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Research Article

The Effect of Corporate Income Tax on Investment in Japan

Reny Andriati[1]*, Aan Andriatno[2]

[1]Badan Pusat Statistik, Takushoku University, 35122, Indonesia
[2]Badan Pusat Statistik, Sekolah Tinggi Ilmu Statistik, 35122, Indonesia

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**Corresponding author:*
E-mail:
andriarey@gmail.com

ABSTRACT

The purpose of this research is to analyse and examine the effect of corporate income tax on the investment in Japan from 1987 to 2016. It is an associative-causal research. The secondary data are taken form International Monetary Fund, International Financial Statistics and data files using World Bank. The hypotheses were tested by using the multiple linear regression analysis. The results of this research showed that, simultaneously, corporate income tax rate and interest rate have highly significant effect on investment. After the research is conducted and it was analysed with partial test, corporate income tax rate negatively affects investment in Japan. It is highly recommended that Japan government should reduce the corporate income tax on companies so that there will be more investment in Japan.
JEL Classification: E22, H32

Keywords*: corporate income tax, investment, multiple linier regressions*

Background

The effect of corporate income taxes on investment and entrepreneurship is one of the central questions in both public finance and development. This effect matters not only for the evaluation and design of tax policy, but also for thinking about economic growth. Japan has been experiencing the protracted stagnation and liquidity trap since a decade ago. Japan owes to both weak growth in real GDP and low inflation, or even deflation. (Akram, 2019) Japan needs to raise productivity and increase the supply of labour and capital outputs. The government needs to induce Japanese corporations to invest in Japan. Japan has recognized the importance of attracting investment as a means of revitalizing its economy and stimulating growth. This has prompted Japan to work on developing favourable conditions to promote investment by decreasing its corporate income tax rates over three decades.

Corporate Taxes are a crucial factor when deciding to invest. However, the inflow of investment is attracted not only by tax factors but also by several other factors such as macroeconomic stability. The inflow of Investment brings several benefits in particular by way of economic growth, infrastructure, human resources, technological development, and employment. The sensitivity of investment to tax varies depending on the conditions of the country, the tax policies of the companies and the

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period of time in analysis. It also depends mainly on the conditions of the country, the investment policies established there, types of industry, and commercial activity covered. In response to the phenomena, this research will assess the effect of corporate income tax on investment in Japan from 1987- 2016 using interest rate as control variable of investment.

Methods

Economists and policymakers have long been concerned about the effects of business taxation and investment incentives on the equilibrium capital stock and the timing of investment. (Hassett & Hubbard, 1996) Corporate tax rates are also negatively correlated with growth, and positively correlated with the size of the informal economy. The results are robust to the inclusion of controls for other tax rates, quality of tax administration, security of property rights, level of economic development, regulation, inflation, and openness to trade. (Djankov, Ganser, & McLiesh, 2010)

The study evaluated the impact of corporate income tax on investment in Nigeria also examined the significant relationship corporate income tax and investment. Findings reveal that corporate income tax has a negative impact on Investment and so does Interest rate. (Adejare & Akande, 2017). Study in United States estimates the investment, financing, and pay out responses to variation in a firm's effective corporate income tax rate. These estimates suggest that lower corporate tax rates and faster accelerated depreciation each stimulate a similar increase in investment, per dollar in lost revenue. (Ohrn, 2018; Akram, 2019)

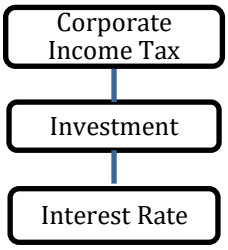
The investment function is a summary of the variables that influence the levels of aggregate investments. It can be formalized as follows:

I=f(r,ΔY,q) ; where r is the real interest rate, Y the GDP and q is Tobin's q.

The signs under the variables simply tell us if the variable influences investment in a positive or negative way (for instance, if real interest rates were to rise, investments would correspondingly fall). (Mankiw, 2017)

The most important provisions of corporate taxation are the corporate income tax and the investment tax credit. The corporate income tax is a tax on corporate profits. Corporate tax rates are also negatively correlated with growth, and positively correlated with the size of the informal economy. The effect of a corporate income tax on investment depends on how the law defines "profit" for the purpose of taxation. In periods of inflation, replacement cost is greater than historical cost, so the corporate tax tends to understate the cost of depreciation and overstate profit. As a result, the tax law sees a profit and levies a tax even when economic profit is zero, which makes owning capital less attractive. For this and other reasons, many economists believe that the corporate income tax discourages investment. (Mankiw, 2017)

Research framework:



The interest rate as controlled variable in this research. Studies have revealed that interest rate is a communal controlled variable for investment.

Data Resources

This research uses secondary data obtained from International Monetary Fund, International Financial Statistics and data files using World Bank data from 1987-2016 of Japan.

Multiple Linier Regression

This research of investment function used Multinomial Linier Regression to perform its model. Model is made to detect corporate income tax effect on investment in Japan. Notation of investment model can be written as follows:

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \varepsilon_t$$

with t = 1987, 1988, …., 2016

The regression analysis that will be carried out in this research is:
Yt: Value of key parameter investment (US$) in Japan on year t. Investment is the sum of the purchases on newly produced capital, changes in business inventories referred to as inventory investment, and the purchases of new residential housing.
X_{1t}: The rate of corporate income tax paid on year t in Japan. Corporate income tax is a tax based on profits or an assessment levied by a government on the profits of a company.
X_{2t}: The rate of interest rate on year t in Japan. Interest rate is the price of a loan, or in other words, the amount borrowers pay for a loan and the amount that lenders receive for the savings. Interest rate is a control variable in this research which has high correlation with investment.

ε_t: Error assumed with independent and normal distribution N (0, σ^2).

Based on the description above, assumed the general linier model for investment:

$$\text{Investment} = \beta_0 - \beta_1 \text{interestrate} + \beta_2 \text{tax} + \varepsilon_t$$

Parameter Estimation

The general equation of the Multiple Linear Regression model is (Gujarati, 2004):

$$Y_i = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \ldots + \beta_p X_{pt} + \varepsilon_t$$

With t = 1, 2, 3, …., n

A time series analysis is started by building a design matrix, which can include current and past observations of predictors ordered by time.

$$\begin{bmatrix} Y_1 \\ Y_2 \\ \cdots \\ Y_p \end{bmatrix} = \begin{bmatrix} 1 & X_{11} & \ldots & X_{p1} \\ 1 & X_{12} & \ldots & X_{p2} \\ \ldots & \ldots & \ldots & \cdots \\ 1 & X_{1n} & \ldots & X_{pn} \end{bmatrix} \begin{bmatrix} \beta_0 \\ \beta_1 \\ \cdots \\ \beta_p \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \cdots \\ \varepsilon_n \end{bmatrix}$$

Y = X β + ε

If these state in the estimation of parameters in the model, namely $\hat{\beta}_0, \hat{\beta}_1, \ldots, \hat{\beta}_p$ as $\hat{\beta}$, then:

$$\hat{\beta} = \begin{bmatrix} \hat{\beta}_0 \\ \hat{\beta}_1 \\ \ldots \\ \hat{\beta}_p \end{bmatrix}$$

Estimation of parameters in the model can be done using the normal equation matrix approach as follows:

$$X^{'} X \hat{\beta} = X^{'} Y$$

These normal equations can be solved in the following way:

$$(X^{'} X)^{-1} (X^{'} X) \hat{\beta} = (X^{'} X)^{-1} (X^{'} Y)$$

Then, apply ordinary least squares (OLS) to the multiple linear regression model:

$$\hat{\beta} = (X^{'} X)^{-1} (X^{'} Y)$$

Result

Diagnostic test

Linearity

The level of investment in the economy is sensitive to changes in the prevailing interest rate. Because a high interest rate makes borrowing more expensive, the quantity of loanable funds demanded falls as the interest rate rises'; and 'a high interest rate makes saving more attractive, the quantity of loanable funds supplied rises as the interest rate rises'. Conversely, if interest rates are low, investment increases. This inverse correlation is shown in the scatter plot below, to illustrate the relationship between the interest rate and investment.

The scatter plot shows linier inverse relationship between investment and interest rate. An explanation of how the rate of interest influences the level of investment in the economy explains as higher interest rates reduce investment, because higher rates increase the cost of borrowing and require investment to have a higher rate of return to be profitable.

Corporate Income Tax is a tax based on profits, so the impact of on Corporate Income Tax investment depends on definition of "profit". The legal definition uses the historical price of capital. If price of capital rises over time, then the legal definition understates the true cost and overstates profit, so firms could be taxed even if their true economic profit is zero. Figure 2 illustrates that there is linier inverse relationship between investment and corporate income tax. Thus, corporate income tax discourages investment.

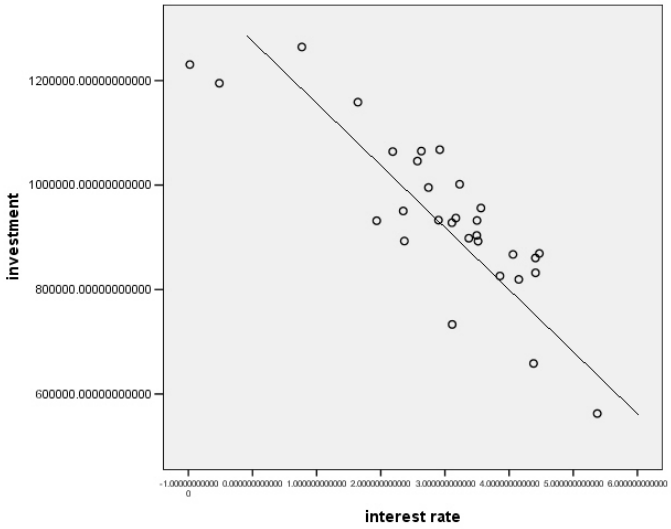


Figure 1. The relationship between investment and interest rate in Japan, 1987-2016

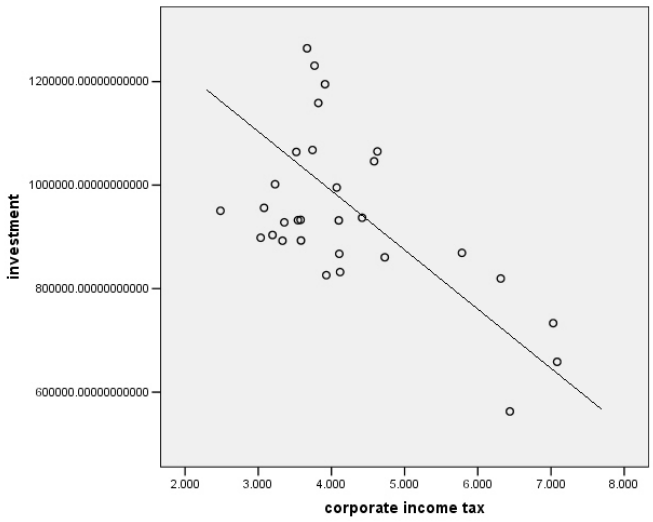


Figure 2. The relationship between investment and corporate income tax in Japan, 1987-2016

Multicollinearity Test

Multicollinearity is a significant issue when research uses more than one autonomous variable to foretell a predictor variable. Variance inflation factors (VIF) was checked to detect multicollinearity problem in the model. If value of VIF higher than five and tolerance level is less than 0.2, then it shows that presence of multicollinearity problem which needs to be corrected. From the result, it can be concluded that both interest rate and coorporate income tax have VIF value of 1.176 which is less than 5, as a result no multicollinearity assumption is fulfilled.

Table 1. Collinearity Test of Variables

Model	Collinearity Statistics	
	Tolerance	VIF
(Constant)		
[1]corporate income tax	.850	1.176
interest rate	.850	1.176

Normality of Residuals Test

Selection for normality is an essential initial step when piloting multiple linier regression, as residuals are customarily distributed as expected (E(ε)=0). Non-normal produces biased standard errors. If the value of significance is larger than alpha (0.05), then the normality of residual test assumption is fulfilled. From both Shapiro-Wilk test and Kolmogorov-Smirnov tests of normality the values of significance are larger than alpha, as a result the normality assumption is fulfilled.

Table 2. Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Residual	.142	30	.127	.954	30	.214

a. Lilliefors Significance Correction

Homoscedasticity

The next assumption to check is homoscedasticity by plotting the predicted values and residuals on a scatterplot and performing Breusch-Pagan test. Heteroscedasticity leads to a bias in test results due to distortion of standard errors, thereby increasing the probability of committing hypothesis testing errors. The homoscedasticity is fulfilled because the picture does not show an obvious pattern and all points equally distributed above and below zero on the X axis, and to the left and right of zero on the Y axis.

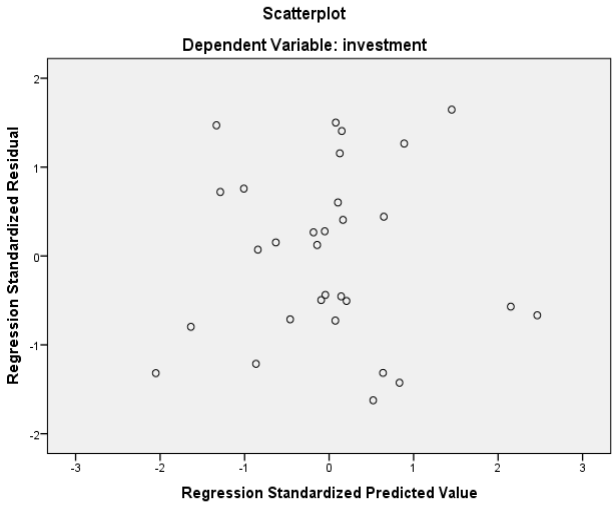


Figure 3. A plot of standardized residuals versus standardized predicted values

A state of homoscedasticity of Breusch-Pagan test is when the p value is higher than 0.05. The conclusion is that the homoscedasticity is fulfilled.

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------- Breusch-Pagan and Koenker test statistics and sig-values --------
                          LM       Sig
Breusch-Pagan          1.322     .516
Koenker                2.844     .241

Null hypothesis: heteroscedasticity not present (homoscedasticity)

if sig-value less than 0.05, reject the null hypothesis
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No Autocorrelation

Autocorrelation violates the assumption of instance independence. In time series, it generally occurs due to sluggishness or inertia within the data. The Durbin Watson test detects the presence of autocorrelation. The DW-stat 1.253 is in no auto correlation region, so there is no autocorrelation between disturbances.

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.886(a)	.784	.768	74582.63268184950000	1.253

Investment Model

Table 4. Analysis of Variance and Partial Test of The Model

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	546147186402.4	2	273073593201.2	49.091	.000[a]
Residual	150189365639.4	27	5562569097.756		
Total	696336552041.8	29			

Table 5. Simultaneous Test of Model's Coefficient

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1342031.134	52290.246		25.665	.000
corporate income tax	-37527.867	12689.145	-.287	-2.957	.006
interest rate	-81755.455	10790.221	-.734	-7.577	.000

From these results, the variables interest rate and income corporate tax are jointly significant since the F-statistics has a probability value (0.000) that is less than alpha (0.05). This suggests the investment model that has the variables interest rate and income corporate tax. The partial test of independent variables shows that the interest rate and income corporate tax affect the investment in Japan partially because the probability value for each variable is less than alpha (0.05). They are 0.000 and 0.006 respectively. This final model is reported in the equation below, with the entire variable in the model are statistically significant with the R2 value of 0.784. The R2 value of 78.4% means, in Japan Investment can be predicted by variable interest rate and tax very well, while the other factors affect the investment besides interest rate and tax describe only 21.6% as predictor of investment.

$$\text{Investment} = 1342031 - 81755.5\text{IR} - 37527.9\text{CPI}$$

From Japan's model of investment, it can be concluded, that if interest rate increases by one percent, investment will decrease by 81,755.5 dollars and if income corporate tax increases by one percent, investment will decrease by 37,527.9 dollars. These estimates suggest that lower corporate tax rates and lower interest rate each stimulate an increase in investment, per dollar in lost revenue.

Discussion

The Effect of Corporate Income Tax on Investment

Corporate income tax rate has inverse relationship with investment in Japan. The principal corporate income tax measure is the

effective tax rate that company pays if it complies with its Japan's laws, defined as the actual corporate income tax owed by the company relative to pre-tax profits. The changes in tax policy will have a measurable impact on investment behaviour in Japan. Firms maximize profits by optimizing on output and price. Taxes on pure profits or economic rents do not distort a firm's choice of output, and thus do induce distortions or efficiency losses. In practice, since pure profits and economic rents are difficult to measure, taxes are levied on accounting profits. Corporate tax as currently applied is not a tax on pure profits or economic rents. Consequently, the corporate tax in its current form does distort economic decision making, which can reduce overall economic output corporate income tax rate applied to all corporate income with no write offs of any kind apart from economic depreciation. Tax is assessed on total profits in pursuance to audited accounts which are subjected to adjustments. Adjusting profits and economic rents to derive investment equations yield is economically important short-run and long-run on tax policy decisions to promote fiscal redistribution of income.

To be remembered that the corporate income tax is the third-largest source of Japan revenue, although substantially smaller than the individual income tax and payroll taxes. Given the positive economic effects of a lower corporate tax rate, Japan governments should avoid viewing the corporate income tax as a potential source of raising additional revenue. Raising the corporate tax rate would walk back one of the most significant pro-growth provisions in the tax policy and reduce the global competitiveness of Japan. The lowered corporate tax rate makes Japan a more attractive place for companies to locate investments and will discourage profit shifting to low-tax jurisdictions. The lower rate encourages new investments that will increase productivity and lead to higher levels of output, employment, and income in the long run. By permanently lowering the corporate tax rate, lawmakers succeeded in making Japan a more globally competitive location for new investment, jobs, innovation, and growth.

Conclusion

The outcome research in Japan illustrates that the higher the corporate income tax, the lower the level of Investment. It is highly recommended that Japan government should reduce the corporate income tax on companies and work on how corporate income tax would be minimized that the government may accommodate more investment in Japan. Pursuing a monetary policy that would reduce interest rate and tightening corporate income tax, would significantly stimulate investment. The lowered corporate income tax rate makes Japan a more attractive place for companies to locate investments and stimulates economic growth from many dimensions.

Japan has a prime standard of living, very high life expectancies, social stability, low levels of crime, and low unemployment rate. However, Japan has experienced low investment, low growth, and even deflation. The declining Japan's population and ageing population has been aggravated the economy growth condition. The Abenomics which stands for accommodative monetary policy, fiscal actions, and structural reforms have mixed results to the expectation. Low interest rate policy could have some harmful effects on the private sector's interest income, business confidence and economic activity, therefore low corporate income tax would generate more investment in Japan.

Investment is requested to upsurge productivity so that the expectation of economic growth would happen. The Japanese authorities should become more receptive to new ideas, engage in policy experiments, and judiciously weigh the balance of evidence to determine the course of action. The country's history demonstrates that the Japanese people can achieve common goals under able and resolute leadership. The government should set goals and implement actions that serve the Japanese people and the rest of the world by fostering higher growth and realizing the inflation target.

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