The Impact of Currency Shocks on Sanandaj Municipality Revenues in Iran

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Abstract

Exchange rate fluctuations have been affecting economic demand in recent years. The purpose of this study is to review the effects of exchange shocks on Sanandaj Municipality Revenues. The statistical population is Sanandaj municipality during 2006-2018 and SPSS, Eviews softwares were used for data analysis. The results show that since the correlation test is not significant at the level of 0.95, there is no significant relationship between two variables of municipality income and exchange fluctuations. Thus, the main hypothesis is rejected. In other words, exchange shocks have no impact on Sanandaj municipality revenues. Also based on the correlation test, since the correlation test is not significant at the level of 0.95, the relationship between the two variables of municipality income and negative exchange fluctuations is not significant and the sub-hypothesis (1) is rejected, and finally based on correlation test, since the correlation test is not significant at the level of 0.95, the relationship between two variables of municipality and positive exchange fluctuations is not significant. Thus, the sub-hypothesis (2) is rejected as well. It could be concluded that, Sanandaj municipality revenues do not follow the currency rate fluctuations.

Keywords: Exchange, Currency Shock, Positive Currency Shocks, Negative Currency Shocks, Municipality Revenues, Sanandaj Municipality
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I. Introduction

In developing countries, such as Iran, with a dysfunctional economic system, weak tax systems, and no mechanisms for citizens’ partnership in providing cities expenses, municipalities’ revenue supply system is mainly driven towards unstable sources of income. This issue became even more critical in Iran after executing self-sufficiency policy of municipalities in 1980s (Mazini, 2006). Two significant challenges of Sanandaj Municipality Revenues Supply System are inadequate sources of income and instability. Unstable sources of income are those incomes of municipality which are dependent on new operations and activities of the urban economy and in the absence of employment, reduced volume of economic trade and currency fluctuations, the volume of these resources would be reduced. Apart from sustainable resources, there are some resources that exist and to require them, no particular action from the owners of those resources is needed. In other words, sustainable income sources are dependent on the production process and unstable resources are dependent on consumption flow (Yavari et al., 2011).

Therefore, to review the impact of exchange rate fluctuations on municipality revenues, it is inevitable to judge the optimal amount of these fluctuations. Since the exchange rate fluctuations affect the economy both on currency and demand sides, the exchange rate could be considered as one of the most important variables affecting the economy and income of organizations, including the municipality. On the other hand, exchange rate variable reflects the economic situation of one country compared to other countries. Crisis experiences resulted from positive and negative shocks of exchange rate fluctuations indicate the importance of unit forecasts of such shocks in designing appropriate exchange rate policies. One of the topics in economy argues that, stable exchange rates provide a stable framework for adjusting countries’ financial markets, labor sources and assets through preserving the value of national exchange and accelerating economic growth. In other words, different studies show that there is a negative relationship among exchange rate fluctuations, economic growth and the income of one country’s organizations. This is especially true for countries where their economies are in transition and capital account freedom exists.

Definitely, there are also various empirical cases where the rise and fall of the real exchange rate had a positive and negative impact on revenues. Therefore, theoretical studies have focused on both positive and negative shocks in recent research. These fluctuations are also considered in this article (Mazini, 2006).

Achieving the optimal structure for providing municipality revenue sources, reviewing the municipality revenues structures could serve as a guide and an appropriate model for amending and reforming an optimal revenue structure. The extent of the municipality's scope of action as a public institution and providing various services such as improvement of the urban environment, construction of urban infrastructures, street lighting, construction of streets, floodgates, public health supply, basically could not be directly supplied by the private sector due to their specific features and characteristics. On this basis, the way municipalities’ revenues are funded to provide these services optimally seems necessary. Since the Currency rate fluctuations affect the economy demand itself, the exchange rate could be one of the most important variables affecting municipalities economy and income (Ziyari, et al., 2012).

On the one hand, the currency rate variable represents the economic situation of a country compared to other countries and that is why many studies have been conducted on exchange rate and its changes which haven’t had similar results that have not been followed. Also, there is controversy about the impact of this variable on other economic variables. Most of recent studies have shown that, the currency rate variable has asymmetric impacts on variables such as price, production, and ultimately income. This means that the effect of increasing this variable is different from reducing it. The liquidity criterion variable is another essential factor affecting the economy. The changes of this variable will have profound effects on economy. It is expected that, currency and monetary policies shocks have adverse effects on industry sub-sectors (Kens, 2017).

For this reason, in this study first we will try to determine whether exchange shocks have had any impacts on Sanandaj municipality revenues or not. Second, we study if positive and negative shocks have had the same impacts on municipality's revenue. Thus, it is essential to identify the effect of currency rate fluctuations on macro variables in the Iranian economy and to provide strategic exchange recommendations aligned with the proper management of municipalities, currency rates and resources.

II. Literature Review

The results of the study conducted by Ali Falahati et al. (2016) titled “Interaction Effect between Government Tax Revenues and Metropolitan Municipality of Ahvaz Revenue” shows that increasing tax revenue leads to a decrease in Ahwaz municipality revenue. Mehregan (2015) conducted a research on “Currency Shocks and Financial Markets” and showed the importance and analysis of exchange fluctuations on financial markets, using VAR Panel Self-Regression Model and daily data gathered from January 1, 2009 to July 31, 2013. The results show: 1. The exchange rate
guides the stock market and the stock index response to shock exchange is positive. 2: In sanctions situation, the currency is considered as a real asset for investment and 3: In sanctions situation, the long-term exchange shock has a negative effect on the stock index due to the dependence of domestic production on raw materials and machineries imported.

Alexis Cruz-Rodriguez (2013) conducted a research titled “The Relationship between Fiscal Sustainability and Currency Crises in Some Selected Countries”. The results show that, the financial sustainability index does not have the power required to predict the currency crises in different countries. It was stated that, fiscal policies play an important role in creating currency crises.

Grier and Smallwood (2013) study the effect of currency rate uncertainty on trade-offs. The findings show that, the impact of unpredictable shocks of currency rate shocks on production level is positive and the impact of predictable shocks of currency rates on the production level is negative.

III. Methodology

Currency is a common monetary unit in proportion to another common monetary unit. That is, the amount required of one currency that can buy some other currency is the exchange rate. So, this rate could be a conversion factor. In general, the exchange rate is the relative price of foreign currency to the domestic currency which has always been the interest of the economic and financial community as one of the significant economic factors. In fact, this rate reflects economic conditions of the country and a factor to compare the national economy with that of other nations. The rate of exchanging the currency of a country with the currencies of other countries is called currency rate (Kazerouni et al., 2007).

Currency Shock: Currency shock is a significant change in the exchange rate (Anwar et al., 2015). Positive and negative currency shock effect: A sharp decline in domestic currency value (exchange rate increase) is called negative currency shock effect and the sudden improvement in domestic currency value (currency exchange rate decrease) is called positive shock effect. Through studying the combination of supply and demand, the impact of exchange rate fluctuations on the economy could be identified (Hassanzadeh and Khosroshahi, 2011).

Here are the hypothesis of research:

- Main Hypothesis: The currency shocks affect Sanandaj municipality revenues.
- Sub-hypothesis (1): The negative currency shocks affect Sanandaj municipality revenues.
- Sub-hypothesis (2): The positive Currency shocks affect Sanandaj municipality revenues.

Given the assumption that prices of market goods are equal around the world, the exchange rate could be mathematically defined based on the distinction between market and non-market goods as follows:

\[ y_t = b^* \frac{b^0}{b^*} \]

In this definition, \( b^0 \) and \( b^* \) indicate domestic and international prices for tradable goods respectively, and the price of non-tradable goods are shown by \( P_a \). Based on this definition, a decrease in \( r_c \) equals to an increase of real value of national currency.

Considering the domestic studies of research, it is observed that different researchers use different methods to investigate the impact of currency or monetary shocks on economic variables, including ARDL, GARDH, and others. In this research, Markov Switching Method was used to study the effect of currency fluctuations shocks on Sanandaj municipality revenues.

A dual-mode AR (1) model can be illustrated as follows:

\[
\begin{align*}
\phi_{1} + \phi_{2} y_{t-1} + \epsilon_{1} & \quad \text{if} & \xi = 1 \\
\phi_{3} + \phi_{4} y_{t-1} + \epsilon_{2} & \quad \text{if} & \xi = 2
\end{align*}
\]

Municipality Revenue: One of the significant issues for municipalities worldwide is creating sufficient sources of revenue and providing the cost of public services. Domestic revenue sources include direct municipality receipts from tolls for land and properties as well as the income resulted from tolls for non-properties (Karimi, Samaneh, 2011).

Foreign revenue sources include incomes received outside the municipality organizations such as water, power, telephone and similar urban needs, factories, and government grants. Article 29 of the financial regulations of municipalities, divides municipalities’ revenues into the following categories:

- Income earned from public tolls (regular income)
- Income earned from private tolls
- Cost of services and revenues of municipality non-profit institutions
- Revenues from municipalities’ properties funds
- Government grants and public organizations

Municipality revenues classification is as follows:

- Municipality quota out of ministry payments
- Tolls together with the tax received inland
- Tolls on buildings and lands
- Tolls on communications and transportation
- Tolls on licenses, sales and entertainment
- Income from sales and services
- Income from municipality installations, fines and offenses
- Income from municipality properties
- Grants, gifts, loans, cash balance and assets of prior periods (Samati and Bakhshayesh, 2011).
VAR model is used to evaluate and measure the variable income of the municipality:

\[ Y_t = A_1 Y_{t-1} + \ldots + A_p Y_{t-p} + B x_t + e_t \]

Where \( Y_t \) is a vector with \( k \) components of internal variables, \( x_t \) is a vector with \( d \) components of external variables. \( A_1, \ldots, A_p \) and \( b \) are the coefficients matrix that must be estimated. Finally, \( e_t \) is a transformation vector that may correlate simultaneously, but it has nothing to do with their lagged variables on the right. Since only delayed amount of endogenous variables appears on the right side of the equations, synchronization is not problematic, and the usual OLS method of the smallest square provides compatibility estimations. In standard VAR model, in general, the disturbances are demonstrated simultaneously with correlations. This causes the system to respond the variable changes. All variables associated with that variable have been responded. However, the correlation will be resolved by Chelsea's undeniable ring at the same time (Farzanegan and Marquardt, 2009).

![Figure 1. Conceptual Model](image1)

**Figure 1. Conceptual Model**

**Statistical population**

In this study, Sanandaj municipality is the statistical population, which was analyzed between 2006 and 2018 (13 years).

**Descriptive Analysis:**

Descriptive analysis of statistics and data gathered on United States (U.S.) dollars as well as municipality income are shown below.

![Figure 2. The U.S. Dollar Price Situation since 1978](image2)

**Figure 2. The U.S. Dollar Price Situation since 1978**

Resource: [https://ieb.today/wp-content/uploads/2016/07/Exchange-Rate.png](https://ieb.today/wp-content/uploads/2016/07/Exchange-Rate.png)

As shown in the chart above, first there was a rise in the price of U.S. dollars. Then, the U.S. dollar had the highest price leap in 2012.

![Figure 3. Status of Sanandaj Municipality Revenue between 1978 and 2018](image3)

**Figure 3. Status of Sanandaj Municipality Revenue between 1978 and 2018**

As it could be observed from the chart above, Sanandaj municipality revenue has been on the rise for years, and from 2015 onwards, there is a higher leap than previous years.

**Note:** Sudden exchange leaped to about two thousand four hundred in 2014. While this sudden change of the rate of U.S. dollars has no sudden impact on the chart and the series has been decreasing since 2016, its significance should be considered in the subsequent discussion of statistical analysis and tests.
The three graphs above are actually Sanandaj municipality income in terms of months for different years. They show that, in March of each year the municipality's revenue was higher than other months. This is natural at the end of the year, as it is assumed that at the beginning of each year, there will probably be about 10% increase in registration and administrative costs in administrative system. So most clients tend to carry out their affairs at the end of the year.

As two variables are different, we follow the central argument and the dispersion of the two variables by changes in coefficient method.

Income changes coefficient of variation:

\[
CV_1 = \frac{s}{\bar{x}} \times 100 = \frac{8657840287}{635718870} \times 8708 \times 0.136
\]

Currency changes coefficient:

\[
CV_2 = \frac{s}{\bar{x}} \times 100 = \frac{2913}{2464} \times 100 = 118
\]

Since the changes coefficient is lower in currency variable, the changes in currency variable is lower and it is higher in income variable. Definitely, as discussed earlier, income growth is increasing and that is considered good. But currency changes are not considered as good although it has been a little ascending, and probably the best state is currency stability and municipality revenue increase.
According to the graph above, which shows the currency and revenue of Sanandaj municipality, it is observed that there is no relationship between two variables and the data do not follow any model.

A: The points above are municipality revenue in March of each year. They are not considered as out-of-date data.

B: Significance of the tailed descriptive results is concluded in the following discussion of statistical analysis and tests.

**Table 2: Municipality Income and U.S. Dollars Confidence Intervention**

| Year | Municipality Income | Exchange Rate | US Dollars |
|------|---------------------|---------------|------------|
| 2003 | 75143387           | 18.5325       | 137115.83  |
| 2004 | 85783003           | 17.3019       | 148786.92  |
| 2005 | 85531000           | 16.4879       | 139291.41  |
| 2006 | 86393001           | 15.2059       | 133046.48  |
| 2007 | 86232000           | 14.7059       | 125960.36  |
| 2008 | 65221000           | 18.5325       | 122298.36  |
| 2009 | 75143387           | 18.5325       | 137115.83  |
| 2010 | 74994332           | 17.3019       | 148786.92  |
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Based on the above table in exchange section, since Sig=0.000<0.005, the test is significant at the confidence level of 0.95. This means, hypothesis H0 is rejected and exchange average varies from year to year. Secondly, based on the table above in municipality revenue section, since Sig=0.984>0.05, the test is not significant at the confidence level of 0.95. This means, hypothesis H0 is not rejected and revenue averages are the same in different years.

**Result:** These two tests accurately determine that, currency changes have no impact on municipality revenues.

**Modeling the relation between the Municipality Revenue and the Exchange:**

Although earlier reports suggest that there is no relationship between the currency and income, to be sure, we fit different models to the data by Regression Approach. In this situation, the results are as follows:

**Figure 7: Models or Equations Fitting Diagrams**

It is clear from the above diagram that, none of the above models such as linear and logarithmic equation is a suitable fitting for these data. In fact, data do not have a specific model and equation.

**Autoregressive Conditional Heterogeneity Variance:**

In order to study the GARCH model in this research, we need to investigate the variables’ standing and use the ADF generalized Dickey-Fuller test for the static variables. The results are as follows using the Eviews software at the confidence level of 0.95.
Table 4: Checking the Mann Variables

| Variable | Statistics ADF Calculated | Statistics ADF At the level of 0.95 |
|----------|---------------------------|------------------------------------|
| R        | -13.85                    | -1.94                              |
| E        | -3.22                     | -3.42                              |
| F        | -11.02                    | -2.86                              |

The Dickey-Fuller test results at the confidence level of 0.95 indicate a static mean of variable mana that is obtained with a one-time mana difference.

Then, using the GARCH-LM statistics on the presence and absence of effects of the ARCH model, we follow the following results:

Table 5: Results of GARCH-LM Test

| F-statistic | Probability | Obs-Rsquared | Probability |
|-------------|-------------|--------------|-------------|
| 32.34       | 0.0751      | 25.98        | 0.0542      |

As shown in the table above, there is no GARCH effect at the confidence level of 0.95. The reason is that, probability value is greater than 0.05. So, there is no continuation of the process or method for modeling.

Table 6: Logarithmic Model Fitting Test Table

Based on the above table, since Sig=0.271>0.05, the test is not significant at the confidence level of 0.95. This means, hypothesis $H_0$ is not rejected and the data do not follow the logarithmic model.

**Correlation between Municipality’s Income and Foreign Exchange**

We use Pearson's correlation test to examine the relationship between municipality’s income and foreign exchange as follows:

Pearson Correlations Test:

$$
\begin{align*}
H_0 &: r_{xy} = 0 \\
H_1 &: r_{xy} \neq 0
\end{align*}
$$

Based on the correlation test, since correlation test is not significant at the level of 0.95, there is no relationship between two variables of municipality revenue and foreign exchange. This means that, the main hypothesis is rejected. In other words, identifying the effects of currency shocks on Sanandaj municipality revenues is not significant and cannot be defined.

**Sub-hypothesis (1):**

$$
\begin{align*}
H_2 &: \text{There is no relationship between municipality revenue and negative exchange.} \\
H_3 &: \text{There is a relationship between municipality revenue and negative exchange.}
\end{align*}
$$

Based on the correlation test, since correlation test is not significant at the level of 0.95, the relationship between two variables of municipality revenue and negative exchange is not significant. In other words, sub-hypothesis (1) is rejected. Mentally and in terms of descriptive statistics, it seems that there is a relationship between the two variables. However, what is important is the test result, which indicates that there is no relationship between municipality revenue and negative exchange.

**Sub-hypothesis (2):**

$$
\begin{align*}
H_4 &: \text{There is no relationship between municipality revenue and the positive exchange.} \\
H_5 &: \text{There is a relationship between municipality revenue and the positive exchange.}
\end{align*}
$$

Based on the correlation test, since correlation test is not significant at the level of 0.95, the relationship between two variables of municipality revenue and negative exchange is not significant. In other words, sub-hypothesis (1) is rejected. Mentally and in terms of descriptive statistics, it seems that there is a relationship between the two variables. However, what is important is the test result, which indicates that there is no relationship between municipality revenue and negative exchange.
Based on the correlation test, since correlation test is not significant at the level of 0.95, the relationship between two variables of municipality revenue and positive exchange is not significant. In other words, sub-hypothesis (2) is rejected.

Due to the rising U.S. dollars price, construction growth presents fluctuations as shown above. However, there has been a downturn in housing construction and the price between 2013 and onwards. Housing prices have been rising and in the years of 2012 and at the end of 2018, the most significant increase in housing prices was observed due to the leap in U.S. dollars. Municipality revenue has been rising in terms of years, and from 2015 onwards, it is climbing more than previous years. So, rates of the U.S. dollars and housing prices have been ascending over the years. However, the municipality revenue increased in March, which seems to be natural.

According to Variance Analysis Test for the equality of the average in exchange and municipality revenue, we concluded that currency changes could be considered the same over different years. Indicating that currency rate changes had no impact on municipality revenue and through regression methods as well as different tests, we concluded that exchange data and revenue do not follow any model. According to Pearson correlation test, two variables were identified and at the confidence level of 0.95, there is no relationship between municipality revenue and U.S. dollars. Statistical methods such as time series and regression methods are not needed to expand the subject. Therefore, through descriptive and statistical analysis, we found that there is no relationship between municipality revenue and U.S. dollars, as well as between municipality revenue and positive-negative currency fluctuations.

The branches of municipality revenues could be identified by using 40-year data, which was not possible regarding the above-mentioned limitations of research. So, if an organization or a research institution can find more information about the municipality, more detailed results can be presented. It is also recommended that the Iranian Statistical Center or the municipalities themselves provide this type of data as databanks, which are essential in academic research. Also, some specific rules or legislation can be in order, encouraging departments to arm university students with financial information.

Finally, obtaining information related to municipality revenues was one of the limitations of this study. Gathering the information related to municipality revenues for 40 years was also a limitation of the research, because there were two levels of office and automation. Office accounts was not accessible by the researchers. Also, receiving the information related to municipality revenues daily was another limitation. Plus, not having the permit to obtain information related to municipality revenues in various areas such as changing occupancy, purchasing, and selling was also a limitation. Furthermore, since there was some incomplete months for the year 2019, discussion was oriented on months and years.

References

Cruz-Rodriguez, A. (2013). The Relationship between Fiscal Sustainability and Currency Crises in Some Selected Countries, Review of Economic Perspectives, Vol. 13, Issue: 4.

Falahati, A., Mohsen Khozestani, M. B., Alipourfard, S. (2016). Interaction Effect between Government Tax Revenues and Metropolitan Municipality of Ahvaz Revenue Study.

Farzanegan, M.R., Markwardt, G. (2009). The Effects of Oil Price Shocks on the Iranian Economy, Energy Economics, Vol. 31, 134-151.

Grier, K. B. and Smallwood, A. D. (2013). Exchange Rate Shocks and Trade: A Multivariate GARCH-M Approach Journal of International Money and Finance, Elsevier, Vol. 37(C), pages 282-305.

Hassanzadeh, A., Khoroshahi, P. (2011). Studying of efficient financing pattern for municipal metropolitan (Case Study of Tehran). Fourth Municipality Finance Conference: Problems and Solutions.

Karimi, S. (2011). Sustainability Analysis of Financial Resources and Income of Tehran Municipality (Comparative study with a number of cities in the world), Master's thesis, Allameh Tabataba'i University, Faculty of Management and Accounting.

Kazerouni, A., Rostami, N. (2007). Asymmetric Effects of Exchange Rate Fluctuations on Real Production and Price in Iran, Economic Bulletin 196-177: (25).

Kenneth J. S., Emerson, D. J. (2017). An analysis of the relation between resilience and reduced audit quality within the role stress paradigm. Salisbury University, Department of Accounting & Legal Studies, 1101 Camden Avenue, Salisbury, MD, United States.

Manafi A., Vahid, K. T., Farhad, D. J., Pasban, F. (2015). Factors Influencing Real Exchange Rate Changes and Its Impact on the Competitiveness Index of the Iranian Economy, Financial Knowledge Journal of Securities Analysis, Fall 2015, Vol. 9, Issue 32, pp. 24-1.

Mazini, A. H. (2006). The Impact of Monetary Shocks on Nominal and Real Variables in Economics, Journal of Urban Management Studies, No. 20, Summer 2008, pp. 37-23.

Qomi, N.M.M.A.A. (2015). Currency Shocks and Financial Markets: An Application of the Panel Vector Auto Regression Model, Research and Economic Policies of the Twenty-third Fall 2015, Issue 75.
Yavari, K-R., Majid, M. and Majid, A. (2011). Investigation of the Impact of Foreign Exchange Policies on the Development of Non-Oil Exports of Iran with Emphasis on Currency Agreement and Currency Monetary Policy, Quarterly Economic Research Quarterly.