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FACTORS AFFECTING HEALTHCARE SECTOR INFLATION RATE IN IRAN'S PROVINCES FOR 2004-2015

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ABSTRACT

Control of the inflation rate is one of the goals of each country's macroeconomic policies. Usually, inflation rate in the healthcare sector is higher than public sector and reduces access to health services. This study examines the factors influencing healthcare sector inflation rate in Iran's provinces. In this study, we used the econometric method (Generalized Method of Moments) to estimate the relationship between health sector inflation rate and its determinants in 30 provinces of Iran over 12 years (2004-2015). Data used in this study was collected through the national databases of Iran. Results showed that general inflation rate, number of people covered by health insurance per 1000 population, number of dental practitioners per 1000 population, number of hospital beds per 1000 people and number of physicians per 1000 population had a positive and significant relationship with health sector inflation rate. But healthcare sector inflation rate with a lag had positive and non-significant relationship. Also, GDP per capita had negative and significant relationship with health sector inflation rate. Policy-makers in the health sector must control the factors affecting health sector inflation rate to reduce inequality in access to health care and increase the purchasing power in providing health services.

Disciplinary: Healthcare Management.

1. INTRODUCTION

The inflation rate is always considered as an important indicator in economic contexts [1]. In fact, Control of the inflation rate is one of the goals of each country's macroeconomic policies. health system is one of the major sectors of each country that affect economy and its determinants [2]. Due to its specific characteristics of health sector, usually health care inflation rate was higher than general

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inflation rate. In fact, pattern of inflation in the health services sector shows that the price of hospitals and medical services has grown faster than inflation in other sectors [3].

According to different studies, several factors affect health sector inflation rate including population age, population composition, population growth, general inflation, health insurance coverage, technological changes, low productivity growth, rising people's income, the number of physicians, dentists, pharmacists and hospital beds [4,5].

In general, rising health sector inflation rate affects health care services through increasing the general inflation rate and reducing the purchasing power in the access of low-income groups and the elderly to the health care services [6].

We should consider that the growth of the health sector inflation rate is different from the growth of health expenditure. In fact, health expenditure is the amount of money spent on the volume and cost of health services [7].

Therefore, studying factors affecting the health sector inflation rate helps policymakers to control price growth and improve the purchasing power of the people's health. This study examines the factors influencing health sector inflation rate in Iran's provinces between 2004 and 2015.

2. METHOD

The present study was a descriptive-analytical study that examined the relationship between health sector inflation rate and its determinants in 30 provinces of Iran between 2004 and 2015. Data used in this study was collected through national databases of Iran, including the Central Bank of the Islamic Republic of Iran, Statistical Center of Iran, and Center for Statistical and Information of Iran's Ministry of Health and Medical Education.

The basic model used to determine the effective factors on health sector inflation rate was adopted from Cebula' study [5] as follows:

$$LHI_{it} = \alpha_{i+} LHI_{it}(-1) + \beta_1 LPI_{it} + \beta_2 LINSUR_{it} + \beta_3 LGDP_{it+} \beta_4 LPHY_{it+} \beta_5 LDEN_{it+} \beta_6 LBED_{it+} u_{it} \quad (1),$$

where LHI_{it} and LHI_{it} (-1) are inflation in the health sector and its interval respectively. Also, LPI_{it} is the general inflation rate. Additionally, LINSUR represents logarithm of the coverage rate of health insurance, $LGDP_{it}$ denotes Real GDP per capita logarithms of the provinces. Also, $LPHY_{it}$, $LDENT_{it}$, and $LBED_{it}$ represent logarithm of the number of doctors, dentists and hospital beds per 1000 population in each respectively. The symbol i identifies a province and t time period (2004-2015). The last term u_{it} is the error term.

In this model, all included variables were in the form of natural logarithms in order to calculate the elasticity. To estimate the regression model, dynamic econometric models have been used with panel data (hybrid). The dynamics in these patterns mean that the dependent variable will appear by a lag on the right side of the model. In this case, the least-squares estimators (OLS) are no longer compatible. So, we must use two-step estimation methods or GMM (Generalized Method of Moments). In fact, for estimating models in which their unobservable effects in each country and the presence of interruptions in the dependent variables in the explanatory variables is a fundamental problem, the Generalized Method of vector, which is based on the dynamic model of the panel is used. Also, another use of this estimate is when the number of sections is more than time period. In this study, the number of provinces (N =30) is greater than the number of studied years (T=12).

To estimate the model by this method, first, it is necessary to specify the tool variables and stationary of the variables in the model. To test the stationary of the variables, Levine, Lynn and Chow's (2015) (LLC) Test was used. Also, the compatibility of the GMM estimator depends on the reliability of the assumption of the serial non-correlation of error sentences and tools, which can be tested by two tests.

The first test is the Sargan test as a pre-determined constraint that tests the validity of the tools. The second is M_2 statistics that test the existence of a second-order serial correlation in the first-order differential error statements. The non-rejection of the zero hypotheses in both tests provides evidence of the assumption of serial uncertainty and reliability of the tools. In fact, the GMM estimator is compatible if the second-order serial correlation in the error statements does not exist from the first-order differential equation [8-10].

Finally, Eviews 10 software was used to estimate the model. Results of the estimations, including the coefficient of influence of independent and significant variables, were analyzed and interpreted at a 95% confidence level.

3. RESULT

According to the period of this study, the trend in health and public sector inflation rate of Iran showed that the health sector inflation rate has always been higher than the public sector ones. In recent years, raising the exchange rate, implementation of the Iranian targeted subsidy plan, as well as reducing government allocated credits to the health sector have been among the factors affecting the sharp increase of health sector inflation rate from 17.2% to 38.4%.

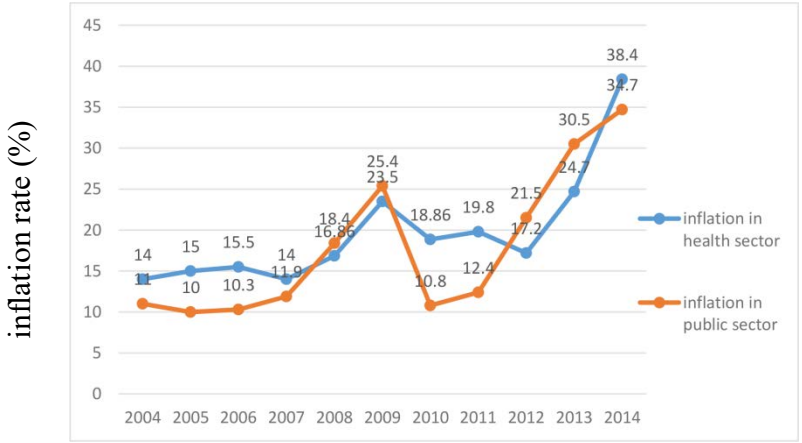

Figure 1: Trend of inflation rate in health and public sector in Iran (2004-2015).

In this regard, the results showed that among all provinces of the country, the province of Tehran had the highest number of beds, physicians and nurses by 34015, 972 and 355 respectively in 2015. Also, the lowest number of beds was 581 for the province of the South Khorasan in 2004. As well as, Hormozgan and the North Khorasan provinces by 3 and 77 respectively, had the lowest number of pharmacists and physicians in 2009.

In this study, the LLC test was used to examine the stationary of the variables. The results of this test showed that all variables, except GDP per capita, are stable in level. So, GDP per capita was stabled by one-time differentiation. The result of the stationary of the variables is reported in Table 1.

Table 1: LLC tests results to check the stationary of the variables

Variables	Evaluation method	t- statistics	Probability	Stationary status
LHI	Fixed value	-3.01	<0.001	Static
	Fixed and Trend value	-2.14	<0.001	Static
LPI	Fixed value	-1.58	<0.001	Static
	Fixed and Trend value	-2.22	<0.001	Static
LHINSU	Fixed value	-22.58	<0.001	Static
	Fixed and Trend value	-14.93	<0.001	Static
LGDP	Fixed value	1.32	0.9	Non-Static
	Fixed and Trend value	-1.59	0.055	Non-Static
LPHY	Fixed value	-1.69	0.044	Static
	Fixed and Trend value	-27.78	<0.001	Static
LDENT	Fixed value	-40.79	<0.001	Static
	Fixed and Trend value	-15.62	<0.001	Static
LBED	Fixed value	-1.5	<0.001	Static
	Fixed and Trend value	-25.81	<0.001	Static

Flowingly, the GMM method was used to estimate regression and the result is shown in Table 2. Accordingly, the health sector inflation rate with a lag had a positive and non-significant relationship with the main value of the health sector inflation rate.

Also, the general inflation rate, number of people covered by health insurance per 1000 population, number of dental practitioners per 1000 population, number of hospital beds per 1000 people and number of physicians per 1000 population had a positive and significant relationship with health sector inflation rate. Also, the relationship between GDP per capita and health sector inflation rate was negative and significant.

In addition, the highest value of coefficients of health sector inflation rate with a lag showed that this variable had the greatest impact on the health sector inflation rate. Coefficients of all variables of the model were statistically estimated at a 95% level.

Also, the results of the Sargan test showed that there is no correlation between the tool variables of the model and the number of residuals. This means that the tool variables are valid in the model. In addition, results of the Arlano and Band test showed that the estimation method was suitable for this model regarding the existence of first-order serial Auto-Correlations and the absence of second-order serial Auto-Correlations.

Also, the result of the Wald test rejects the assumption of being zero of all coefficients at a significant level of 5%. Therefore, all coefficients of the model are valid.

Table 2: Model Estimation Results Using Generalized Method of Moments (GMM)

Variable	Coefficients	t	P-value
C	1.4	9.2	0.1
LHI(-1)	1.14	2.2	0.1
LPI	1.1	7.02	0.01
LGDP	-0.09	1.9	<0.001
LPHYS	0.1	-10.2	<0.001
LDENT	0.08	4.32	<0.001
LBED	1.12	9.74	<0.001
LINSUR	1.01	11.25	<0.001
Diagnostic tests:			
Test	Value		P-value
Sargan test	17.9		0.2
Arellano-Band test for Autocorrelation	AR(1) AR(2)	-1.94 -1.80	<0.001 0.4
Wald test	100711.25		0.01

4. DISCUSSION

According to the results of this study, the positive and non-significant relationship between the amount with the interruption of health sector inflation rate and the main value of this indicator shows the dynamism of the model which was studied. This means that the increase in health sector inflation rate in the previous period will lead to an increase in this indicator in the current levels.

Also, general inflation rate had a positive and significant relationship with the health sector inflation rate. Because when price of inputs or commodities grows, the cost of providing health care increases as well. In fact, rising general inflation rates restrict equitable access to health services and lead to inflation rate in health sector [6,11,12].

Another variable that had a positive and significant relationship with health sector inflation rate was the number of people covered by health insurance. Due to high-coverage of health insurance and the moral hazard phenomenon, demand for high- tech medical services can be increased. As a result, it would lead to higher health sector inflation rate [13, 14].

In addition, results of this study showed that there is a positive and significant relationship between the number of physicians Which reflects this fact that by increasing in the number of physicians and their desire to make more money and because of asymmetric information between doctor and patient, induced demand creates and the volume and variety of tests and therapies increases. Ultimately, the price of health care provided to people would enhance [6].

Also, there is a positive and significant relationship between the number of dentists and health sector inflation rate. Because dental care has a high price elasticity, insurance companies are reluctant to cover it. This issue and also asymmetric information between patient and dentists, lead to rising induced demand and out of pocket payments for these services. Finally the health sector inflation rate increases [15-17].

According to the results of this study, GDP per capita had a negative and significant relationship with health sector inflation rate. In many economic texts, it has been mentioned that "we will have inflation if the growth rate of income or GDP per capita is at a fraction above the productivity growth rate." In the health sector, if the medical tariffs rise more than productivity growth by pressure from non-governmental organizations which has the right to set tariffs, we will have inflation [1,4].

There is also a positive and significant relationship between the number of hospital beds and health sector inflation rate. In fact, increasing the number of hospital beds will lead to an increase in hospital supporting services costs (such as maintenance, equipment, repairs, materials and personnel cost, etc.). Also, according to Roemer's law, rising the number of hospital beds has led to an increase in bed use and a greater willingness of patient to stay in the hospital for long periods of time. Finally these issues cause increase in the cost of providing hospital services and the health sector inflation rate [18,19].

5. CONCLUSION

This study showed that the most important factors which affect Iran's provinces' health sector inflation rate were a number of doctors, dentists, hospital beds, people covered by health insurance, general inflation rate and also rising health sector inflation rate in the previous periods.

But growing GDP per capita will reduce the health sector inflation rate. Therefore, policy-makers in the health sector must control the factors affecting the health sector inflation rate to

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reduce inequality in access to health care and increase the purchasing power of health services.

6. AVAILABILITY OF DATA AND MATERIAL

Data can be made available by contacting the corresponding author.

7. ACKNOWLEDGMENT

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