



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 new 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 Ahvaz 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:

$$s_t = \frac{P_t^d}{P_t^f} = \epsilon \frac{P_t^d}{P_t^*}$$

In this definition, P_t and P_t^* indicate domestic and international prices for tradable goods respectively, and the price of non-tradable goods are shown by P_n . Based on this definition, a decrease in r_t 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:

$$\begin{cases} \phi_{0,1} + \phi_{1,1}y_{t-1} + \epsilon_t & \text{if } S_t = 1 \\ \phi_{0,2} + \phi_{1,2}y_{t-1} + \epsilon_t & \text{if } S_t = 2 \end{cases}$$

$$y_t = \phi_{0,S_t} + \phi_{1,S_t}y_{t-1} + \epsilon_t$$

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:

$$Y_t = A_1 Y_{t-1} + \dots + A_p Y_{t-p} + Bx_t + e_t$$

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, \dots, 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).

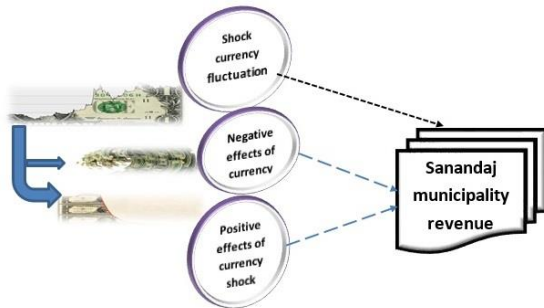


Figure 1. Conceptual Model

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.

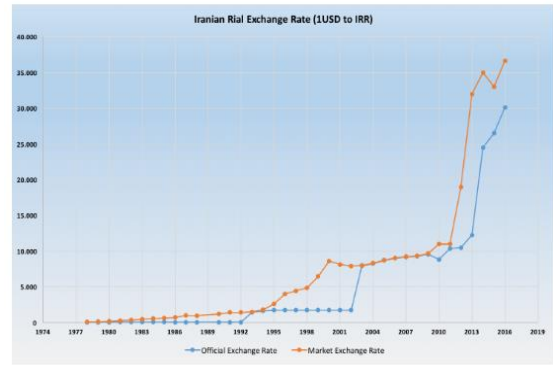


Figure 2. The U.S. Dollar Price Situation since 1978

Resource: <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.

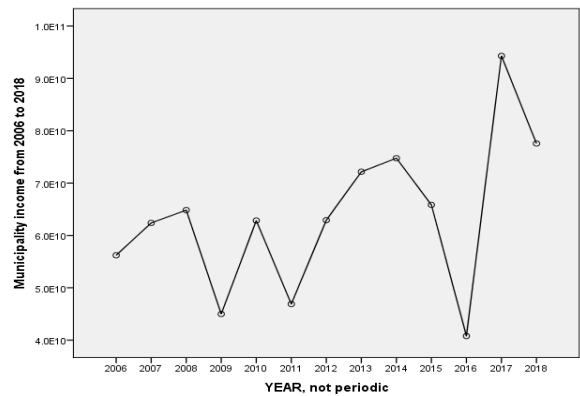


Figure 3. Status of Sanandaj Municipality Revenue between 1978 and 2018

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.

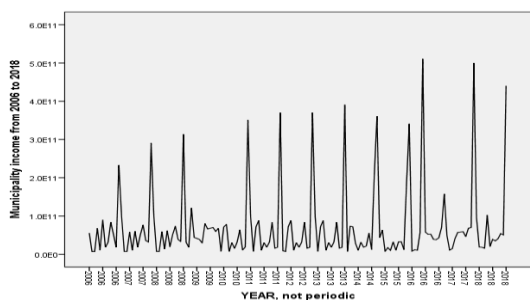


Figure 4. Reviewing Municipality Revenue Charts in terms of Months (1)

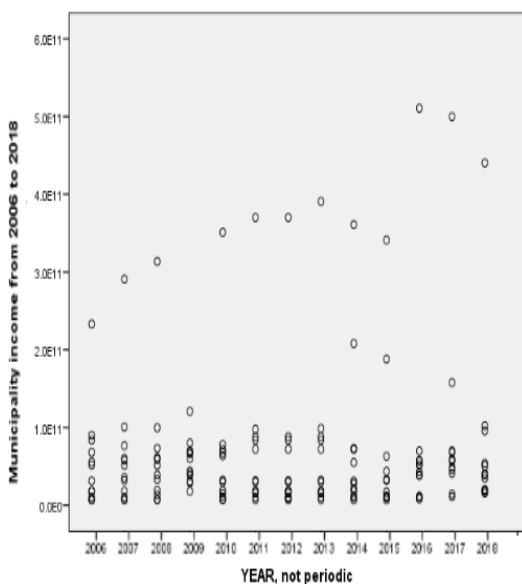


Figure 5. Reviewing Municipality Revenue Charts in terms of Months (2)

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.

Table 1: Status of Sanandaj Currency and Municipality Revenue between 2006 and 2018

	N	Mean	Std. Deviation	
Currency in different years	2006	12	910.6667	9.62320
	2007	12	924.6667	2.14617
	2008	12	944.0833	9.51036
	2009	12	969.0833	9.16970
	2010	12	1024.3333	8.79394
	2011	12	1072.8333	20.38642
	2012	12	1178.0000	43.62235
	2013	12	1273.5000	22.75362
	2014	12	2705.6667	193.96313
	2015	12	3040.1667	76.75798
	2016	12	3250.5833	29.78852
	2017	12	3557.9167	25.88948
	2018	12	11383.2500	3590.34354
	Total	156	2464.2115	2913.30427
	Municipality Income between 2006 and 2018	2006	12	56207650033.33
2007		12	62385054177.75	77712998904.720
2008		12	6483772054.75	83314009808.517
2009		12	44989509621.25	33016581938.331
2010		12	62841135768.50	94573597358.675
2011		12	46900842134.25	36671256163.588
2012		12	62916903329.42	101196261268.771
2013		12	72138727320.25	10578483888.494
2014		12	74758896163.83	105712957529.215
2015		12	65838683106.25	99723074510.296
2016		12	40781788777.33	20419583289.299
2017		12	94296406055.08	132908463869.493
2018		12	77564084400.92	117800371796.402
Total		156	63575188703.46	86578402877.576

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

Income changes coefficient of variation:

$$cv_1 = \frac{s}{\bar{x}} (100) = \frac{86578402878}{63575188703} (100) = \% 136$$

Currency changes coefficient:

$$cv_2 = \frac{s}{\bar{x}} (100) = \frac{2913}{2464} (100) = \% 118$$

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.

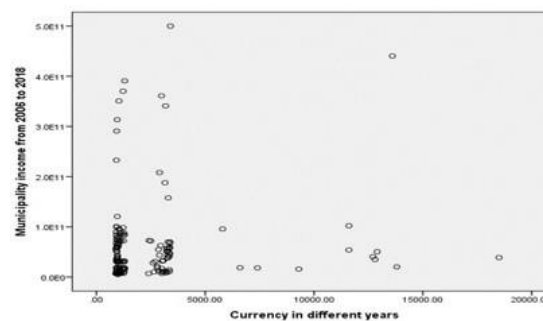


Figure 6. Correlation Chart

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

	N	Mean	Std. Deviation	95% Confidence Interval for Mean		Minimum	Maximum	
				Lower Bound	Upper Bound			
Currency in different years	2006	12	910.6667	9.62320	904.5524	916.7610	890.00	919.00
	2007	12	924.6667	2.14617	923.3031	926.0303	921.00	928.00
	2008	12	944.0833	9.51036	938.0407	950.1259	930.00	957.00
	2009	12	969.0833	9.16970	963.2572	974.9095	958.00	983.00
	2010	12	1024.3333	8.79384	1018.7459	1029.9207	1006.00	1036.00
	2011	12	1072.8333	20.38642	1059.8604	1085.7862	1039.00	1100.00
	2012	12	1178.0000	43.62235	1150.2837	1205.7163	1110.00	1226.00
	2013	12	1273.5000	22.75382	1259.0430	1287.9570	1230.00	1300.00
	2014	12	2705.6667	163.96313	2582.4284	2828.9056	2400.00	2990.00
	2015	12	3040.1667	76.75798	2961.3970	3088.5364	2900.00	3180.00
	2016	12	3250.5833	29.74852	3231.6566	3269.5101	3200.00	3290.00
	2017	12	3357.9167	25.88948	3341.4873	3374.3651	3300.00	3400.00
	2018	12	11883.2500	3590.34354	8102.0545	13864.4455	8900.00	18500.00
	Total	156	2464.2115	2913.30427	2003.4505	2924.9726	890.00	18500.00
	Municipality income from 2006 to 2018	2006	12	620765003.33	83069521.52	1611407779	9629322275	688045458
2007		12	623805054177.75	7772998904	1306857036	11176153799	70878054	290005485952
2008		12	6483772054.75	720	1192925569	1177226841	724568665	313478498705
2009		12	4408950821.25	33010581938	517	2401177447	65987245164	503712599
2010		12	4408950821.25	33010581938	331	8.37	13	12080082632
2011		12	62841138768.50	94573597358	2751938784	12293033275	722415212	350905485121
2012		12	46900842136.25	36871256163	2360103757	70205946698	716787234	95647816050
2013		12	62918903329.42	101196261268	771	1380133551	12721364021	370234565541
2014		12	72158727320.25	105794835868	494	4946246217	13937120542	36905485190
2015		12	74758896163.83	105712957529	215	7593087391	14192570493	36985485190
2016		12	65838883106.25	99723074510	298	2477664434	12919970177	34085485182
2017		12	40781788777.33	20419553289	2780763452	53755773027	827143052	65642249042
2018		12	94296406055.08	132958485869	493	985039551	17874241645	49958792340
Total		156	63575186703.46	86578402877	576	4988219088	77268216540	503712599

Considering the exchange data of 2018 for a short interval, we can observe that it had reached 18500. But the figure was not stable and it was declining rapidly. Besides, the currency is between 2003 and 2924. Also, the municipality income is generally at the range of 49882160866 - 77268216541.

ANOVA Testing for Municipality Income and U.S. Dollars:

$$\left\{ \begin{array}{l} H_0 : \mu_1 = \mu_2 = \dots = \mu_k \\ H_1 : \mu_1 \neq \mu_2 \neq \dots \neq \mu_k \end{array} \right.$$

That is, at least two averages are equal

Table 3: ANOVA Testing for Municipality Income and U.S. Dollars

		Sum of Squares	df	Mean Square	F	Sig.
Currency in different months	Between Groups	1173210915.103	12	97767576.259	98.230	.000
	Within Groups	142327054.917	143	995294.090		
	Total	1315537970.019	155			
Municipality revenue from 2006 to 2018	Between Groups	305354635501687560000	12	254462196251406	.322	.984
	Within Groups	113131661239876520000	143	791130498180954		
	Total	11618520759489390000	155			

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:

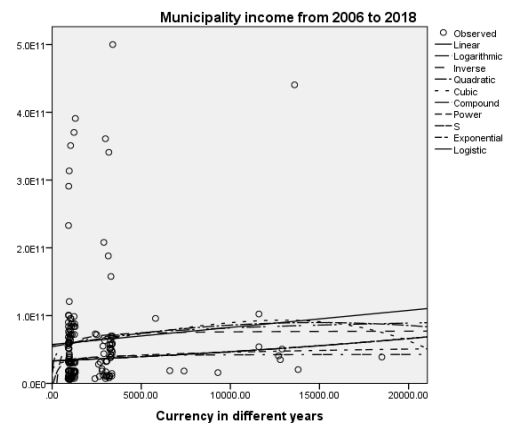


Figure 7: Models or Equations Fitting Diagrams

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	32.34	Probability	0.0751
Obs-Rsquared	25.98	Probability	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

	df	Mean Square	F	Sig.
Regression	1	9137753032163086000000.000	1.221	.271
Residual	154	7485157941017990000000.000		
Total	155			

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 H₀ 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:

$$\begin{cases} H_0 : r_{xy} = 0 \\ H_1 : r_{xy} \neq 0 \end{cases}$$

Table 7: Pearson Correlations Test for the relationship between Municipality's Income and Foreign Exchange between 2006 and 2018

		Municipality income from 2006 to 2018	Currency in different years
Municipality income from 2006 to 2018	Pearson Correlation	1	.071
	Sig. (2-tailed)		.378
	N	156	156
Currency in different years	Pearson Correlation	.071	1
	Sig. (2-tailed)	.378	
	N	156	156

Resource: Author's Computation

Based on the above table, since Sig=0.378>0.05, the test is not significant at the confidence level of 0.95. This means, hypothesis H₀ is not rejected and there is no correlation coefficient between the variables of municipality revenue and U.S. dollars.

Even though the test was significant, the coefficient of determination of the two variables indicates the degree of correlation between the two variables, r²_{xy}=(0.071)²=0.005=0.

IV. Conclusion and Recommendations

Reviewing the hypotheses through Pearson correlation test:

Main hypothesis:

$$\begin{cases} H_0 : & \text{There is no relationship between municipality revenue and the exchange.} \\ H_1 : & \text{There is a relationship between municipality revenue and the exchange.} \end{cases}$$

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):

$$\begin{cases} H_0 : & \text{There is no relationship between municipality revenue and negative exchange.} \\ H_1 : & \text{There is a relationship between municipality revenue and negative exchange.} \end{cases}$$

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):

$$\begin{cases} H_0 : & \text{There is no relationship between municipality revenue and the positive exchange.} \\ H_1 : & \text{There is a relationship between municipality revenue and the positive exchange.} \end{cases}$$

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.

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