008 and found that if central bank's independence leads to price stability, it will have the best results in this matter. Ameli (2009)

studied the relationship between central bank independence and oil price effect on monetary policy in 9 mass oil exporting countries including Iran, Kuwait, Mexico, Nigeria, Norway, Russia, Saudi Arabia, UAE and Venezuela and found that countries with higher central bank's independence used a contracted monetary policy (less tensional policy) in comparison to countries with lower central bank independence. Iran was ranked as 7th and 8th country among 9 countries of the sample in two different scales. Maadelat (1996) studied the relationship between central bank independence and inflation and found that central bank's independence scale is extremely significant with a coefficient of 63 percent. Ahmadi (1999) investigated the relationship between central bank independence and other economic performance in developing countries using Cukierman model. This model calculated Iran central bank independence as 0.22 and it is ranked 37 among 45 developing countries under study. In addition, Iran's scale for central bank headquarter substitution rate was estimated as 0.38 that is ranked 35 among the 45 countries since its foundation until 1999. Also, they found a negative relationship among legal independence, inflation rate, inflation tax and money volume and a positive relation among legal independence, budget surplus and GDP growth. In addition, central bank headquarter substitution rate has a positive relationship with inflation rate, inflation tax and money volume and a negative relationship with budget surplus and GDP growth. Habibi (1998) studied the relationship between inflation and central bank independence in Iran during the period 1963-1995. He used the ratio between government's net debt to central bank and government's budget deficit as a scale for central bank independence and mentioned that if this ratio increased during a specific amount of time, then it can be concluded that the central bank independence has lowered. In other words, the bigger the ratio, the lower the central bank's independence. Davoodi Zanjani (2005) investigated the effect of central bank independence on production level, inflation and its variability in selected developing countries during the period 1980-1998. He showed that central bank independence had a negative and significant effect on inflation. Although the effect of central bank's independence on production is less than its effect on inflation but the results showed that CBI has a positive and significant effect on average production in the long run. In contrast, central bank independence has a negative and significant effect on average deviations of production from the base year in the short run. Based on the above literature, the study hypotheses are as follows:

1-A negative and significant relationship exists between central bank independence and inflation in Iran.

2-A negative and significant relationship exists between central bank independence and inflation variability in Iran.

RESEARCH METHOD

In this study, the effect of Iran central bank independence on inflation and its variability was investigated since its foundation in 1950 until 2008. To do that, regression models were applied using Eviews and Microfit softwares. In order to analyze and quantify the central bank's independence, standard questionnaire and also library methods were used. As it is known, central bank independence has a slight change during a one year period. Due to that, the sample divided into 5 equal periods:

1. 1950-1971: from its foundation until the approval of banking and monetary law in 1972.
2. 1972-1979: from the approval of banking and monetary law until Iran Islamic revolution.
3. 1980-1989: from Iran's Islamic revolution until the of Iran war with Iraq.
4. 1990-1997: from the end of the war until fifth, sixth and first half of seventh period of presidency.
5. 1998-2008: from the second half of seventh period of presidency until eighth and ninth period of presidency.

In order to investigate the relationship between central bank independence and inflation and its variability in Iran, the following models have been used:

(1) $Ln(CPI) = C_0 + \alpha_1 Ln(RGDP) + \alpha_2 Ln(M2) + \alpha_3 INDPDNCE + U_t$

(2) $\Delta Ln(CPI) = C_0 + \alpha_1 \Delta Ln(RGDP) + \alpha_2 \Delta Ln(M2) + \alpha_3 INDPDNCE + U_t$

GDP to base price index data, cash volume of private sector (M_2) data and also customers price

index (CPI) data were extracted using library method and via surveillance in Iran central bank documents (www.cbi.com). In addition, central bank independence data were determined through the calculation of three scales of legal independence, real independence and central bank headquarter substitution rate. Real independence of central bank was estimated using a special questionnaire with specialized questions (ACBI). Thus, the statistical population of the research in constrained to central bank employees who were in high rank positions with high levels of experience and background and those who have enough knowledge about central bank's performance and its relationship with government. In other words, the statistical population contains central bank's board of directors; CEOs and also experienced consultants. Due to limited number of people who were eligible to take part in this research, the whole statistical population was used to fill out the questionnaire (Bazargan et al., 1998; Sarookhani, 2003). In conclusion, 33 filled out questionnaires used in order to estimate the Iran central bank real independence.

Central bank legal independence data were collected using library method and also through the investigation of Iran monetary and banking law approved in 1960 and revised in 1972 and 1984. In order to estimate the central bank head quarter substitution rate (TOR), the reverse period of their management has been mentioned for each year and the data were extracted using library method (www.tsd.cbi.ir).

Results and Discussion

As it is known, it has some difficulties to mention stationary premise when econometrics methods such as first order subtraction of time series analysis are being used. Although, stationary of time series analysis is calculated through subtraction, but so many valuable information regarding to long-term relationships will be removed. In order to solve the problem, cointegration method has been used. It should be mentioned that in some cases, more than one long-term cointegration vector might be existed in multi variable time series analysis. In multi variable time series, more than one long-term cointegration vector might be existed. Therefore, methods such as Engle-Granger cannot determine these vectors without the analysts' premises. Johansen and Juselius (1990) formulated the cointegration vector which used the maximum likelincod in order to determine the vector. This method corrected the problems existed in Engle-Granger method. Cointegration methods are widely used in economics science. One of the conditions for using these methods is that the applied variables should have stationary or the cointegration level of the applied variables should be equal.

Thus, first of all, the stationary of the available variables should be done prior to research hypotheses analysis using Augmented Dickey-Fuller (ADF) test. The optimal lags for ADF unit root test were determined via Schwarz scale. The maximum amount of Schwarz scale has been selected as the optimal lag. The results of ADF unit root test for model variables are summarized in table (1).

As it was calculated, the absolute value of ADF statistic for each variable in table (2) was less than the critical quantity (in 5% level of significance). Therefore, LNCPI (natural logarithm of customer price index), LNRGDP (natural logarithm of real gross domestic product), LNM_2 (natural logarithm of private section cash volume), LCBI (central bank legal independence), TOR (central bank headquarter substitution rate) and ACBI (central bank real independence) have non-stationary. Thus, stationary test for first order subtraction of variables has been applied. The results are summarized in table (2). As it is shown, all variables become stationed after the first order subtraction. In other words, all variables are an integrated process of degree one.

In Johansen and Juselius method, a vector autoregressive model (VAR) is assumed and then, after some corrections, a vector error correction method (VECM) is estimated (Noferesti, 1999).

After determining the stationarity of the variables, VAR model degree was specified. Johansen and Juselius offered criteria such as Akaike Information Criterion (AIC),Schwarz Bayesian Criterion (SBC), LR statistic and balanced LR statistic for determining the optimal degree of VAR (maximum amount of each statistic will determine the model optimal degree). Thus, the degree of VAR (1) is selected as the optimal model. In conclusion, the number of cointegrated vectors was determined through special amounts maximum and also the effect tests (Johansen and Juselius, 1990).

Table 1: The summary of ADF's unit root test for model's variables

Variable	Y-Intercept without trend		Y-Intercept with trend	
	Statistic of the test	Critical quantity (in 5% level of significance)	Statistic of the test	**Critical quantity (in 5% level of significance)**
LnCPI	1.848315	-2.9241	-2.376831	**-3.5066**
LnRGDP	-1.467006	-2.9241	-2.348493	**-3.5066**
LnM2	0.137735	-2.9241	-3.281074	**-3.5066**
LCBI	-0.474787	-2.9241	-1.792106	**-3.5066**
TOR	-1.274850	-2.9241	-1.871073	**-3.5066**
ACBI	**-1.555654**	**-2.9241**	**-0.979313**	**-3.5066**

Reference: the results were estimated using Eviews Software.

Table 2: The results of ADF's unit root test for first order subtraction of variables

Variable	Y-Intercept without trend		Y-Intercept with trend	
	Statistic of the test	Critical quantity (in 5% level of significance)	Statistic of the test	**Critical quantity (in 5% level of significance)**
LnCPI	-3.336307	-2.9256	-4.222765	**-3.5088**
LnRGDP	-3.088607	-2.9256	-3.775024	**-3.5088**
LnM2	-3.342824	-2.9256	-3.265769	**-3.5088**
LCBI	-4.896985	-2.9256	-4.896985	**-3.5088**
TOR	-4.699725	-2.9256	-4.653697	**-3.5088**
ACBI	**-4.674288**	**-2.9256**	**-4.922043**	**-3.5088**

Reference: the results were estimated using Eviews Software.

Hypotheses Testing

In order to estimate the central bank independence in Iran, central bank legal independence (LCBI), central bank headquarter substitution rate (TOR) and central bank real independence (ACBI) were used in this study. To test the hypotheses, the three variables were applied in place of central bank's independence as follows:

Central Bank's Independence in Iran Has a Negative Relationship with Inflation: The Effect of Central Bank's Legal Independence on Inflation

The results of special amount maximum test and also the effect test for three co-integrated vectors, in 95% level of confidence, are shown in tables (3) and (4). The estimated co-integrated vector of Johansen and Juselius method is summarized in table (5). The normalized coefficients were shown in parentheses.

Based on the coefficients of optimal cointegrated vector, there is negative relation between RGDP and CPI. In addition, cash volume has a positive relation with consumer price index. Furthermore, central bank's legal independence index has a negative relation with inflation rate. The related coefficient showed that 1 unit of change in central bank legal independence will lead to a 4.3% reverse change in CPI. Thus, it can be concluded that a negative relationship exists between central bank legal independence and inflation rate.

Table 3: The results of special amounts' maximum test for the first sub-hypothesis of the first hypothesis

Special amounts' list in a descent order 0.00000.15308 0.30281 046061 0.94618			
H_0	H_1	statistic	**95% level of confidence**
0r =	1r =	140.2647	**28.2700**
	2r =	29.6314	**22.0400**
$r \leq 2$	3r =	17.3132	**15.8700**
	4r =	7.9754	**9.1600**

Reference: the results were estimated using Microfit Software.

Table 4: The results of effect test for the first sub-hypothesis of the first hypothesis

Special amounts' list in a descent order 0.00000.15308 0.30281 046061 0.94618			
H_0	H_1	statistic	**95% level of confidence**
0r =	1r =	195.1847	**53.4800**
$r \leq 1$	2r =	54.9199	**34.8700**
$r \leq 2$	3r =	25.2886	**20.1800**
$r \leq 3$	4r =	7.9754	**9.1600**

Reference: the results were estimated using Microfit Software.

Table 5: The estimated cointegrated vectors for the first sub-hypothesis of the first hypothesis

Variable	Vector1	Vector2	Vector3
LNCPI	0.058676	-0.25117	0.37918
	(-1.0000)	(-1.0000)	(-1.0000)
LNRGDP	0.11708	-0.57380	-0.13127
	(-1.9953)	(-2.2845)	(0.34619)
LNM2	-0.053879	0.32289	-0.23457
	(0.91825)	(1.2855)	(0.61862)
LCBI	-0.13043	-1.0771	-0.72814
	(2.2229)	(-4.2884)	(1.9203)
Intercept	-0.89066	5.0144	3.0710
	(15.1794)	(19.9638)	(-8.0991)

Reference: the results were estimated using Microfit Software.

The Effect of Central Bank Head Quarter's Substitution Rate on Inflation

As it is known, central bank headquarter substitution rate will show the dependency of central bank. Therefore, its positive relation with inflation denotes a negative relationship between central bank's independence and inflation. The results of special amount maximum and also the effect tests, which are summarized in table (6) and table (7), show three cointegrated vectors in

95% level of confidence. The co-integrated vectors of Johansen and Juselius method are summarized in table (8). The normalized coefficients were shown in parentheses. The cointegrated vectors of coefficients showed a negative relationship between RGDP and CPI. In addition, the cash volume has a positive relationship with consumer price index. Furthermore, central bank headquarter substitution rate has a positive relationship with inflation rate.

Table 6: The results of special amounts' maximum test for the second sub-hypothesis of the first hypothesis

Special amounts' list in a descent order 0.0000 0.13415 0.29240 0.51943 0.94454			
H_0	H_1	statistic	**95% level of confidence**
0r =	1r =	138.8229	**28.2700**
$r \leq 1$	2r =	35.1737	**22.0400**
$r \leq 2$	3r =	16.6019	**15.8700**
$r \leq 3$	4r =	6.9142	**9.1600**

Reference: the results were estimated using Microfit Software.

Table 7: The results of effect test for the second sub-hypothesis of the first hypothesis

Special amounts' list in a descent order 0.0000 0.13415 0.29240 0.51943 0.94454			
H_0	H_1	statistic	**95% level of confidence**
0r =	1r =	197.5126	**53.4800**
$r \leq 1$	2r =	58.6898	**34.8700**
$r \leq 2$	3r =	23.5160	**20.1800**
$r \leq 3$	4r =	6.9142	**9.1600**

Reference: the results were estimated using Microfit Software.

Table 8: The estimated cointegrated vectors for the second sub-hypothesis of the first hypothesis

Variable	Vector1	Vector2	Vector3
LNCPI	0.043719 (-1.0000)	-0.44173 (-1.0000)	-0.21552 (-1.0000)
LNRGDP	0.13004 (-2.9744)	-0.54015 (-1.2228)	0.22143 (1.0274)
LNM2	-0.052933 (1.2108)	0.39651 (0.89764)	0.14194 (0.65859)
LCBI	-0.090307 (2.0656)	-0.60880 (-1.3782)	0.50236 (2.3309)
Intercept	-1.0317 (23.5975)	4.2584 (9.6404)	-3.6646 (-17.0034)

Reference: the results were estimated using Microfit Software.

The Effect of Central Bank's Real Independence on Inflation

The results of special amount maximum test and also the effect test for three cointegrated vectors, in 95% level of confidence, are shown in tables (9) and (10). The cointegrated vectors of Johansen and Juselius method are summarized in table (11). The normalized coefficients were shown in parentheses.

The co-integrated vectors of co-efficient shows a negative relationship between RGDP and CPI. In addition, the cash volume has a positive relationship with consumer's price index. Furthermore, central bank real independence has a negative relationship with inflation rate. The related coefficient shows that 1 unit of change in central bank real independence will lead to a 6.8% reverse change in CPI. Thus, it can be concluded that a negative relationship exists between central bank's real independence and inflation rate. In conclusion, central bank independence (using all 3 scales) has a negative relationship with inflation. Also, as it is shown below, the relationship between inflation rate variability and central bank independence were investigated using the mentioned 3 scales.

The Relationship between Inflation Rate Variability and Central Bank's Independence in Iran

As it is known, all variables of the model, except central bank independence, have stationary. Therefore, Johansen and Juselius co-integrated method should not be used to estimate the model. Instead, OLS model have been used to estimate the second hypothesis.

Table 9: The results of special amounts' maximum test for the third sub-hypothesis of the first hypothesis

Special amounts' list in a descent order					
	0.0000	**0.15984**	**0.29420**	**0.43641**	**0.94558**
H_0	H_1	statistic		**95% level of confidence**	
0r =	1r =	139.7270		**28.2700**	
$r \leq 1$	2r =	27.5241		**22.0400**	
$r \leq 2$	3r =	16.7246		**15.8700**	
$r \leq 3$	4r =	8.3596		**9.1600**	

Reference: the results were estimated using Microfit Software.

Table 10: The results of effect test for the third sub-hypothesis of the first hypothesis

Special amounts' list in a descent order					
	0.0000	**0.15984**	**0.29420**	**0.43641**	**0.94558**
H_0	H_1	statistic		**95% level of confidence**	
0r =	1r =	192.3353		**53.4800**	
$r \leq 1$	2r =	52.6083		**34.8700**	
$r \leq 2$	3r =	25.0841		**20.1800**	
$r \leq 3$	4r =	8.3596		**9.1600**	

Reference: the results were estimated using Microfit Software.

Table 11: The estimated cointegrated vectors for the third sub-hypothesis

Variable	Vector1	Vector2	Vector3
LNCPI	0.071998	-0.18456	0.33633
	(-1.0000)	(-1.0000)	(-1.0000)
LNRGDP	0.12981	-0.45635	-0.24602
	(-1.8029)	(-2.4726)	(0.73150)
LNM2	-0.070963	0.21259	-0.20754
	(0.98562)	(1.1519)	(0.61708)
LCBI	-0.16140	-1.2528	-0.61388
	(2.2417)	(-6.7882)	(1.8253)
Intercept	-0.90081	4.5717	4.3356
	(12.5117)	(24.7708)	(-12.8910)

Reference: the results were estimated using Microfit Software.

The Effect of Central Bank's Legal Independence on Inflation Variability

The results of OLS test for the first sub-hypothesis were summarized in table (12).

In order to reduce or remove the autocorrelation problem, first order of auto regressive (AR (1)) was used in the model. The results are shown in table (13).

In addition, based on White's heteroscedasticity test, H_0 (homoscedasticity) was accepted. Therefore, no heteroscedasticity problems were observed. The results of heteroscedasticity test for the first sub-hypothesis were shown in table (1) of the index. The balanced determination coefficient of the model equals to 0.21. In other words, the explanatory variables of the model are weak in explaining the dependent variable fluctuations. The Durbin-Watson statistic of the model is 1.97 that shows the error terms do not have autocorrelation during the time and they are independent. F statistic is about 3.91. Thus, the regression is significant. Based on central bank legal independence coefficient, no statistically significant relationship was observed between central bank legal independence and inflation variability in Iran.

The Effect of Central Bank Head Quarter's Substitution Rate on Inflation Variability

The results of OLS test for the second sub-hypothesis were summarized in table (14). In order to remove the autocorrelation problem, first order of moving average (MA (1)) was used in the model. The results are shown in table (15). In addition, based on White's heteroscedasticity test, H_0 (homoscedasticity) was accepted. Therefore, no heteroscedasticity problems were observed.

As it is known, central bank headquarter substitution rate indicates the dependency of central bank. Thus, its relationship with inflation variability denotes a negative relationship between central bank's independence and inflation variability. The balanced determination coefficient of the model equals to 0.30. In other words, the explanatory variables of the model are weak in explaining the dependent variable's fluctuations. The Durbin-Watson statistic of the model is 2.01 which show that the error terms do not have autocorrelation during the time and they are independent. F statistic is about 5.95. Thus, the regression is significant.

Unexpectedly, the obtained coefficients approved a negative relationship between central bank headquarter substitution rate and inflation variability. Also, the related coefficients showed that 1 unit of change in central bank headquarter substitution rate will lead to a 0.20% reverse change in inflation rate. Thus, it can be concluded that a positive relationship exists between central bank head quarter's substitution rate and inflation variability. In addition, as it is mentioned in the literature, due to obedience of central bank headquarter from government that leads to longer period of position stability, the central bank headquarter substitution rate sometimes can be misleading.

Table 12: OLS test results for the first sub-hypothesis of the second hypothesis

Variable	Coefficient	Standard Deviation	t statistic	Probability
C	0.144770	0.042530	3.403987	0.0014
DLn M2	0.138836	0.146750	0.946075	0.3494
DLn RGDP	-0.435036	0.157701	-2.758612	0.0085
LCBI	-0.019740	0.099636	-0.198120	0.8439
Determination coefficient		0.161466	D-W statistic	1.297197
Balanced determination coefficient		0.102964	F statistic	2.759989
Regression's standard deviation		0.073030	F statistic's probability	0.053630

Reference: the results were estimated using Eviews Software.

Table 13: The corrected OLS test results for the first sub-hypothesis of the second hypothesis

Variable	Coefficient	Standard Deviation	t statistic	Probability
C	0.139766	0.057399	2.434977	0.0193
DLn M2	0.073582	0.164408	0.447560	0.6568
DLn RGDP	-0.323990	0.172599	-1.877129	0.0676
LCBI	0.015940	0.137929	0.115566	0.9086
AR (1)	0.371805	0.144011	2.581785	0.0135
Determination coefficient		0.276395	D-W statistic	1.973440
Balanced determination coefficient		0.205800	F statistic	3.915191
Regression's standard deviation		0.068734	F statistic's probability	0.008783

Reference: the results were estimated using Eviews Software.

Table 14: OLS test results for the second sub-hypothesis of the second hypothesis

Variable	Coefficient	Standard Deviation	t statistic	Probability
C	0.215407	0.037982	5.671335	0.0000
DLn M2	0.131049	0.128090	1.023096	0.3120
DLn RGDP	-0.352059	0.142729	-2.466621	0.0177
TOR	-0.216458	0.064822	-3.339262	0.0017
Determination coefficient		0.333529	D-W statistic	1.632319
Balanced determination coefficient		0.287031	F statistic	7.172963
Regression's standard deviation		0.065108	F statistic's probability	0.000521

Reference: the results were estimated using Eviews Software.

Table 15: The corrected OLS test results for the second sub-hypothesis of the second hypothesis

Variable	Coefficient	Standard Deviation	t statistic	Probability
C	0.219597	0.044024	4.988061	0.0000
DLn M2	0.095358	0.142513	0.669117	0.5071
DLn RGDP	-0.321262	0.155299	-2.068663	0.0448
TOR	0.209298	0.078318	-2.672419	0.0107
MA(1)	0.246994	0.149996	1.646668	0.1071
Determination coefficient		0.361555	D-W statistic	2.014705
Balanced determination coefficient		0.300750	F statistic	5.946197
Regression's standard deviation		0.064479	F statistic's probability	0.000695

Reference: the results were estimated using Eviews Software.

Table 16: OLS test results for the third sub-hypothesis of the second hypothesis

Variable	Coefficient	Standard Deviation	t statistic	Probability
C	0.299387	0.060616	4.939055	0.0000
DLn M2	0.139524	0.130242	1.071265	02900
DLn RGDP	-0.196389	0.162683	-1.207182	0.2340
ACBI	-0.436853	0.142563	-3.064270	0.0038
Determination coefficient		0.311127	D-W statistic	1.514509
Balanced determination coefficient		0.263066	F statistic	6.473600
Regression's standard deviation		0.066193	F statistic's probability	0.001029

Reference: the results were estimated using Eviews Software.

Table 17: The corrected OLS test results for the third sub-hypothesis of the second hypothesis

Variable	Coefficient	Standard Deviation	t statistic	Probability
C	0.321005	0.068360	4.695830	0.0000
DLn M2	0.132465	0.138750	0.954704	0.3453
DLn RGDP	-0.183362	0.163555	-1.121104	0.2688
ACBI	-0.497820	0.164663	-3.023268	0.0043
AR(1)	0.191226	0.147004	1.300815	0.2006
Determination coefficient		0.389215	D-W statistic	1.986970
Balanced determination coefficient		0.329627	F statistic	6.531692
Regression's standard deviation		0.063148	F statistic's probability	0.000366

Reference: the results were estimated using Eviews Software.

The Effect of Central Bank's Real Independence on Inflation Variability

The results of OLS test for the third sub-hypothesis were summarized in table (16).

In order to reduce or remove the autocorrelation problem, first order of auto regressive (AR (1)) was used in the model. The results are shown in table (17).

In addition, based on white heteroscedasticity test, H_0 (homoscedasticity) was accepted. Therefore, no heteroscedasticity problems were observed.

The balanced determination coefficient of the model equals to 0.33. In other words, the explanatory variables of the model are weak in explaining the dependent variable fluctuations. The Durbin-Watson statistic of the model is 1.98 that shows the error terms do not have autocorrelation during the time and they are independent. F statistic is about 3.91. Thus, the regression is significant.

The obtained coefficients approved a negative relationship between central bank real independence and inflation variability. In other words, 1 unit of change in central bank real independence will lead to a 0.5% reverse change in inflation rate. Thus, it can be concluded that a negative relationship exists between central bank real independence and inflation variability.

CONCLUSION

In this study, three different scales have been used in order to determine the relationship between Iran central bank's independence and inflation. The results showed a negative relationship between central bank real independence and inflation rate and its variability. This negative relationship also observed between central bank legal independence and inflation rate, but statistically, no significant relationship was seen between central bank legal independence and inflation variability. In addition, a positive relationship was observed between central bank headquarter substitution rate and inflation rate, but unexpectedly, a positive relationship was seen between central bank headquarter substitution rate and inflation variability. Furthermore, it should be mentioned that this scale does not have any significant relationship with average inflation rate in industrial countries and this relationship just observed in developing countries. Also, the weaker levels of this relationship cannot either denote the independence degree due to obedience of central bank headquarter from government that leads to longer period of position stability. Based on the literature, central bank independence can be used as a mechanism that denotes national impetus in order to deal with inflation and handle it to lower levels. To do so, some conditions should be established in order to be successful in inflation control. These conditions were summarized below:

Central bank independence will not be successful in controlling the inflation individually, and therefore, an inflation controlling culture should be established among society, policy makers and government. On the other hand, although one of the methods to increase central bank's credit is its independence, but this independence does not guarantee the central bank credit, especially when it does not accompany with good performance. Therefore, central bank should assure people that it is serious in controlling inflation. Another important factor is the compatibility of financial policies with the goal of inflation control. Due to Iran economic sanctions, it is impossible to control inflation without having discipline in financial policies and constant budget deficits. In addition, these sanctions will make great fluctuations in government income structure, which is highly dependent on oil revenues. This will lead to a pressure on monetary policy and also a temporary retard in price stability programs and as a result these factors will have a negative effect on central bank credit. Another important issue that has negative impact on Iran economic system is its reliance on government and subsidy, which leads to economic and production factors inefficiency. It is not possible for any country to decrease inflation constantly only by means of demand tools, unless all necessary tools are used effectively to improve the productivity of production factors. Without any doubts, In order to improve the productivity of production factors, privatization and subsidy systems should be progressed.

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