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ANALYSIS OF SIMULATION EFFECT OF INCREASED TAX AND REGIONAL GOVERNMENT SPENDING ON CONSUMPTION OF LAMPUNG PROVINCE COMMUNITIES

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ABSTRACT

The purpose of this study is to analyze the effect of increased local government taxes and expenditure on the consumption of Lampung Province society. The estimation model in the simultaneous model of the increase in taxes and expenditure of the Lampung provincial government uses the 2 SLS (Two-Stage Least Squares) method. The simulation results of a tax increase of 10% reduced the Gross Regional Domestic Product of Lampung Province by 0.03% and the consumption of Lampung Province by 0.03%. This is also shown by the decrease in demand for the Province's money by 0.01%. On the other hand, the simulation results of the Lampung Province Government spending increase by 10% raised the Lampung Province Regional Domestic Products by 2.06% and the Lampung Province people's consumption by 0.04%. In conclusion, the increase in regional government expenditure is a driving factor that provides stimulus in addition to the Gross Regional Domestic Product and the consumption of the Lampung Province community, as well as to the activities of private investors and regional exports and imports including the money supply.

Keywords: Simulation, Tax and Local Government Spending, and Consumption

1. INTRODUCTION

The Indonesian government sets policies in achieving economic growth by paying attention to the equity (growth with equity) of the poor. The government is trying to increase economic growth and that growth can be enjoyed by the general public from the center to the regions. This is evident from the increase in Gross Regional Domestic Product (GRDP).

Lampung Province is a province in Indonesia with considerable economic potential. The Central Statistics Agency / BPS (2011) states that economic growth in Lampung Province has decreased by 6.56%, while in 2012 it has decreased by 6.44%. The Central Statistics Agency (2015) states that Lampung Province economic growth data has decreased to 5.05%. On the other hand, national economic growth increased by 6.22% (BPS, 2011) and decreased by 5.06% (BPS, 2015).

The level of consumption of the people of Lampung Province can be used as an indicator of the economic growth of the Province in terms of provincial aggregate expenditure or demand. Mankiw (2006), said about the amount of public consumption which is influenced by disposable income. According to him the level of public consumption in a low economy is high compared to the level of savings, so that the capital accumulation for private investment is small.

Arsyad (1999) said that economic growth is interpreted as an increase in the growth of the National Income that is greater than the population growth. Samuelson and Nordhaus (1997) suggest three main functions of an economy, namely: economic efficiency, fairness, and policy stabilization. Sukirno (2000) suggests the main problems in the economy, namely: (1) unemployment, (2) inflation, (3) freedom of economic growth, and (4) instability of the balance of payments. In another section, Jhingan (2000) argues about the economic growth of a region determined by the trade balance because it is related to the components supporting export. Todaro and Smith (2012) suggest economic growth through export-oriented policies.

2. RESEARCH METHODOLOGY
2.1. Research Location and Time
The study is located in Lampung Province in 2018 - 2019.

2.2. Data Types and Sources
The data needed is secondary data in the form of annual period data. The data is sourced from the National Statistics Agency, the Central Statistics Agency, Lampung Province, Central and provincial Bank Indonesia, and other related agencies / services.

2.3. Model Identification and Estimation Methods
The actual phenomenon is presented in a model in order to explain it, predict it, and control it. Before estimating, the model is identified first to determine whether the parameters could be estimated. Testing identification uses the order condition axiom (Koutsoyianis, 2000; Intriligator et al, 2003; Pindyck and Rubinfeld, 2008). Order conditions are expressed as:

$$(K - M) \geq (G - 1)$$

Explanation :

G	=	The number of endogenous variables in the model
K	=	Total variables in the model (endogenous and exogenous variables)
M	=	The number of endogenous and exogenous variables included in an equation.

If :
$(K - M) = (G - 1)$ then an equation is said exactly identified,
$(K - M) > (G - 1)$ then an equation is said *overidentified*, and
$(K - M) < (G - 1)$ then an equation is said *underidentified*.

The Lampung Province aggregate demand model which is formulated has 6 equations as structural equations. The number of endogenous variables is 6 and exogenous variables are 13. After the model has been identified using order conditions, all equations are obtained "overidentified" so that the estimation method that can be applied is the 2 SLS (Two Stage Least Squares) method. Statistical tests F and t are used to test whether explanatory variables together or each have a significant effect on endogenous variables.

2.4. Model Validation

Statistical criteria used for validation are Root Mean Squares Error (RMSE), Root Mean Squares Percent Error (RMSPE) and U-Theil (Theil's Inequality Coefficient). The smaller the value of RMSE, RMSPE and U-Theil, the better the model. The statistical criteria are formulated as follows:

$$\text{RMSE} = \sqrt{\frac{1}{n} \sum_{t=1}^{n} \left(Y_t^s - Y_t^a\right)^2}$$

$$\text{RMSPE} = \sqrt{\frac{1}{n} \sum_{t=1}^{n} \left(\frac{Y_t^s - Y_t^a}{Y_t^a}\right)^2}$$

$$U = \frac{\sqrt{\frac{1}{n} \sum_{t=1}^{n} \left(Y_t^s - Y_t^a\right)^2}}{\sqrt{\frac{1}{n} \sum_{t=1}^{n} \left(Y_t^s\right)^2} + \sqrt{\frac{1}{n} \sum_{t=1}^{n} \left(Y_t^a\right)^2}}$$

where:

Y_t^s = The value of the basic simulation results from the observation variable

Y_t^a = The actual value of the observation variable.

n = Number of observation periods.

3. RESEARCH RESULT

3.1. General Model Estimation Performance

The coefficient of determination (R^2) in all equations is quite high, ranging from 0.9393 to 0.9880. The statistical value of F shown by the probability value of F for all equations is smaller than 0.0001. The F test is a test of the significance of the R^2 statistic (Pindyck and Rubinfeld, 2008). The t test statistic is used to test whether each explanatory variable individually has a significant effect on endogenous variables. The significance of the t-test used in this study was $\alpha = 20\%$.

According to the t test results as much as 38.24% or 13 parameters of the alleged explanatory variables in the equation are significantly different from zero at the real level $\alpha = 1 - 5\%$, as much as 17.65% or 6 parameters of the alleged explanatory variable are significantly different from zero at the real level $\alpha = 6\text{-}10\%$, as much as 11.76% or 4 parameters of the alleged explanatory variable are significantly different from zero at the real level $\alpha = 11\text{-}15\%$, and as many as 11.76% or 4 parameters of the expected explanatory variable are significantly different from zero at the real level $\alpha = 16\text{-}20\%$.

Table 1. Results of Estimating Parameters of Consumption Variables in the Lampung Province Community (KONL) for the 1982-2016 Period

Explanatory Variable		Prob. T		Elasticity	
	Estimated Parameter		Real Level	Short Term	Long Term
Interception	1443710				
Disposable Income (PD)	0.1246	0.0007	A	0.210	0.620
Money Supply (UB)	0.0061	0.0003	A	0.080	0.220
Community Savings (TAM)	-0.0408	0.0306	A	-0.010	-0.030
Inflation (INF)	-5253.3	0.1646	D	-0.003	-0.010
Lag of Community Consumption (LKON)	0.6527	<0.0001			
Prob. F < 0.0001	R-SG = 0.9994	Adj R-SQ = 0.9990		DW = 2.105	

Explanation :

A = Significantly influences the level (α), α =   1 - 5 %

D = Significantly influences the level (α), α = 15 - 20 %

Table 1 shows that the R2 coefficient of determination coefficient, F test, and t test in the KONL equation have good criteria. The disposable income, the money supply, public savings, and the general inflation rate significantly affect the consumption of the people of Lampung province at the level of α = 0.05 or 5%, except for the inflation rate at α = 0.16 or 16%. The results of the estimation of positive parameters on disposable income and the money supply show a positive relationship to public consumption. The results of the estimation of negative parameters on savings and inflation show a negative relationship to public consumption.

Analysis of short-term elasticity on disposable income, money supply, public savings, and inflation has an inelastic value. In long term, disposable income has an elastic level of elasticity. This has the understanding that public consumption has almost no potential to decline or tends not to change in the short or long term (Table 1).

Table 2. Results of Estimating Parameters of the Lampung Private Investment Expenditure (INVL) for the 1982-2016 Period

Explanatory Variable		Prob. T		Elasticity	
	Estimated Parameter		Real Level	Short Term	Long Term
Interception	78069.61				
Interest Rate (IR)	-1519.58	0.3153	-	0.01	-0.02
Lampung Gross Regional Domestic Product (PDRBL)	0.0476	0.0114	A	0.29	1.20
Exchange Rate (NT)	-16.1361	0.0579	B	-0.02	-0.09
Lag of Lampung Private Investment Expenditures (INVDL)	0.7574	<0.001			
Pro. F < 0.0001	R-SQ =0.9972	Adj R-SQ=0.9969		DW = 2.447	

Explanation :

A = Significantly influences the level (α), α = 1 - 5 %

D = Significantly influences the level (α), α = 15 - 20 %

Table 2 shows that the R2 coefficient of determination coefficient, F test, and t test in the INVL equation have good criteria. Interest rates, the gross regional domestic product of Lampung Province, and the exchange rate have a significant effect on Lampung private investment expenditure at α = 0.05 or 5%, except for the interest rate at α = 0.31 or 31%. The positive parameter estimation results in the gross regional domestic product of Lampung Province show a positive relationship to Lampung private investment expenditure. The results of the estimation of negative parameters on interest rates and exchange rates show a negative relationship to Lampung private investment expenditure.

Analysis of short-term elasticity in interest rates, gross regional domestic product of Lampung Province, and the exchange rate has an inelastic value. In the long term interest rates, Lampung Province's gross regional domestic product and the exchange rate have an elastic level of elasticity. This has the understanding that Lampung's private investment expenditure does not have the potential to decline or tends not to change in the short or long term (Table 2).

Table 3. Estimation Results of the Lampung Province Government Expenditure Parameter (GOVEL) for the 1982-2016 Period

Explanatory Variable		Prob. T		Elasticity	
				Short Term	Long Term
	Estimated Parameter		Real Level		
Interception	132950.9				
Lampung Private Investment Expenditure (INVDL)	0.1092	0.1933	D	0.080	0.220
Community Savings (SAV)	-0.5665	0.0043	A	-0.010	-0.030
Lag of Government Expenditure (LGOVE)	0.9986	<0.0001			
Prob. F < 0.0001	R-SQ = 0.9964		Adj R-SQ = 0.9961	DW = 3.008	

Explanation :

A = Significantly influences the level (α), α = 1 - 5 %

D = Significantly influences the level (α), α = 15 - 20 %

Table 3 shows that the R2 coefficient of determination coefficient, F test, and t test in the GOVEL equation have good criteria. Community savings have a significant effect on α = 0.05 or 5%, while Lampung private investment expenditure has a significant effect on α = 0.20 or 20%. The results of the estimation of a positive parameter on Lampung private investment expenditure shows a positive relationship with the Lampung provincial government expenditure. The results of the estimation of negative parameters on community savings show a negative relationship to the expenditure of the Lampung Province government.

Analysis of short-term elasticity in Lampung private investment expenditure and community savings has an inelastic value. In long term, Lampung private investment expenditure has an elastic level of elasticity. This in general has the understanding that Lampung Province government spending has almost no potential to decrease or tends not to change in the short or long term.

Table 4. Estimated Results of the Parameters of the Lampung Province Export Demand (XDL) for the 1982-2016 Period

Explanatory Variable		Prob. T		Elasticity	
				Short Term	Long Term
	Estimated Parameter		Real Level		
Interception	-1264319				
Exchange Rate (NT)	68.756	0.0751	B	0.04	0.06
Import Expenditures (IML)	0.9887	<.0001	A	0.69	1.05
Growth of the Gross Regional Domestic Product of Lampung Province (GPDRBL)	134062.1	<.0001	A	0.31	0.12
Lag of Export Demand ((LXDL)	0.3426	<.0001			
Prob. F < 0.0001	R-SQ = 0.9961	Adj R-SQ = 0.9956		DW = 1.262	

Explanation :
A = Significantly influences the level (α), α = 1 - 5 %
D = Significantly influences the level (α), α = 6 - 10 %

Table 4 shows that the R2 coefficient of determination coefficient, F test, and t test in the Lampung Province Export Demand (XDL) equation has good criteria. The exchange rate, import expenditure, and growth of the Lampung Province Gross Regional Domestic Product (GPDRBL) significantly influence the level of α = 0.05 or 5%, except for the exchange rate at α = 0.07 or 7%. The results of the estimation of positive parameters on the exchange rate, import expenditure, and GPDRBL show a positive relationship with XDL. Analysis of short-term and long-term elasticities on the exchange rate and GPDRBL has an inelastic value, except for import expenditure.

Table 5. Estimation Results of the Parameters of the Lampung Province Import Expenditure (IML) for the 1982-2016 Period

Explanatory Variable		Prob. T		Elasticity	
				Short Term	Long Term
	Estimated Parameter		Real Level		
Interception	-3744519				
Exchange Rate (NT)	-291.218	0.0135	A	-0.22	-0.25
Lampung Gross Regional Domestic Product (PDRBL)	0.4898	0.0001	A	1.60	1.85
Lag of Import Expenditures (LIML)	0.1346	0.2719			
Prob. F < 0.0001	R-SQ = 0.9564	Adj R-SQ = 0.9520		DW = 2.016	

Explanation :
A = Significantly influences the level (α), α = 1 - 5 %
D = Significantly influences the level (α), α = 6 - 10 %

Table 5 shows that the coefficient of determination coefficient R^2, F test, and t test in the Lampung Province Import Expenditure equation (IML) has good criteria. The exchange rate and Lampung Regional Gross Domestic Product (PDRBL) significantly influence the IML at the level of $\alpha = 0.05$ or 5%. The results of the estimation of positive parameters on the exchange rate and GRDP show a positive relationship with the IML.

Analysis of short-term and long-term elasticity on the exchange rate has an inelastic value, whereas in the short-term and long-term PDRBL has an elastic level of elasticity. This has the understanding that IML has no potential to decline or tends not to change in the short term, but changes in the long term (Table 5).

Table 6 shows that the coefficient of determination coefficient R^2, F test, and t test on the Money Demand equation (MDL) have good criteria. Growth in public savings, inflation, and import expenditure significantly affected MDL at the level of $\alpha = 0.06$ or 6%, except for interest rates and disposable income growth at $\alpha = 0.44$ or 44%. The results of the estimation of positive parameters on the growth of public savings, inflation, import expenditure, and disposable income growth show a positive relationship with MDL. The results of the estimation of negative parameters on interest rates show a negative relationship with MDL.

Table 6. Estimation Results of the Parameters of the Lampung Province Demand for Money Demand (MDL) for the 1982-2016 Period

Explanatory Variable	Estimated Parameter	Prob. T	Real Level	Elasticity Short Term	Long Term
Interception	-13130000				
Interest Rate (IR)	-61287.2	0.4334	-	-0.010	-0.230
Disposable Income Growth (GDI)	140541.8	0.4007	-	0.010	0.220
Community Savings Growth (GSAV)	202.5498	0.0452	A	0.004	0.170
Inflation (INF)	619114.2	0.0622	B	0.030	1.330
Import Expenditures (IML)	3.8674	0.0612	B	0.170	7.230
Lag of Money Request (LMDL)	0.9770	<.0001			
Prob. F < 0.0001	R-SQ = 0.9965	Adj R-SQ = 0.9957		DW = 1.191	

Explanation :
A = Significantly influences the level (α), α = 1 - 5 %
D = Significantly influences the level (α), α = 6 - 10 %

Analysis of short-term and long-term elasticities on interest rates, disposable income growth, and growth in public savings have an elastic level of elasticity. This has the understanding that the demand for money in the Province of Lampung has no potential to decline or tends not to change in the short or long term. Inflation and expenditure on imports have an elasticity level that is inelastic in the short term, but has an elastic level in the long term (Table 6).

3.2.Model Validation Results

Model validation aims to determine whether the resulting model is valid used in simulations. ndicators used to assess whether a model is valid or not are *Root Mean Square Error* (RMSE), *Root Mean Square Percent Error* (RMSPE), and *U-Theil (Theil's Inequality Coefficient)*. Expected RMSE, RMSPE, and U-Theil values are small which is close to zero.

Table 7. Model Validation Results in Lampung Province Research

Endogenous Variable		Validation Statistics		
		RMSE	RMSPE	U-Theil
PDRBL	= Gross Regional Product of Lampung Province	1217190	6.2771	0.0226
KONL	= Consumption of Lampung Province Communities	163351	1.2689	0.0053
INVL	= Lampung Private Investment Expenditures	110176	2.8188	0.0126
GOVEL	= Lampung Government Expenditures	82641.2	2.0129	0.0119
XDL	= Export Demands from Lampung Province	2046484	41.7314	0.0768
IML	= Lampung Province Import Expenditures	1319358	34.5707	0.0712
MSL	= Total Money Supply in Lampung Province	10188125	13.0840	0.0219
MDL	= Money Demands for Lampung Province	10188125	13.0840	0.0129

Table 7 shows the results of validation with criteria that meet the requirements are RMSPE value <100 and U-Theil values on all endogenous variables <0.20. Pindyck and Rubinfield (2008) say that the U-Theil value <0.20 shows that the model does not experience systematic bias, the model precisely replaces the variation of the dependent variable, and the simulation error fluctuates due to random. The predicted results of the model have met the statistical criteria so that the model is declared valid in the simulation.

The simulation result in Table 8 shows an increase in tax value of 10% has the effect of reducing the Gross Regional Product of Lampung Province (PDRBL) by 0.03%, thereby reducing disposable income. Decreasing disposable income reduces consumption of Lampung Province by 0.03%. The decrease in PDRBL has the effect of reducing INVL by 0.01%, export products by 0.06%, import spending by 0.05%, and money demands by 0.01%. Thus, a tax increase of 10% is enough to burden the people of Lampung so that it affects long-term economic growth.

The simulation result in Table 8 also shows an increase in government spending by 10% has an effect on increasing GDP by 2.6%, increasing consumption of Lampung Province by 0.04%, INVL by 0.59%, export products by 3.81%, import spending by

Table 8. Simulation Results of the Effects of Increasing Taxes and Expenditure in Lampung Province Government

Endogenous Variable	Simulation Value of Tax Increase (TAX) and Government Expenditure (GOVEL)			
	TAX Up 10%		GOVEL Up 10 %	
	(Nilai)	(%)	(Nilai)	(%)
Gross Regional Product of Lampung Province (million IDR)	-7517	-0.03	492726	2.06
Consumption of Lampung Province Communities (million IDR)	-4353	-0.03	5721	0.04
Lampung Private Investment Expenditures (million IDR)	-358	-0.01	23466	0.59
Lampung Government Expenditures (million IDR)	000	000	---	---
Export Demands from Lampung Province (million IDR)	-6449	-0.06	384962	3.81
Lampung Province Import Expenditures (million IDR)	-3682	-0.05	241318	3.33
Total Money Supply in Lampung Province (million IDR)	-20000	-0.01	930000	0.54
Money Demands for Lampung Province (million IDR)	-20000	-0.01	930000	0.54

3.33%, and money demands by 0.54%. Thus, a tax increase of 10% is enough to burden the people of Lampung, thus affecting long-term economic growth.

4. CONCLUSION AND SUGGESTION
4.1. Conclusion
Lampung Provincial Government expenditure is a driving factor that provides a stimulus to the development of private investment, increased exports and imports, and consumption of the people of the Province. This is also shown by the Lampung Province Gross Regional Domestic Product and the money supply.

4.2. Suggestion
Suggestion and implication of Lampung Provincial Government's policy is to continue to increase Government spending to increase the economic growth of Gross Regional Domestic Product in line with efforts to increase the fiscal future of the province.

REFERENCES

Arsyad. L. 1999. Ekonomi Pembangunan. Edisi Keempat. STIE YKPN, Yogyakarta.

Badan Pusat Statistik. 1991. Produk Domestik Bruto atas Harga yang Berlaku Menurut Lapangan Usaha 1987 - 1990. Badan Pusat Statistik, Jakarta.

----------------------------. 1998. Produk Domestik Bruto atas Harga yang Berlaku Menurut Lapangan Usaha 1992 - 1996. Badan Pusat Statistik, Jakarta.

--------------------------. 2012. Produk Domestik Bruto   atas Harga yang Berlaku Menurut Lapangan Usaha 1997 - 2011. Badan Pusat Statistik, Jakarta.

--------------------------. 2017. Produk Domestik Bruto   atas Harga yang Berlaku Menurut Lapangan Usaha 2012 - 2016. Badan Pusat Statistik, Jakarta.

Badan Pusat Statistik Provinsi Lampung. 2017. Produk Domestik Regional Bruto Provinsi Lampung Menurut Lapangan Usaha. Badan Pusat Statistik Provinsi Lampung, Lampung.

Intriligator. M., R. Bodkin and C. Hsiao. 2003. Econometric Models, Techniques, and Applications. Second Editions. Prentice-Hall International, Inc.

Jhingan M.L. 2000. Ekonomi Pembangunan dan Perencanaan. P.T. Raja Grafindo Persada. Jakarta.

Koutsoyiannis, A. 2000. Theory of Econometrics: An Introductory Exposition of Economic Methods. Second Edition. The MacMillan Press Ltd, London.

Koutsoyiannis, A. 2013. Modern Microeconomics. Macmillan, London.

Mankiw. N.G. 2006. Macro Economics. Sixth Edition. Worth Publisher, New York.

Pindyck. R.S. and Rubinfeld. D.L. 2008. Econometric Models and Economic Forecast. Fourth Edition. Irwin McGraw-Hill. New York.

Samuelson. P.A., dan Nordhaus. 1997. Makro Ekonomi, Edisi Keempatbelas. Erlangga, Jakarta.

Sukirno. S. 2000. Makro Ekonomi Modern : Perkembangan Pemikiran dari Klasik hingga Keynesian Baru. Raja Grafindo Pustaka, Jakarta.

Todaro. M.P. and S.C. Smith. 2011. Economic Development. Addison-Wisley. New York.