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Investigate the possible effects of the implementation of value-added tax on the amount of government budget deficit, cost of domestic products, demand pressure, inflationary expectations and inflation in Iran

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Abstract

This paper investigates the possible effects of the implementation of value-added tax on Iran's inflation in companies listed on the Tehran Stock Exchange. The time domain of the collected data includes the financial statements of manufacturing companies accepted in the Tehran Stock Exchange in 6 years from the spring of 2014 to the spring of 2019. The obtained data includes manufacturing, service companies and institutions. Moreover, leasing companies, financial institutions, insurance and banks are not included with their data uploaded based on the Kodal site. The liquidity growth has been obtained from 2013 as the base year. This paper evaluates the collected data in two descriptive and inferential statistics sections. The descriptive analysis includes the indicators of descriptive statistics of frequency, percentage of relative frequency, mean, standard deviation, and inferential section art investigates research hypotheses using independent variables over dependent variables. In the following, efforts were made to investigate the direct and indirect effects of statistical equations and Eviews10, Excel software. the modified model results show the estimated coefficient of ($\beta = 368.1346$). Also, the value (T=3.803553) of the critical point (2) and the probability level of Prob=0002, show that the estimated coefficient obtained is significant. The R^2 value indicates that the variable of inflation, which is known as an independent variable, has been able to affect the dependent variable of value-added tax by 0.89%. The value of AR(1) is the amount of residual or residual based on the time pattern. According to the correction of the model, Durbin-Watson's value ranges from 1.80 to 10.2 for the optimal fit model.

Keywords: value added tax, inflation, stock exchange, Tehran
2020 MSC: 91B64

1 Introduction

Social developments, population growth and urbanization, especially in developing countries that are facing a severe lack of infrastructure projects, as well as governments' efforts to achieve goals such as more efficient resource

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allocation, fairer distribution of income, economic growth and employment expansion, economic stability and improving the balance of payments imposes a huge cost on governments, and these costs are on the rise, especially in developing countries. Reliance on tax revenues is fundamental to secure the government's financial resources and reduce the budget deficit. The low tax share (the ratio of tax revenue to GDP) and the many problems and inadequacies in our country's tax system necessitates a new tax system capable of generating significant tax revenue with an efficient method [1].

The tax system generally consists of two components: tax laws and regulations and the executive system. The tax system should be flexible according to the economic changes. The results of the investigations in the field of taxes indicate that the tax system does not have the required efficiency in most countries requiring some reforms. Thus, many countries have addressed the value added tax as one of the basic solutions for reforming the tax system [9].

Value added tax, although has attracted the attention of governments due to its positive economic effects and wide tax base, which can help the government in implementing financial policies, it has also created concerns in societies. One of these concerns is "the effects of this type of tax on inflation". Inflation is considered one of the most important and fundamental economic problems of today's societies, with various destructive economic and social effects, including increase in government budget deficit, balance of payments deficit, increase in inequality of income distribution, decrease in savings, etc. inflation has always been an issue of concern in our country, with high growth rate in recent years so that its annual increased rate decreased purchasing power. Therefore, the implementation of the value added tax plan in a circumstances where the country is struggling with a severe structural inflation on the one hand and with inflation caused by sanctions on the other hand will eventually lead to an increase in unbridled inflation in the country [12].

Compared to other conventional taxes, value added tax is a new type of tax. The expansion of this system is one of the most important tax developments and is undoubtedly one of the most controversial topics of the late 20th century. This tax system was developed by the efforts of economists to eliminate or reduce the disruption and inadequacies of traditional taxes and also to increase the government's income. This tax is a type of multi-stage sales tax that exempts the purchase of intermediate goods and services from paying taxes. In fact, a tax credit is considered for intermediary purchases of economic enterprises, which eliminates the double taxation to disappear, so economic factors pay tax only once for each value created [4].

Before this, value added tax was implemented indirectly and covered a small number of products such as energy carriers, etc. Many countries considered the value added tax system implementation following its establishment of in Western countries and then South African countries to achieve economic goals. Paying taxes in some countries is considered a big legal obligation and failure to pay them will result in legal actions for the law violators. Taxes constitute a major part of public expenses in many countries so that in some countries 90 to 95% of public expenses needed by the government are provided through taxes, but taxes have low shares in Iran far from the usual figures in the world even with the government's efforts. In addition, about 32% of the gross domestic product of some countries is provided by tax revenue, while this figure is very small in Iran. The requirement to achieve the desired state of tax revenues in the country is to promote the tax culture, for which the tax self-declaration plan is implemented in July every year for this purpose.

Value added tax has been welcomed by many countries in this century, so that currently more than 150 countries have implemented it and benefit from the advantages of this modern tax. This tax is collected from the added value of companies in different stages of the production process and distribution with many advantages, including high revenue generating capacity for the government, broad tax base, ease of implementation, reducing the incentive of tax evasion, and direct participation of the taxpayer in the process, reliance on self-declaration method, trust in taxpayers, self-control mechanism, low cost of tax collection due to self-execution, avoidance of double taxation, and so forth.

The value added tax system has been implemented in more than half of the world's countries in the last few decades. Those countries that have not yet followed this tax system or those that are late in implementing it, have one concern, and that is the issue of increasing the level of prices after the value added tax implementation [7].

In this situation, the tax is not collected from the production factors provided to the companies and the income of the households, but the tax is imposed on the sale of the goods and services of the companies. Therefore, the tax is actually paid by the companies. Although the tax burden is not necessarily on the companies, but it is the consumer who suffers the cost pressures, and the cost pressure inflation analysis or theory claims that the increase in production costs in a situation where the companies determine the price in a non-competitive world, causes the price level increases. In addition, the continuation of price increases or inflation from this source is caused by the continued increase in production costs and mainly due to the continuous bargaining of the labor force to increase the wage level [5].

Researches have been conducted on the impact of value added tax, which will be mentioned below. Hosseini and Shokouhi [6] carried out a research entitled, "Investigate of factors influencing inflation with emphasis on the role of retrospective and prospective expectations." Using the Generalized Moment Method (GMM) and the data from 1976-2009, the estimation results of Phillips hybrid model showed that inflation in Iran is significantly affected by retrospective inflation expectations, prospective inflation expectations, production gap, the currency rate and the growth of the money supply. However, retrospective expectations are more important than prospective expectations. These results mean that the inflation expectations, money growth and exchange rate management can be complementary to achieve overall price stability.

Naghavi and Shahnooshi [10] conducted a research entitled, "Using Bayesian causal maps to investigate factors affecting inflation in Iran's economy." In this study, they first identified factors affecting inflation using a complete causal map. Then, they investigated the factors on the inflation rate in Iran's economy using causal Bayesian network to determine prior probabilities and posterior probabilities in the form of different scenarios. The sensitivity analysis results show that the positive relationship between the inflation rate and the variables of budget deficit, the ratio of private sector credits to the GDP, government debt, exchange rate, government funds and interest rate. Moreover, they found a negative relationship between the inflation rate and the economic growth rate variable. Therefore, according to the results, considering the importance of the inflation problem, if the government budget is independent of oil revenues, we can hope that the independence of the Central Bank can be a step towards reducing inflation in the Iranian economy.

Ershadi et al. [4] conducted a research entitled, "The effect of value added tax on prices in Iran." The results of the survey showed that the value added tax implementation law had a very insignificant price effect.

Nabizadeh [8] conducted a research titled, "Investigate the mutual effect of inflation and value added tax in Iran's economy." The obtained results showed that there is a significant and reciprocal relationship between both variables, namely inflation and value added tax, and finally they neutralize each other's effects to some extent. Similarly, the Friedman test determined that different inflation indicators, including the amount of tax revenue, inflation expectations, gross national product and government budget deficit have the greatest impact on the amount of value added tax, respectively and also the above variables have been greatly affected by it.

In their research, Benkovskis and Fadejeva [2] investigated the effect of value added tax rate on inflation in Latvia using the consumer price index. In this study, they examined 6 products that were subject to value added tax. The results showed that after the implementation of the tax, the highest inflation is in the transportation sector, alcoholic beverages, communication and tobacco, and the lowest inflation rate is related to hotel services and clothing.

Olatunji [11] conducted a research on value added tax and inflation in Nigeria (1990-2003). The purpose of this research was to investigate the effect of value added tax on the production and income of Nigeria and to understand the relationship between value added tax and inflation. This was a descriptive research. accordingly, research data was prepared from oral interviews, questionnaires, and the annual report of the Nigerian Statistics Center. The results showed that the decrease or increase in the inflation rate is not affected by the value added tax, and proper planning is required for the success of any financial policy.

Ebrill et al. [3] in a book titled, "The modern VAT", published by the International Monetary Fund, have discussed the value added tax implementation problems in small and large economies. They also analyzed the threshold and exemption of this type of tax according to the goals of the country implementing the tax. This study has been introduced as one of the main reference books in the field of value added tax.

In this research, the following assumptions will be investigated:

1. There is a direct relationship between the implementation of value added tax plan and the amount of inflation in the society.
2. There is an inverse relationship between value added tax and the government budget deficit and finally inflation.
3. There is a direct relationship between value added tax and the cost of domestic products and ultimately inflation.
4. There is a direct relationship between value added tax and demand pressure and ultimately inflation.
5. There is a direct relationship between value added tax and inflationary expectations and ultimately inflation.

2 Research method

This paper investigates the possible effects of the value added tax implementation on Iran's inflation in companies listed on the Tehran Stock Exchange. The time domain of the collected data includes the financial statements of

manufacturing companies accepted in the Tehran Stock Exchange in the period of 6 years from the spring of 2014 to the spring of 2019.

The statistical population of this research includes the financial statements of 217 companies data listed on the Tehran Stock Exchange in the period of 6 years from the spring of 2014 to the spring of 2019. The inclusion criteria were as the following:

1. Companies that have been members of the stock exchange from the spring of 2014 to the spring of 2019 and continue to operate.
2. The company should not be among the investment, leasing, banking, financial and insurance companies.
3. The data is available.
4. The companies have an amended or acceptable audit report.

Data was collected using library methods, and field methods were used to collect data to confirm or reject the research hypotheses. The obtained data includes manufacturing and service companies and institutions. And there are no other than leasing companies and financial institutions, insurance and banks, and their information is uploaded based on the Kodal site. To check the liquidity growth, its base year has been obtained from 2014. Significance was tested using the Levin, Lin, Chow test. Eviews10 and Excel software were used to analyze the data.

3 Data analysis

3.1 Liquidity and money volume descriptive characteristics

Table 1: Descriptive characteristics of the amount of liquidity and amount of money in manufacturing companies listed on the Tehran Stock Exchange

Variable	Year	Mean	SD	Skewness	Kurtosis	Min.	Max.	Range
Liquidity	1393	148155.8419	542766.4581	8.028	75.775	89.00	6071775.00	6071686.00
	1394	1326660.5581	392323.2043	6.014	45.585	203.00	3862279.00	3862279.00
	1395	119921.8186	360512.4383	5.508	34.508	227.00	3097854.00	3097854.00
	1396	209479.0372	882580.2703	8.226	78.470	109.00	9896004.00	9895895.00
	1397	324096.6651	973515.1371	5.290	32.696	285.00	8439539.00	8439254.00
	1398	686541.6465	2644312.931	7.019	57.130	9.00	26659685.00	26659676.00
Domestic product cost	1393	148158.8419	388912.4824	5.586	38.427	00.00	3677277.00	3677277.00
	1394	162307.5209	404669.6017	5.006	29.833	631.00	3502302.00	3501671.00
	1395	178797.2279	494714.3688	7.186	67.739	3203.00	5555601.00	5552398.00
	1396	211523.4930	564013.4845	6.324	52.486	2033.00	5915866.00	5913833.00
	1397	320280.0884	928134.1485	5.672	37.889	2687.00	8173947.00	8171260.00
	1398	544775.8512	2076040.773	7.778	69.191	2459.00	21721029.00	21718570.00

The above table shows the findings of liquidity and cost of products in subsidiary companies in Tehran Stock Exchange. The table shows mean, standard deviation, and skewness coefficients.

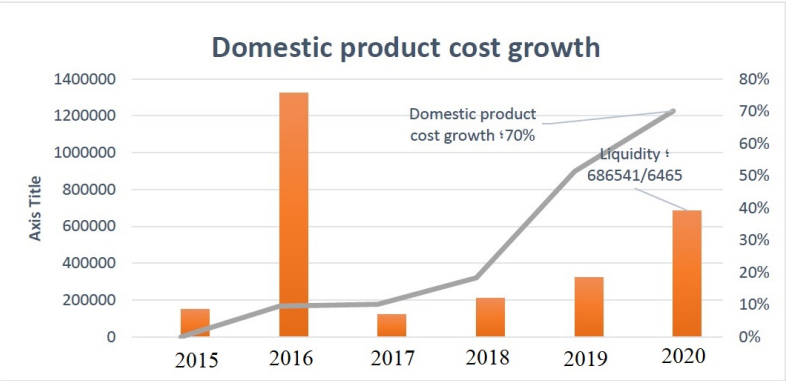

Figure 1: Domestic product cost growth based on liquidity

Table 2: Descriptive findings of financial indicators of manufacturing companies in Tehran Stock Exchange (based on millions of Rials).

Variable	Observations	Mean	SD	Skewness	Kurtosis	Min.	Max.
Amount of money in circulation	205	1480566	6904704	7.423566	60.66164	4000.000	61503539
income tax	205	62504.33	253339.9	7.170680	57.44009	0.000000	2355771
Liquidity	205	67052.62	237303.8	5.979228	39.60434	9.000000	1927377
demand	205	141093.3	525957.6	6.933270	56.75982	967.0000	5218585
Cost of products	205	133944.8	524256.0	7.038109	57.88130	967.0000	5218585

The above table shows the descriptive findings related of financial indicators of companies listed on the Tehran Stock Exchange. The descriptive findings show the mean and the general standard deviation of the companies in terms of the amount of money in circulation, income tax, liquidity, demand, and cost of products, which includes the time series of audited financial statements from 2014 to 2019.

3.2 Inferential data analysis

3.2.1 First hypothesis findings

Hypothesis: There is a direct relationship between the implementation of value added tax plan and the amount of inflation in the society. A regression model is used to predict the effect of the value added tax plan implementation and the rate of inflation. To check the data, the type of data must be specified, which includes three types (intersectional, time series, panel). He data here is of panel data type, because the statistical data includes the time series from 2014 to 2019 and we want to check the service and production companies that operate in the Tehran Stock Exchange. In this hypothesis, we use the regression equation to examine the effect of the independent variable on the dependent variable. In fact, regression means obtaining a line between two groups (y and x), with the following equation:

$$x_i = \text{independent variable} \qquad Y = \alpha + \beta x_i + V_i$$

$$e_i = \text{dependent variable} \qquad Y_i = \alpha + \beta x_i + V_i \text{ (population line)}$$

$$V_i = \text{the residual from the data deviation} \qquad Y_i = \alpha + \beta x_i + e_i \text{ (sample line)}$$

Table 3: Regression model of value added tax plan implementation and inflation rate.
Dependent Variable: ARZAESHAF
Method: Panel Least Squares
Date: 02/01/22 Time: 11:50
Sample: 2004 2009
Periods included: 6
Cross-sections included: 35
Total panel (unbalanced) observations: 205

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TVAROM	616.5834	149.6312	4.120687	0.0001
R-squared	0.002773	Mean dependent var		12069.47
Adjusted R-squared	0.002773	S.D. dependent var		42714.69
S.E. of regression	42655.42	Akaike info criterion		24.16456
Sum squared reside	3.71E+11	Schwarz criterion		24.18077
Log likelihood	-2475.868	Hannan-Quinn criter.		24.17112
Durbin-Watson stat	0.277818			

The above table examines the effect of the independent variable (inflation) on the value added tax plan implementation (dependent variable) from the least squares model, according to the time series data panel related to the manufacturing and service companies on the Tehran Stock Exchange, and displays the value of 205 data observations (estimated coefficient = β). The value of $T > 2$ and $p < 0$. It can be said because the value of absolute value $|6.509989|t =$ greater than $2 < t$ indicates the significance and impact of the independent variable on the dependent variable, the value of $R^2 = 0.02773$ is the influence of the independent variable on the dependent variable. The model cannot have a good fit, because its residuals should be estimated so that the value of $dw = 2$ or close to it, as well as to eliminate the degree of linear correlation. The diagram below specifies its value and according to it, its type of model can be estimated. There are a series of spatio-temporal patterns that are used to predict the present or future

of a spatio-temporal variable based on the intervals of the same variable and the present and past values of the errors. In terms of (AR), (MR), (ARMA) and (ARIMA) processes, how can they be classified and which of these four modes does this variable include?

According to the Correlogram, which is used to check the degree of collinearity and non-collinearity; if the curve Ac is decreasing (exponential or sinusoidal), the process is AR and its order P is determined from PAC. Therefore, the diagram below shows that the data is exponential and decreasing.

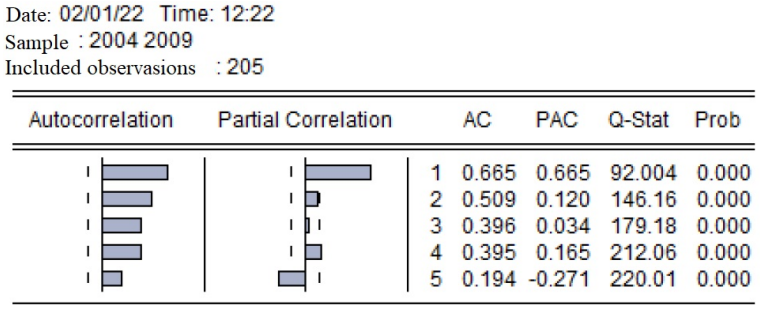

Figure 2: A Correlogram to check the collinearity or non-collinearity of the data

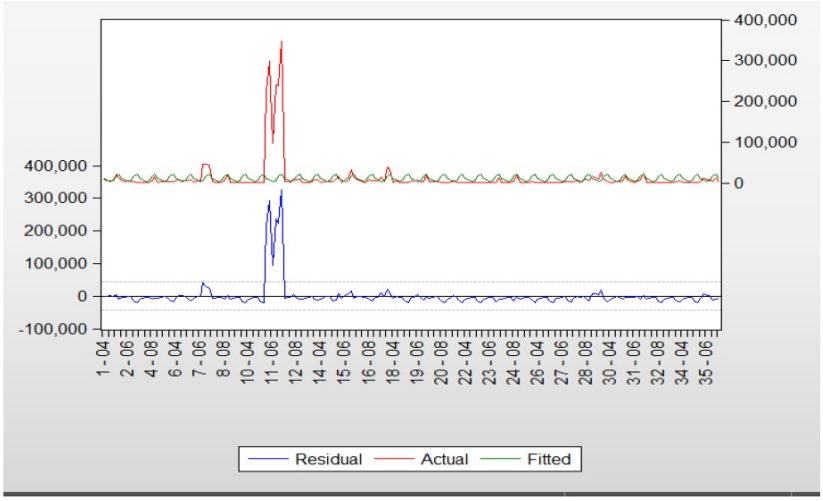

Figure 3: Collinear regression of value added tax and inflation variables

Table 4: Modified regression model of the value added tax plan implementation and inflation rate
Dependent Variable: value added tax
Method: Panel Least Squares
Sample (adjusted): 2005 2009
Periods included: 5
Cross-sections included: 34
Total panel (balanced) observations: 170
Convergence achieved after 4 iterations

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Intercept	6010.273	1857.054	3.236456	0.0015
Inflation	368.1346	96.78704	3.803553	0.0002
AR(1)	-0.330894	0.101495	-3.260199	0.0014
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.890523	Mean dependent var		12595.10
Adjusted R-squared	0.861928	S.D. dependent var		43771.68
S.E. of regression	16264.70	Akaike info criterion		22.41695

Sum squared reside	3.54E+10	Schwarz criterion	23.08100
Log likelihood	-1869.441	Hannan-Quinn criter.	22.68642
F-statistic	31.14281	Durbin-Watson stat	1.917232
Prob(F-statistic)	0.000000		
Inverted AR Roots	-0.33		

According to the modified model the estimated coefficient is ($\beta = 368.1346$). Also, the value (T=3.803553) of the critical point (2) and the probability level of Prob=0002, shows that the estimated coefficient obtained is significant. The value of R^2 indicates that the variable of inflation, which is known as an independent variable, has been able to affect the dependent variable of value added tax by 0.89%. And the value of AR(1) is the value of residual or residual based on the time pattern. According to the correction of the model, Durbin-Watson's value ranges from 1.80 to 10.2 for the optimal fit model.

Result: In this hypothesis, as can be seen, the OLS method (Ordinary Least Squares) was used to check the time interval. This method is one of the most widely used methods. This method tries to estimate the unknown parameters or the dependent variable in the linear regression model by minimizing the difference between the variables. This method uses the AR(1) model, whose model is $Y_t - c\Phi Y_{t-1}\varepsilon_t$. Due to the fact that in this model the values are interrupted and estimated in the first interval. Thus in the expression of the random step, it was the value of the variable, i.e. Y_t, plus the previous value of the variable plus a random term.

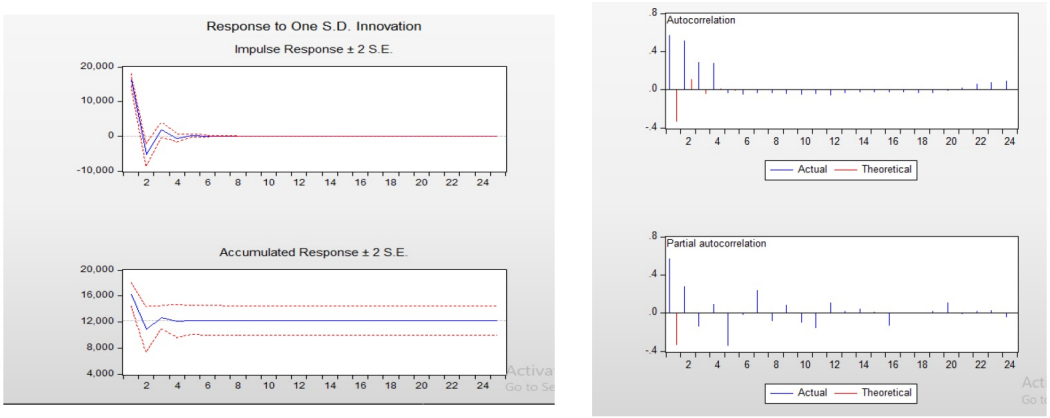

Figure 4: Statistical estimation of inflation on value added tax

3.2.2 Second hypothesis findings

There is an inverse relationship between value added tax and the government budget deficit and finally inflation.

The modified regression model to assume the effect of the independent variables of government budget deficit and inflation rate on the dependent variable of value added tax was investigated based on ordinary least square method and AR(1) autoregression model. The results obtained in the budget deficit variable with a coefficient ($\beta = 0.450051$) with the standard deviation value of the beta coefficient (STD=0.135112) and the value of the statistic (t=3.330942) which is from the critical point $t > 2$, shows the effectiveness of the government budget deficit variable in the value added tax ($\beta = 1256.371$) and the statistical value (t=2.532213) and the significance level (prob=01115) prove the relationship between the variables. The value of $R^2 = 0.63$, shows that the independent variables (budget deficit and inflation) affect the dependent variable by 0.63% and cause variability.

Result: The general review shows that according to Durbin-Watson's statistics, the degree of collinearity is solved using the AR(1) model and by estimating the time lags between the variables, the results show that the variables of government budget deficit and inflation can affect the value added tax.

3.3 Third hypothesis findings

There is a direct relationship between value added tax and the cost of domestic products and ultimately inflation.

The modified regression model to assume the effect of the independent variables of domestic product cost and inflation rate on the dependent variable of value added tax was investigated based on ordinary least square method

Table 5: Regression model of the value added tax plan implementation, government budget deficit and inflation rate
Dependent Variable: value added tax
Method: Panel Least Squares
Sample (adjusted): 2005 2009
Periods included: 5
Cross-sections included: 205
Total panel (balanced) observations: 1025
Convergence achieved after 5 iterations

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Government budget deficit	0.450051	0.135112	3.330942	0.0009
Inflation	1256.371	496.1553	2.532213	0.0115
Intercept	32885.20	52774.17	0.623131	0.5334
AR(1)	0.893682	0.064309	13.89678	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.636256	Mean dependent var		47046.39
Adjusted R-squared	0.544095	S.D. dependent var		191599.2
S.E. of regression	129369.1	Akaike info criterion		26.55777
Sum squared reside	1.37E+13	Schwarz criterion		27.55870
Log likelihood	-13402.86	Hannan-Quinn criter.		26.93774
F-statistic	6.903789	Durbin-Watson stat		1.829099
Prob(F-statistic)	0.000000			
Inverted AR Roots	0.89			

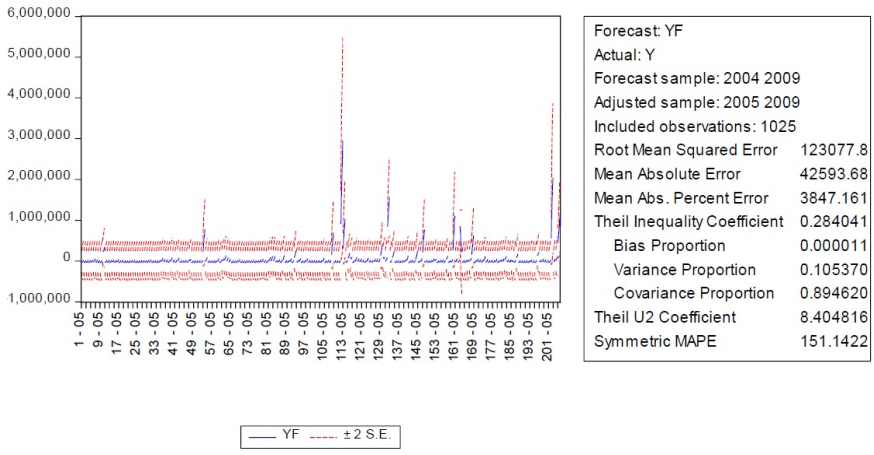

Figure 5: Autoregression prediction (dynamics) of the budget deficit and inflation variables in value added tax

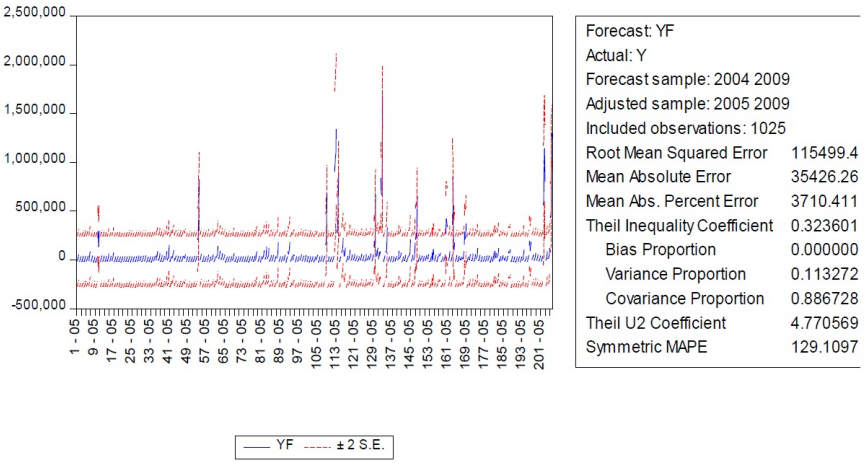

Figure 6: Autoregression prediction (static) of budget deficit and inflation variables in value added tax

and AR(1) autoregression model. The coefficient obtained in the domestic products cost variable with the coefficient

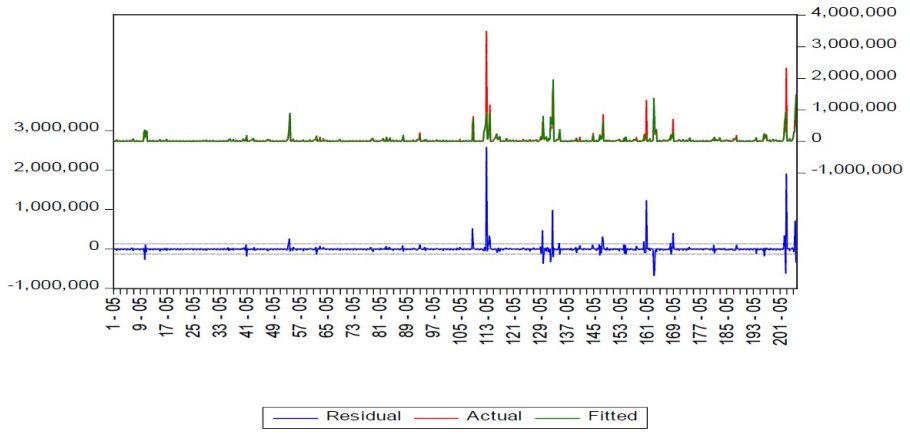

Figure 7: Predicting the value of the dependent variable using independent variables

Table 6: Regression model of the value added tax plan implementation, domestic products cost and inflation rate
Dependent Variable: value added tax
Method: Panel Least Squares
Sample (adjusted): 2005 2009
Periods included: 5
Cross-sections included: 205
Total panel (balanced) observations: 1025
Convergence achieved after 8 iterations

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
domestic products cost	0.163969	0.006999	23.42904	0.0000
Inflation	1187.295	357.0372	3.325410	0.0009
Intercept	-1315.742	12976.85	-0.101391	0.9193
AR(1)	0.658777	0.049328	13.35516	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.778902	Mean dependent var		47046.39
Adjusted R-squared	0.722883	S.D. dependent var		191599.2
S.E. of regression	100861.4	Akaike info criterion		26.05993
Sum squared reside	8.31E+12	Schwarz criterion		27.06085
Log likelihood	-13147.71	Hannan-Quinn criter.		26.43989
F-statistic	13.90431	Durbin-Watson stat		1.998068
Prob(F-statistic)	0.000000			
Inverted AR Roots	0.66			

($\beta = 0.163969$) with the value of the standard deviation of the beta coefficient (STD=0.006999) and the value of the statistic (t=23.42904) which is from the critical point $t > 2$ shows the relationship of the effectiveness of the domestic products variable cost on value added tax with prob=0.000.

In the inflation variable with a coefficient ($\beta = 1187.295$) with the value of the standard deviation of the beta coefficient (STD=357.0372) and the value of the statistic (t=3.325410) (which is from the critical point ($t > 2$), it shows the relationship of the influence of the variable inflation cost on value added tax with prob=0.000.

Result: The time interval using the OLS (ordinary least squares) method was used to investigate the effect of independent variables (domestic products cost and inflation) on value added tax, the AR model (1) whose model is $Y_t - c\Phi Y_{t-1}\varepsilon_t$.

The above table shows the time intervals based on different modes, according to the Schwartz criterion, $Sc = 58.68929^*$ var(2) is determined as the optimal interval determination.

3.3.1 Fourth hypothesis findings

There is a direct relationship between value added tax and demand pressure and ultimately inflation.

The fixed-panel test is used to estimate panel or pool data. The value of f=20.440273 and the value of Prob=0.000 in the two parts of Period F show that the data is a new panel and the pool hypothesis is rejected.

The modified regression model to assume the effect of the independent variables of demand for purchase and the

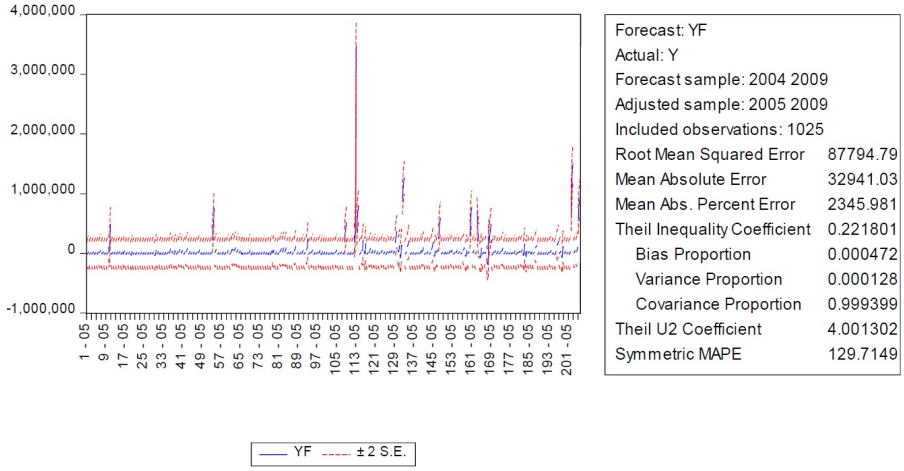

Figure 8: Predicting the effect of inflation expectations and inflation on the amount of value added tax

Table 7: Vector Autoregressive Estimates in endogenous variables
Vector Autoregression Estimates
Sample (adjusted): 2006 2009
Included observations: 820 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	Value added tax	**Domestic products cost**	**Inflation**
Value added tax (-1)	1.070679	0.396360	1.11E-06
	(0.05819)	(0.14113)	(1.2E-06)
	[18.3993]	[2.80839]	[0.92070]
Value added tax (-2)	0.284296	-0.076294	-1.51E-06
	(0.07575)	(0.18371)	(1.6E-06)
	[3.75320]	[-0.41529]	[-0.96492]
Domestic products cost (-1)	0.476323	3.537474	3.09E-07
	(0.02640)	(0.06402)	(5.5E-07)
	[18.0453]	[55.2566]	[0.56701]
Domestic products cost (-2)	-0.530571	-2.449820	-4.82E-07
	(0.03665)	(0.08888)	(7.6E-07)
	[-14.4774]	[-27.5619]	[-0.63707]
Inflation (-1)	-20.42451	-2806.242	0.768671
	(539.136)	(1307.59)	(0.01113)
	[-0.03788]	[-2.14612]	[69.0432]
Inflation (-2)	-3315.662	-2726.865	-2.859769
	(1448.61)	(3513.38)	(0.02991)
	[-2.28886]	[-0.77614]	[-95.6001]
Intercept	37898.90	31129.67	38.13255
	(18523.7)	(44926.4)	(0.38252)
	[2.04597]	[0.69290]	[99.6889]
R-squared	0.691134	0.902194	0.959315
Adj. R-squared	0.688854	0.901472	0.959015
Sum sq. resids	1.12E+13	6.61E+13	4795.234
S.E. equation	117608.5	285240.8	2.428620
F-statistic	303.2012	1249.896	3194.972
Log likelihood	-10733.61	-11460.11	-1887.620
Akaike AIC	26.19661	27.96856	4.621024
Schwarz SC	26.23681	28.00876	4.661225
Mean dependent	52801.74	219457.3	19.20000
S.D. dependent	210841.8	908724.7	11.99627
Determinant resid covariance (dof adj.)		6.02E+21	
Determinant resid covariance		5.87E+21	
Log likelihood		-24041.61	
Akaike information criterion		58.68929	
Schwarz criterion		58.80990	
Number of coefficients		21	

inflation rate on the dependent variable of value added tax was investigated based on ordinary least square method and AR(1) autoregression model. The coefficient obtained in the demand variable with the coefficient ($\beta = -0.016576$)

Table 8: Determining the optimal interval based on optimal models
VAR Lag Order Selection Criteria
Endogenous variables: Value
added tax- Domestic products
cost - inflation
Exogenous variables: C
Sample: 2004 2009
Included observations: 820

Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-26656.19	NA	3.48e+24	65.02242	65.03965	65.02903
1	-25360.82	2578.115	1.51e+23	61.88492	61.95384	61.91136
2	-24041.61	2615.891*	$6.18e+21$*	58.68929*	58.80990*	58.73557*
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Table 9: Hausman to estimate data panelityRedundant Fixed Effects TestsEquation: UntitledTest cross-section and period fixed effects

Effects Test	**Statistic**	**d.f.**	**Prob.**
Cross-section F	20.440273	(34,169)	0.0000
Cross-section Chi-square	342.644089	34	0.0000
Period F	4.171001	(5,169)	0.0013
Period Chi-square	24.436005	5	0.0002
Cross-Section/Period F	18.451478	(39,169)	0.0000
Cross-Section/Period Chi-square	348.548987	39	0.0000

Table 10: The regression model of the value added tax plan implementation, domestic products cost and inflation rate
Dependent Variable: value added tax
Method: Panel Least Squares
Sample (adjusted): 2005 2009
Periods included: 5
Cross-sections included: 34
Total panel (balanced) observations: 170
Convergence achieved after 13 iterations

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
demand for purchase	-0.016576	0.004265	-3.886821	0.0002
Inflation	469.9684	109.5286	4.290829	0.0000
Intercept	8899.153	2225.819	3.998148	0.0001
AR(1)	-0.188830	0.098096	-1.924953	0.0564
Effects Specification				
	Cross-section fixed (dummy variables)			
R-squared	0.889052	Mean dependent var		14788.04
Adjusted R-squared	0.859021	S.D. dependent var		46002.49
S.E. of regression	17272.65	Akaike info criterion		22.54148
Sum squared resid	3.97E+10	Schwarz criterion		23.22398
Log likelihood	-1879.026	Hannan-Quinn criter.		22.81843
F-statistic	29.60437	Durbin-Watson stat		2.128914
Prob(F-statistic)	0.000000			
Inverted AR Roots	-0.195			

with the value of the standard deviation of the beta coefficient (STD=0.004265) and the value of the statistic (t=-3.886821) which is from the critical point $t > 2$ shows the relationship between the effectiveness of the demand level and the added value tax, prob=0.002.

In the inflation variable with the coefficient ($\beta = 469.9684$) with the value of the standard deviation of the beta coefficient (STD= 109.5286) and the value of the statistic t=4.290829) (which is from the critical point $t > 2$), it shows

the relationship of the effectiveness of the variable cost of inflation in value added tax, prob=0.000. R^2 value=0.88% variability variance on value added tax variable is affected by demand variables and inflation on value added tax.

Result: the general investigation shows that according to Durbin-Watson's statistics, the degree of collinearity is solved using the AR(1) model and by estimating the time lags between the variables, the results show that the variables of demand and inflation can affect added value taxes.

3.3.2 Fifth hypothesis findings

There is a direct relationship between value added tax and inflationary expectations and ultimately inflation.

Table 11: Hausman to estimate data panelityRedundant Fixed Effects TestsEquation: UntitledTest cross-section fixed effects

Effects Test	**Statistic**	**d.f.**	**Prob.**
Cross-section F	3.474461	(33,132)	0.0000
Cross-section Chi-square	106.283608	33	0.0000

To check the data in terms of panel or pool data, the results of the Hausman test show that according to the chi-square value, $\chi^2 = 106.283608$, the p value is < 0.000, so the test shows that the data is panel type.

Table 12: Regression model of the value added tax plan implementation, inflation expectations and inflation rate
Dependent Variable: value added tax
Method: Panel Least Squares
Date: 02/04/22 Time: 02:30
Sample (adjusted): 2005 2009
Periods included: 5
Cross-sections included: 34
Total panel (balanced) observations: 170
Convergence achieved after 5 iterations

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
demand for purchase	-0.016576	0.004265	-3.886821	0.0002
Inflation	199.2085	78.47817	2.538394	0.0123
Amount of money in circulation	9.60E-05	0.000216	0.443607	0.6581
Products cost	0.034814	0.003998	8.707038	0.0000
Intercept	3954.883	1442.676	2.741352	0.0070
AR(1)	-0.398123	0.084487	-4.712223	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.931752	Mean dependent var		12595.10
Adjusted R-squared	0.912622	S.D. dependent var		43771.68
S.E. of regression	12938.79	Akaike info criterion		21.96791
Sum squared resid	2.21E+10	Schwarz criterion		22.66885
Log likelihood	-1829.272	Hannan-Quinn criter.		22.25234
F-statistic	48.70621	Durbin-Watson stat		2.074285
Prob(F-statistic)	0.000000			
Inverted AR Roots	-0.40			

The modified regression model for predicting inflation expectations and inflation rate on the dependent variable of value added tax was investigated based on ordinary least square method and AR(1) autoregression model. The results of the obtained model show that in the examination of inflationary expectations, the domestic products cost with coefficient ($\beta = 0.034814$) and value (T=8.707038) and value prob=0.0070 are factors that can increase inflation and tax growth in the long term. The value of $R^2 = 0.93$ shows the influence of the independent variable in general, which has been able to have a decisive role on the amount of added value.

4 Conclusion

The results showed that the inflation variable, which is known as an independent variable, was able to affect the dependent variable of a value added tax by 0.89%. And the value of AR(1) is the amount of residual or residual based

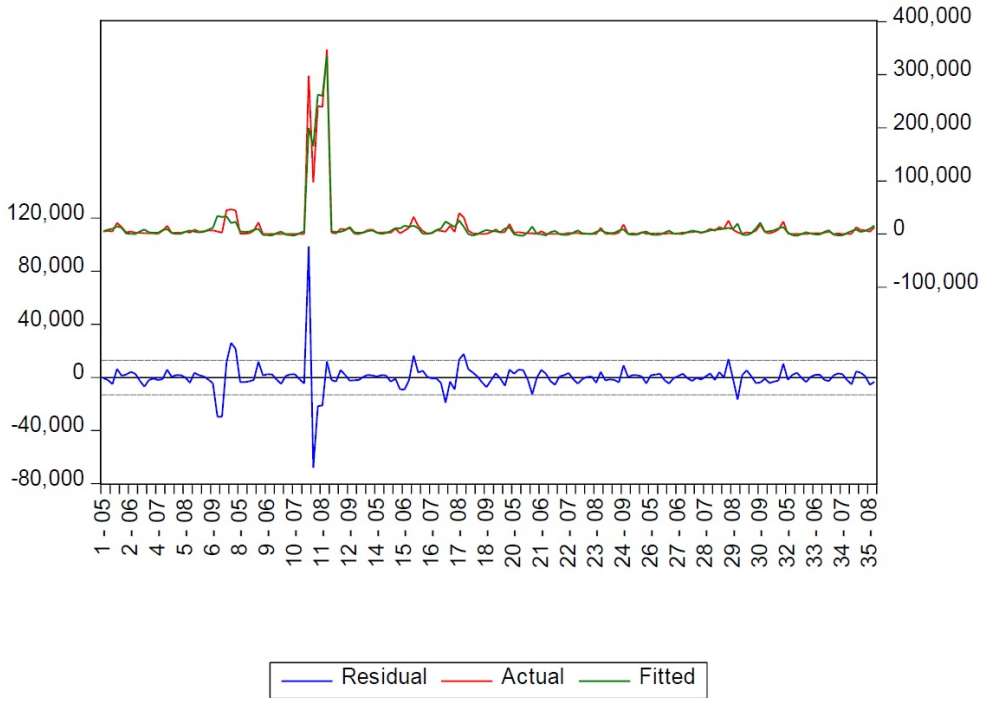

Figure 9: Estimation of independent variables on inflation and value added tax

on the time pattern. According to the correction of the model, Durbin-Watson's value ranges from 1.80 to 10.2 for the optimal fit model.

The modified regression model to assume the effect of the independent variables of government budget deficit and inflation rate on the dependent variable of value added tax based on ordinary least square method and AR(1) autoregression model showed that in the variable of budget deficit with coefficient ($\beta = 0.450051$) with the value of the standard deviation of the beta coefficient (STD=0.135112) and the value of the statistic ($t = 3.330942$) which is from the critical point $t > 2$ shows the influence of the government budget deficit variable on value added tax, prob=0.000. The modified regression model to assume the effect of the independent variables of domestic products cost and inflation rate on the dependent variable of value added tax based on the ordinary least square method and autoregression model AR(1) showed that the coefficient obtained in the variable of domestic products cost with a coefficient ($\beta = 0.163969$) with the standard deviation value of the beta coefficient (STD=0.006999) and the statistical value of 23.42904 (t=2), which is from the critical point $t > 2$, shows the influence of the variable domestic products cost on the value added tax, prob=0.000.

The modified regression model to assume the effect of the independent variables of demand for purchase and the inflation rate on the dependent variable of value added tax was investigated based on ordinary least square method and AR(1) autoregression model. The coefficient obtained in the demand variable with the coefficient ($\beta = -0.016576$) with the value of the standard deviation of the beta coefficient (STD=0.004265) and the value of the statistic (t=-3.886821) which is from the critical point $t > 2$ shows the relationship between the effectiveness of the demand level and added value tax, prob=0.002.

The modified regression model for predicting inflation expectations and inflation rate on the dependent variable of value added tax was investigated based on ordinary least square method and AR(1) autoregression model. The results of the obtained model show that in the examination of inflationary expectations, domestic products cost with coefficient ($\beta = 0.034814$) and value (T=8.707038) and value prob=0.0070 are factors that can increase inflation and value added tax growth in the long term. The value of $R^2 = 0.93$ shows the influence of the independent variable in general, which has been able to have a decisive role on the amount of added value.

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