IS PUBLIC DEBT NEUTRAL? EVIDENCES FOR INDONESIA[1)]

Arti Adji[2)]

ABSTRACT

"Jer basuki mawa bea". *There is no such thing as a free lunch. Government-like other economic agents-has to finance its* expenditures, *now or later. "Oikos nomos",-Greek words from which the word economics came from is the essence of government activities in managing its budget. The topic of this paper concerns with the way the government finances its budget and its effects on economic activity. Specifically, this paper is aimed to test empirically whether the Ricardian equivalence or a public debt neutrality holds in Indonesia. The longrun analysis of an error correction representation suggests that the timing of taxation does not matter, implying that the government can conduct mix-finance fiscal policy. Furthermore, test for rationality conducted in this paper shows the evidence of rational consumers-one of the assumptions underlying the Ricardian hypothesis to hold.*

I. Introduction

The way the government finances its expenditures determines the macroeconomic performance. One of macroeconomic studies concerning the public expenditures financing is the Ricardian Equivalence Theorem/Proposition. This proposition is named after David Ricardo, a British economist who was the first to deliver this idea. Ricardo asserted that, "in point of economy, there is no real difference in either the modes-taxation versus issuance of public debt..."(O'Drisco// Jr, 1977, p. 208). The so called Ricardian equivalence theorem states that for a given

---

[1)] "This paper is written based on the author's thesis titled, *"Pendekatan Ekuiualensi Ricardian, Studi Kasus di Indonesia"*, under the supervision of Dr. Insukindro, MA, Gadjah Mada University, Yogyakarta, Indonesia, January, 1994.

[2)] The author is indebted to Dr. Insukindro, MA, who has given numerous constructive comments, suggestions, and, most of all, "the art" of arranging a thesis.

path of government expenditures, substitution of debt for taxes will have no impact to the level of aggregate demand throughout the economy. Under a set of specific circumstances, it actually makes no difference to the level of aggregate demand throughout the economy if the government finances its outlays by debt or by taxation *(Leiderman,* 1988, p.2; Hague, 1988, p. 318). This idea has been reviewed and elaborated on by Harvard economist, Robert Barro. According to the Ricardian equivalence proposition, present tax cut would not stimulate aggregate demand because consumers would *realize* that future tax increases would be required to meet the interest payment on the public debt. Consumers would consider today's tax cut as an increase in future taxation. Therefore, the government cannot regard public debt financing as anything other than delayed taxes *(Barro,* 1974, p. 1095; *Parkin and Bade,* 1982, p. 497; Hall and Taylor, 1988, p. 311;).

The Ricardian equivalence proposition has received a great deal of attention during the last decade because of the existence of large fiscal deficits in industrial as well as developing countries. Large budget deficits are thought to create higher real interest rates, lower capital formation and slower economic growth in industrial countries. Besides, large budget deficits in developing countries are expected to create an increase in external indebtedness. (Euans, 1985, p. 68; Hague, 1988, p. 318; Johnson, 1992; p.142; Champ and Freeman, 1994, p. 208). Since external funds became limited, developing countries have to conduct fiscal policy in order to reduce their external dependancy. This required reduction in external funding has attracted inquiries into the chances of fiscal policy such as issuance of government bonds when the expensive external funds became a scarcity. In order to maintain economic growth in the future when external funds is probably still limited and expensive, it is necessary to determine whether the needed increase in savings would improve funds allocation. If the Ricardian equivalence holds, total saving would remain unchanged in the face of increased public savings (Hague, 1988, p. 318).

Fiscal policy in Keynesian model states that a tax cut would lead to increased spending by individuals. Therefore, expansionary fiscal policy could lead to an

increase in output. If agents regard the issuance of government bonds as net wealth, there might be an increase in aggregate demand. In that case, the timing of taxation does matter.

However, that line of thought has been rejected by the Ricardian approach to budget deficits. It is argued that a tax cut today does not affect the agent's ability to consume. Lower tax today means higher tax rate in the future. Why would consumers consume more if there is no change in their lifetime income? An agent would ask who will pay the increase in future taxation that service the present public debt issuance. If the burden of an increase in future taxation belongs to the agent, the present tax cut is no longer an increase in wealth. In this case, the timing of taxation does not matter.

If the Ricardian equivalence does not hold, the public debt produce a burden on future generation by reducing their capital stock. It means that the government who conducts fiscal deficits shifts some of the burden of current government expenditures to future generation. (Hague, 1988, p.318, Dornbusch, 1991, p. 611-622).

Is the Ricardian equivalence approach applicable in Indonesia? The aim of this paper is to test empirically whether the Ricardian equivalence holds in Indonesia. As well as in other developing countries, the economic agents in Indonesia have not effectively been involved in the activities of buying bonds. The phenomenon of imperfect capital market is considered as one of the constraints. However, the idea of issuance of government bonds as an alternative of financing government outlays is likely to occur recently (see for instance Kompas, March, 20, 30, and April 3, 1993). The issue raised here is that' whether the Indonesian households sector is sensitive to the substitution of debt-financed for tax-financed expenditures. In section II, the theory underlying the Ricardian approach is delivered. Section III sketches the estimation procedures as well as the statistical issues of the time series properties. Section IV performs the empirical results. The conclusions are presented in Section V.

II. The Ricardian Equivalence Theorem

The theoretical framework is provided by a discussion of the Ricardian theory. The Ricardian model contains a specific set of circumstances, namely, the assumptions of lumpsum taxation, farsighted and rational individuals, lack of liquidity constraints, and the existence of intergenerational transfer *(Barro,* 1974; *Carmichael,* 1982; *Aschauer,* 1985; *Barsky et* a/., 1986; *Brown,* 1988; Evans, 1988; *Scarth,* 1988; *Barro,* 1989; *Bernhelm,* 1989; Bayoumi, 1990; Breeder *and Winder,* 1992; Bohn, 1992; *Sealer,* 1993)'.

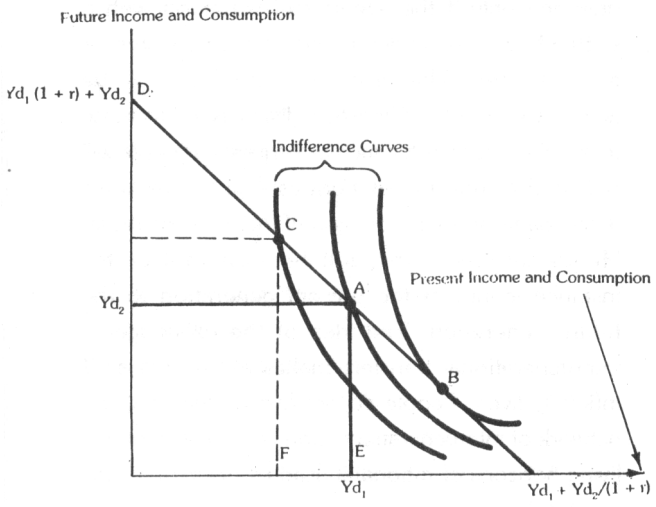
There is no such thing as a free lunch. Government expenditures must be paid now or later. The government can finance its outlays either by taxing or by borrowing. According to the Ricardian or debt neutrality theory, it makes no difference how government spending is financed. Given a path of government expenditures, a present tax cut accompanied by a rising debt issuance would have no impact to macroeconomic performance. The government is able to increase its revenue by issuing more debt. However, the government is not able to do so unlimitedly since issuance of public debt means commitment to interest payment which exactly compensates the revenues obtained from the open market operation. Therefore, an individual can think of issuing debt as simply delaying the bad day of increasing future taxation. Rational economic agents would think that the increasing government bonds must be repaid in the coming period. The agents, therefore, would raise their saving funds as a reservation to meet future tax obligations.

The government debt, therefore, is nothing but a deferred taxation. In this view, agents are assumed to exclude government bonds from their wealth. On the one hand, public debt is seen explicitly as a promise of future interest payment from the government. On the other hand, it is regarded implicitly as a promise of an increase in future taxation that is required by the government to meet the need of the interest payment *(Parkin and Bade,* 1982; p. 497; *Leiderman and* Some economists argued that Ricardian equivalence is an unappealing proposition because of the fact that people do not live forever. Hence, people do not care about the increased future taxes

that are probably levied after the end of their living horizon. In the model of finite horizon, people only care about taxes that are levied on them during their planning horizon. This model of finite horizon seems to create an increase in aggregate consumption or a reduced total savings. However, the result occurs only and only if the agents feel better off *with* a shifted future tax burden levied on their children or grandchildren. The result does not occur if the agents are altruistic. Altruistic individuals will increase their voluntary transfer such as bequests. Parents will adjust the amount of bequests given to their descendants as an anticipation of future tax increase. Hence, altruism, through bequest motive for instance, connects the present generation to the future generation. The idea of the existence of intergenerational transfers makes the agents as if infinitely lived. People do not live forever, but the network of intergenerational transfers creates infinite living horizons of rational individuals (Barro, 1989, p. 41-43).

Figure 1 describes the Ricardian equivalence hypothesis. The figure assumes that there is only two periods of planning horizon: the present period represented by the horizontal axis and the future period represented by the vertical axis. The individual's present income is expected to be Yd_1 and the future one is expected to be Yd_2. Point A represents the endowment point. The maximum the agent can consume in the first period is represented by point $[Yd_1+Yd_2/(1+r),0]$ and $[0, Yd_1 (1+r) + Yd_2]$ in the second period; where r denotes the rate of interest. Point B shows the circumstances where an agent is borrowing against future income to permi current consumption to exceed present income. In the Ricardian world, if the government raises taxes today to retire some government bonds, agents will regard this policy as means of substituting current taxes for future ones. The policy does not alter the agents' consumption decisions although it does alter the endowment point, say from A to C. The present value of the overall income stream or the budget constraint position does not change. Agents still choose to consume at point B. They simply do more borrowing now than before.

Figure 1:
The Ricardian Equivalence



The Ricardian equivalence does not hold if agents are constrained by liquidity. An individual is said to be liquidity-constrained if her or his budget constraint has a kink at the endowment point as a result of a higher rate of interest faced when she or he borrows than that is received when she or he lends. This difference is thought to occur especially because some individuals have only human wealth the present values of the individuals' expected future labor income. The commercial banking institutions would consider this human wealth as a bad collateral. The vertically kinked budget constraint faced by an individual is an extreme case in which the individual cannot borrow at all. The initial budget constraint for this agent is represented by line DAE. After the implementation of government fiscal policy of raising taxes today, the budget constraint is depicted by line DCF. Originally, the agent is at a corner solution (point A); she is now moving to point C. Hence, for an individual facing the vertically kinked budget constraint, the issuance of government bonds accompanied by a current tax cut does produce an increase in current consumption expenditures *(Scarth,* 1988, p. 106).

Deviations from Ricardian equivalence also occurs if taxes are not lumpsum. Consider the occurence of current income tax cut. In this case, issuance of public debt

change the timing of income taxes, and hence, affect individuals' motivation to work in different periods. Assume there are only two periods, the first (t) and the second period (t+1). Consider a case where the government implies fiscal deficits accompanied by current income tax cut in the first period. Furthermore, the government is assumed not to increase the number of the outstanding public debt and increase the rate of tax in the second period. Since the tax cut only applies to income, individuals are motivated to work more in the first period and less in the second period. Since the tax cut does not apply to expenditures, desired total saving increases in the first period and decreases in the second period. Therefore, there exists a non-Ricardian result in the world of non-lumpsum taxation. In a non-Ricardian world, budget deficits would crowd out capital formation (Barro, 1989, p. 46; Champ *and Freeman*, 1994, p. 211).

In the world of Ricardian, deficit does not crowd out capital. Assume that the debt created at the first period t will not be repaid by taxing generation in the future, but by taxing the old at the second period t+1. Under this assumption, the tax to repay the debt is levied on the generation that enjoys the tax reduction. This case will be discussed by comparing two fiscal proposals-Proposal 1 and Proposal 2-that yield the same level of government outlays per young individual g_t. In Proposal 1 each individual of generation t automatically pays a tax equal to g, goods when young. In this proposal, all government outlays are financed by taxation. The government does not need to issue any government bonds. In Proposal 2, no taxes are levied on the generation when young. Yet, the government outlays are financed by issuance of government bonds bt equal to gt goods per young individual. These bonds are then retired with interest by a tax on the old at the second period t+1. For government bonds pay the gross rate of return r, the tax levied on each old individual equals to the amount of rb,. The lifetime budget constraint in general is (Champ and *Freeman*, 1994, p. 211-212):

$$(1)\quad c_{1,t} + \frac{c_{2,t+1}}{r} \leq y_1 - \tau_{1,t} + \frac{y_2 - r_{2,t+1}}{r}$$

y_1 = goods available when the generation is young
y_2 = goods available when the generation is old
c_1 = consumption plan in the first period
c_2 = consumption plan in the second period
r = rate of interest
τ = tax

In Proposal 1, the lifetime budget constraint is:

$$(2)\quad c_{1,t} + \frac{c_{2,t+1}}{r} \leq y_1 - g_t + \frac{y_2}{r}$$

In Proposal 2, the lifetime budget constraint is:

$$(3)\quad c_{1,t} + \frac{c_{2,t+1}}{r} \leq y_1 + g_t + \frac{y_2 - rg_t}{r}$$

The above equations show that the lifetime budget set is the same under the two proposals. The deficit-financed tax cut does not change the wealth of the generation because the increase in income from the tax cut when young is exactly offset in present value by the reduction in income from the tax to retire the bonds. Generation t pays for the entire government outlays in both proposals. The fact that the generation is taxed to pay for the retirement of the bonds does not affect the generation's wealth. Since wealth is the same with or without the deficit, individuals will choose the same level of consumption in the first and the second period of life. Individuals do not consume any part of the increase in disposable income when young. Rather, they save the entire tax cut as a reservation of the forthcoming tax increase that will be required to pay off the government bonds. By saving the whole increase in disposable income, the individuals will have just right amount of money to pay the increase in taxes when old. Does the deficit crowd out capital formation?

Consider that saving equals capital k plus bonds b. Changes in savings must equal the sum of changes in capital and government bonds:

$$(4) \quad s_t = k_t + b_t \Longrightarrow ds_t = dk_t + db_t$$

Bonds rise by the same amount of the increase in disposable income. The entire tax cut is saved, so that there is no change in capital. Hence, the interest rate or the marginal product of capital does not change. In addition, the desire to save rises by exactly the amount of the fiscal deficits, so that the government did not need to offer a higher interest rate in order to induce agents to hold its bonds. There is no crowding out of capital. Therefore, the fiscal deficit run by the government does not alter real variables such as aggregate consumption or capital. These circumstances are referred to as the Ricardian Equivalence Theorem.

III. The Model and the Time Series Properties

In this study, the basic model that will be estimated to test the Ricardian hypothesis is modified from those used by *Feldstein* (1982), Kormendi (1983), *Aschauer* (1985), and *Lelder-man and Blejer* (1988):

$$(5) \quad C_t = \alpha_0 + \alpha_1 Y_t + \alpha_2 G_t + \alpha_3 T_t + \alpha_4 B_t + \mu_t$$

C = private consumption
Y = national income
G = government expenditures
T = government tax revenues
B = public debt
μ = error term
subscript $_t$ denotes time period.

The null hypothesis for the Ricardian equivalence to hold is a3 = a4 = 0. The data used is Indonesian annual data: 1971-1992 *(International Financial Statistics, Yearbook 1992, Bank Indonesia Annual Report, and Anggaran Pendapatan dan*

Belanja Negara *1992/1993).* Before estimating the regression equation, statistical issues of the time series analysis will be discussed.

The purpose of time series analysis is to study the dynamics or temporal structure of data. A long time ago, there was a little communication between those who focused on econometric theory and those who focused on time series theory. Econometricians have focused on economic theory and a study of relationship between variables at a point of time (contemporaneous relationship), while time series analysts have focused on the behaviour of data. Time series analysts thought that it was better to let the data determine the model. They did not believe in economic theories. On the other hand, the econometricians did not consider the temporal structure of data. Theories were imposed on the data even when the dynamics of the data did not conform the theories. Since the middle of 1970s these two approaches have been converging. Nowadays, econometricians analyze the temporal structure of the data to check the specification of the model, while time series studies have been influenced by some economic theories *(Maddala,* 1992, p. 526).

In line with the convergence of the time series and the econometric approaches, this study will use both approaches to analyze the data. In other words, the behaviour of data will be analyzed before estimating the parameters.

Until recently, econometric theory has been based on the assumption that the underlying data processes are stationary (Hendry, 1986, p. 201). Recent research on regression with non-stationary variables has important implications for dynamic specification and the estimation of the longrun *(Wlckens* and *Breusch,* 1988, p.202). Test of unit root will be conducted in this study to find whether the data are stationary. Autoregressive time series with a unit root have been the subject of much recent attention in the econometric literature since the unit root hypothesis is of considerable interest in applications, not only with data from financial and commodity markets where it has a long history, but also with aggregate time series *(Phillips,* 1987, p. 277). The result of the unit root test is presented in Table 1.

Table 1.
Test of Unit Root

Variables	DF	ADF
C	1.91	-1.13
Y	2.18	1.60
G	-1.39	-2.04
T	0.51	-0.81
B	0.37	-1.21

C = private consumption (billion of Rp, 1985=100)
Y = gross domestic product (billion of Rp, 1985=100)
G = government expenditures (billion of Rp, 1985=100)
T = government tax revenues (billion of Rp, 1985=100)
B = public debt (billion of Rp, 1985=100)

Table 2.
Critical Values with the Null Hypothesis of A Unit Root Existence

Degree of Significance	DF	ADF
1%	-3.75	-4.38
5%	-3.33	-3.95
10%	-3.00	-3.60
20%	-2.63	-3.24

Table 1 and 2 show that all variables are non-stationary. Non-stationary variables may become stationary after the removal of a non-stochastic trend or after differencing, i.e., be trend of difference stationary *(Wickens and Breusch,* 1988, p. 202). Economists would argue that since standard statistical theory only applies to stationary series, each series must be transformed to stationarity using deterministic trends and seasonals, and/or first and seasonal differences *(Hylleberg and Mizon*, 1989, p. 113). Hence, the extension of test of unit root, namely, test of *degree* of

integration is conducted *(Granger,* 1986; *Engle and Granger,* 1987; *Insukindro,* 1990; *Insukindro,* 1992). The result is shown on.Table 3.

Table 3.
Test of Degree of Integration

Variables	DF	ADF
C	12.12	14.81
Y	13.74	16.29
G	11.18	14.28
T	4.39	4.71
B	13.51	16.54

The finding shows that all series are integrated of order one {I(1)}. At the least sophisticated level of economic theory, lies the belief that certain pairs of economic variables should not diverge from each other by a great extent, at least in the longrun. Such variables may drift apart in the shortrun but if they continue to be too far apart in the longrun, economic forces such as government intervention or market mechanism will bring them together toward equilibrium again. If variables x_t and y_t are I(1) but walk together in the longrun, it is necessary that z_t the difference between x_t and $Æy_t$; *Æ* is the cointegrating parameter be I(0) as otherwise x_t and y, will drift apart. For a pair of I(1) variables, cointegration is a necessary condition for the ideas of the tendency of an economic system to move towards a particular region of the possible outcome space to hold *(Granger,* 1986, p. 214-216).

If each element of a vector time series x_t achieves stationarity after differencing, a linear combination $\alpha' x_t$ is stationary, then x_t is said to be cointegrated with cointegrating vector a. *Engle and Granger* (1987) interpret $\alpha' x_t = 0$ as the longrun equilibrium relationship between the elements of x_t *(Wickens and Breusch,* 1988, p. 203). A test for cointegration can be thought of as a pre-test to avoid spurious regression situations *(Granger,* 1986, p. 227).

In this study, the cointegration test is started by estimating the cointegrating regression in order to obtain cointegrating regression durbin watson (CRDW). Table 4 below shows the result.

Table 4, shows that the calculated CRDW is larger than its critical value. It gives an approximation that there exists a longrun equilibrium relationship. However, CRDW is only used as a rough guide. Following *Fry* (1991), the next step is to run cointegration test conducted without trend and constant. Table 5 shows the result of the test and the Mc-Kinnon critical values,

Table 4.
The Cointegrating Regression

Dependent Variable: LC

Variables	Coefficient	t-stat
Constant	1.68	4.86
LY	0.80	7.09
LG	0.02	0.23
LT	-0.04	-0.72
LB	0.04	1.49
R squared	= 0.9952	
Adjusted R squared	= 0.9941	
CRDW	= 1.5914	
CRDW (critical value)	= 0.386	
LX = log (X)		

Table 5.
Cointegration Test without Trend and Constant: Mc-Kinnon Critical Values

DF (calculated)	-5.8040
Mc-Kinnon critical values	
1%	-6.0975
5%	-5.1161
10%	-4.8517

The finding shows that there exists a longrun equilibrium relationship among the variables in the system at 5% confidence level. So far, we have discussed the time series properties econometrically. Beside analyzing the temporal structure of the data in a modern manner, this study also conducts a traditional way of studying the dynamics of the data by implementing the Simple Two Variables Table *(Insukindro* et al., 1994). The Simple Two Variables Table is presented below:

Table 6.
The Simple Two Variables Table

First Difference	Marginal Propensity	Standard of Deviation (sd)	t-stat
dC=2911.2126	MPC=0.6913	sdMPC=0.1561	19.8052
dY=5574.6818			
dG= 544.7275	MPG=0.1386	sdMPG=0.0338	18.3384
dT= 685.3992	MPT=0.2931	sdMPT=0.2869	4.5688
dB= 198.1379	MPB=0.0669	sdMPB=0.1228	2.4364

dX = Xt - Xt-1
MPX = dX/dY; X = the variable in question
t stat = MPX/(sdX/√n); n = number of observations

The average values of the first difference of each variables are positive integers. It implies that the series are walking together in the same direction. The fact tells us that in the longrun, the variables in the system tend to move together toward equilibrium. This result is in line with the result obtained by the modern procedure. The finding also shows that individually, consumption, government outlays, tax, dan public debt are influenced by national income.

One of six implications of cointegration drawn by Granger is the existence of Granger causality (Hendry, 1986, p. 209). If x_t, y_t are I(1) and cointegrated, there must be Granger causality in at least one direction, as one variable can help forecast the other (Granger, 1986, p. 218).

The topic of causality is important in economics *(Gujarati,* 1988, p. 546). In this paper, a statistical test of causality proposed by Granger is conducted. Granger starts from the premise that the future cannot cause the present or the past. If consumption occurs after taxation, consumption cannot cause taxation. However, if consumption occurs before taxation, it doesn't necessarily imply that consumption causes taxation. Do movements in consumption precede movements in taxation, or does the latter precede the former, or are there contemporaneous movements?. This is the purpose of Granger causality (Maddala, 1992, p. 393).

Table 7 shows the results of the Granger causality test. The results suggest that the direction of causality is from Y to C, G to C, T to C, and B to C since the estimated F values are significant at the 5% level. On the other hand, there is no feedback or reverse causation from C to Y, C to G, C to T, and C to B since the calculated F values are not statistically significant. Therefore, the basic model that will be estimated by ordinary least squares would not be suffering from simultaneous equation bias since the behaviour of data shows that there exists unidirectional causality from a set of independent variables (Y, G, T, B) to dependent variable C.

Table 7.
Granger Causality

Null Hypothesis	F-stat	Probability
C is not Granger-caused by Y	9.3812	0.0064
Y is not Granger-caused by C	0.0015	0.9695
C is not Granger-caused by G	2.7106	0.0880
G is not Granger-caused by C	0.3210	0.8101
C is not Granger-caused by T	2.4908	0.1310
T is not Granger-caused by C	1.5246	0.2320
C is not Granger-caused by B	3.0231	0.0908
B is not Granger-caused by C	0.8519	0.1370

Because of psychological, technological, and institutional reasons, it is possible for an economic dependent variable to respond to an economic determining variable with a lapse of time. In such condition, the dynamic model is needed to portray the time path of the dependent variables in relation to the past values of the dependent as well as the determining variables. The dynamic vehicle for this analysis is the currently highly favoured error correction model (ECM). Many economic theories have proportional forms in static equilibrium, hence, error correctioon models might be expected to occur frequently. This specification encompasses models in both levels and differences, and is compatible with proportional longrun equilibrium behaviour. The fundamental spurious regression problem is circumvented through the use of appropriate differenced variables in the model, but without losing longrun information due to using differenced data only. Furhtermore, if x_t and $y_($ are cointegrated, there is a longrun relationship between them. The shortrun dynamics can be described by the error correction mechanism. This condition referred to as the Granger Representation Theorem (Hendry, *et.al.*, 1984, p. 1048; *Domowitz and Elbadawi,* 1986, p. 258-259; Eng/e and *Granger,* 1987, p. 251-276; *Gujarati*, 1988, p. 543; *Wickens and* Breusch, 1988, p. 189; *Hylleberg and Mizon,* 1989, p. 117-118; *Insukindro,* 1992b, p.l; Madda/a, 1992, p. 597). The estimation of the error correction mechanism is presented below.

Table 8.
The Estimated Error Correction Mechanism (ECM)

Dependent Variable: DLC

Independent Variables	Coefficient	t-stat
Constant	2.0222	2.4630
DLY	0.4277	2.0317
DLG	-0.0516	-0.5132
DLT	0.0100	0.0704
DLB	0.0319	1.0648
BLY	-0.3030	-1.6090
BLG	-0.8424	-3.0077
BLT	-0.9319	-3.1703
BLB	-0.8651	-3.5827
DLC(-1)	0.3036	1.8207
ECT	0.9177	3.4436

R squared = 0.8018
Adjusted R squared = 0.6037
DW = 1.98
F = 4.05

The error correction term is significantly different from zero implying the existence of an error correction mechanism. The result satisfies the Granger Representation Theorem. If the series are cointegrated, there exists an error correction representation, and if there exists an error correction representation, the series are cointegrated. Further interpretation and implication of the empirical results showed above will be discussed in the next section.

IV. Are Indonesian Consumers Ricardian? A Longrun Evidence of An Error Correction Mechanism

This study focuses on the longrun estimation. Why? The principle interest is in the longrun behaviour of a model, because that is what economic theory has usually most to say about, and because as a result, tests of theory tend to focus on its longrun properties (Wickens and *Breusch,* 1988, p. 189 and p. 203; Insukindro,

1990b, p. 1-2). The dynamic specification enables researchers to estimate shortrun as well as longrun regression coefficients components. Following *Insukindro* (1990b), consider the next error correction relationship:

(6) $DY_t = e_0 + e_1 X_t + e_2 BX_t + e_3 B(X_t - Y_t)$

The longrun relationship between Y and X can be defined as:

(7) $Y_t = f_0 + f_1 X_t$; $f_0 = e_0/e_3$; $f_1 = (e_2+e_3)/e_3$

The standard deviation of longrun regression coefficient is:

(8) $\text{Var}(f_0) = F0^T V(e_3,e_0)\, F0$

$FO^T = [df_0/de_0 \; df_0/de_3]$

$= [1/e_3 \; -(f_1-1)/e_3]$

(9) $\text{Var}(f_1) = F1^T V(e_3,e_2) F1$

$F1^T = [df_1/de_2 \; df_1/de_3]$

$= [1/e_3 \; -(f_1-1)/e_3]$

$\text{var } k_i$ = estimator of variance k_i

J = partial derivatif matrix of (6)

J^T = transpose of matrix J

$V(k_i, f_i)$ = variance-covariance matrix of parameters

We can calculate the standard deviation of longrun regression coefficients after obtaining the estimated regression coefficients and variance-covariance matrix of parameters. Table 9 below presented the longrun analysis of the error correction representation.

Table 9.
Estimated Longrun ECM

Dependent Variable: LC

Independent Variables	Coefficient	t-stat
Constant	2.2037	10.8025
LY	0.6698	2.4634
LG	0.0821	0.7240
LT	-0.0155	-0.0256
LB	0.0573	0.1069

The finding shows that the null hypothesis of the Ricardian equivalence to hold cannot be rejected by Indonesian annual data: 1971-1992. Thus, there exists a public debt neutrality in Indonesia. The Indonesian government, therefore, cannot regard bonds issuance as nothing other than delayed taxes. Debt implies future taxes with a present value equal to the value of the debt. Rational individuals, realizing the equivalence, will behave as if the issuance of public debt did not exist, resulting in the debt having no effect on economic activity. Fiscal deficit is only postponed taxes. Rational agents can see that the present discounted value of taxes does not depend on the timing of taxation. Rather, it depends on real government expenditures. Rational agents reacts to the change in future tax liabilities by altering their saving decisions (Bernheim, 1989, p. 63; Bayoumi, 1990, p. 370; Seater, 1993, p. 142).

Again, one of the assumptions underlying the Ricardian hypothesis is rational agents. There is a considerable amount of literature on what is known as a test for rationality. *John Muth* (1961) was the first who deliver the basic idea of rational expectations. Agents are said to be rational if the subjective expectation equals to the objective expectation conditional on data available. Hence, rational expectations are formed if there is a connection between the subjective beliefs of economic agents and the actual behaviour of the economic system. In this study, test for rationality is conducted by estimating the equations whose results are presented below (Madda/a, 1992, p. 431-432):

$$(10)\quad y_t - y_t^* = \underset{(2.739D\text{-}07)}{2.237D\text{-}09} - \underset{(-6.456D\text{-}07)}{6.429D\text{-}0.8}\, y_{t-1}$$

$$(11)\quad y_t - y_t^* = \underset{(-0.4848)}{-0.0023} - \underset{(-0.5671)}{0.1228}\, y_{t-1} - y_{t-1}^*$$

Rationality implies that $\alpha_1 = 0$ in both equations. The findings suggest that Indonesian consumers form rational expectations. The information contained in past forecast errors was fully utilized in forming future predictions.

Rational agents save the additional disposable income due to current tax cut to anticipate future tax increases. Holding government outlays fixed, the current tax cut is exactly offset in present value terms by higher taxes in the future. Therefore, consumption remain unchanged (Bohn, 1992, p. 588). Although the circumstances for full Ricardian equivalence, in which the households sector exactly offsets the change in government saving, are quite stringent, some degree of substitution between households and government saving seems to be likely to occur (Bayoumi, 1990, p. 370). In the world of Ricardian, debt wouldn't crowd out investment. Government deficits have no effect on growth *(Stiglitz,* 1988, p. 672; Seater, 1993, p. 178). This is the main implication of the Ricardian approach to fiscal deficits (Barro, 1974; 1989).

V. Concluding Remarks

Although theoretically, Ricardian equivalence requires too many stringent circumstances to be believable, I think it reasonable to conclude that Ricardian equivalence is strongly supported by the Indonesian annual data: 1971-1992. Equivalence appears to be a good approximation. The way the government finances its expenditures does not affect the agents' decision in managing their consumption pattern. Additionally, test for rationality implies that Indonesian consumers form subjective expectations that equal to mathematical conditional expectations. In other words, all information are utilized in predicting future values. The timing of taxation

doesn't alter the consumers' budget constraints implying unchanged consumption decision.

The government, therefore, can conduct mix-finance fiscal policy to cover its outlays. This is so because substitution of public debt for taxes will have no effect to the level of aggregate demand. Private investment wouldn't be crowded out, and economic growth wouldn't be reduced. Therefore, I suggest the recent frequently occured ideas of issuing government bonds as one of the alternatives of financing government outlays (Kompas, March, 20, 30 and April 3; MangJcusubroto, 1994) to be conducted. The empirical results obtained in this study make Ricardian equivalence an attractive model of public debt's effects on economic activity.

In this era of globalization, I suggest further research concerning the Ricardian equivalence in the field of international trade and finance. I also suggest a well-designed Ricardian equivalence model simulation using other method of analysis such as constructing a structural model.

Bibliography

Aschauer, David Alan (1985), *"Fiscal Policy and Aggre-gate Demand",* **The American Economic Review,** March, Vol. 35, p. 1 IT-127.

Barro, Robert J. (1987), **Macroeconomics,** John Wiley & Sons.

Barro, Robert J. (1974), *"Are Government Bonds Net Wealth?,* **Journal of Political Economy,** p. 1095-1117.

Barsky, Robert B., N, Gregory Mankiw, and Stephen P. Zeldes (1986), *"Ricardian Consumers with Keynesians Propensities",* **The American Economic Review,** Sept, p. 676-689.

Bayoumi, Tamim (1990), *"Saving-Investment Correlations, Immobile Capital, Government Policy or Endogenous Behaviour",* **International Monetary Fund Staff Papers,** Vol. 37, No. 2, p. 360-387.

Bernheim, B. Douglaas (1989), *"A Neoclassical Perspective on Budget Deficits",* **Journal of Economic Perspectives,** p. 55-72.

Bohn, Henning (1992), *"Endogenous Government Spending and Ricardian Equivalence"*, **The Economic Journal,** 102, **May, p. 588**-597.

Breeder, C. Den, and C.C.A. Winder (1992), *"Financing Government Spending in the Netherlands, An Analysis from Ricardian Perspective"*, **De Economist,** 140, NR, 1, p. 65-82.

Carmichael, Jeffrey (1982), *"On Barm's Theorem of Debt Neutrality: The Irrelevance of Net Wealth"*, **The American Economic Review,** March, Vo. 72, No. 1, p. 202-213.

Domowitz, lan, and Ibrahim Elbadawi (1987), *"An Error Correction Approach to Money Demand, The Case for Sudan"*, **Journal of Development Economics,** 26, p. 257-275.

Dornbusch, Rudiger and Stanley Fischer (1991), **Macroeconomics,** McGraw-Hill Inc.

Engle, Robert P., and C.W.J. Granger (1987), *"Co-integration and Error Correction: Representation, Estimation, and Testing"*, **Econo-metrica,** Vol. 55, No. 2, p. 251-276.

Evans, Paul (1985), *"Do Large Deficit Produce High In-terest Rates?"* **The American Economic Review,** p. 68-116.

Freeman, Scott, and Bruce Champ (1994), **Modelling Monetary Economics,** John Wiley & Sons Inc.

Fry, Maxwell J. (1991), *"Longrun and Shortrun Behaviour of Korea's Current Account"*, manuscript, p. 1-25.

Fuller, Wayne, A. (1976), **Introduction to Statistical Time Series,** John Wiley & Sons Inc.

Granger, C.W.J. (1986), *"Developments in the Studies of Cointegrated Economic Variables"*, **Oxford Bulletin of Econometrics and Statistics,** 48, 3, p. 231-228.

Gujarati (1988), **Basic Econometrics,** McGraw-Hill Book Company.

Hall, Robert J., and John B. Taylor (1988), **Macroeconomics Theory, Performance, and Policy,** WW Norton and Company.

Haque, Nadeem U. (1988), *"Fiscal Policy and Private Saving Sector Behaviour in Developing Countries",* **International Monetary Fund Staff Papers.**

Hendry, David F. 1986, *"Econometric Modelling with Cointegrated Economic Variables: An Overview",* **Oxford Bulletin of Economics and Statistics, 48, 3.**

Hendry, David F, AR Pagan dan S. Sargan (1984), *"Dynamic Specification",* **Handbook of Econometrics,** p. 1023-1095, Elsevier Science Publishers BV.

Hylleberg, Svend, and Gragham E. Mizon, 1989, *"Cointegration and Error Correction Mechanism",* **The Economic Journal, 99, p. 113-**125.

International Financial Statistics, Yearbook 1992. International Financial Statistics, August 1993.

Insukindro (1990), **The Short and Long-term Determinants of Money and Bank Credit Markets in Indonesa,** Ph.D. thesis, University of Essex, UK, unpublished.

Insukindro (1990), *"Komponen Koefisien Regresi Jangka Panjang Model Ekonomi: Sebuah Studi Kasus Impor Barang di Indonesia",* **Jurnal Ekonomi dan Bisnis Indonesia,** No. 2 Vol V, BPFE-FE UGM, Yogyakarta, p. 1-11.

Insukindro (1992), *"Cointegration: Practical Application and Poblems",* a paper presented in **Seminar Seton,** Faculty of Economics, Gadjah Mada University, Yogyakarta, Indonesia, February, 29, p. 1-21.

Insukindro (1992), "Dynamic *Specification of Demand for Money: A Survey of Recent Development",* **Jurnal Ekonomi Indonesia, p. 8 - 23.**

Insukindro, Wihana Kirana Jaya, and Anggito Abimanyu (1994), *"Perilaku Neraca Transaksi Berjalan Indonesia: Suatu Tinjauan Analisis Runtun Waktu",* manuscript, Inter Universities Centre, Gadjah Mada University, December.

Kompas, March, 20, 1993. Kompas, March, 30, 1993. Kompas, April, 3, 1993.

Leiderman, Leonardo and Mario I. Blejer (1988), *"Modelling and Testing Ricardian Equivalence, A Survey"*, **International Monetary Fund Staff Papers, p. 1-35.**

Maddala, G.S. (1992), **Introduction to Econometrics,** MacMillan Publishing Company, 1992.

Mangkusubroto, Guritno (1994), **Kebijakan Ekonomi Publik di Indonesia.**

O'Driscoll, Gerald P. (1977), *"The Ricardian Non-equivalence Theorem"*, **Journal of Political Economy,** p. 207-215.

Parkin, Michael and Robin Bade (1982), **Modern Macroeconomics,** Philip Allan Published Limited, Oxford, UK.

Phillips, P.C.B. (1986), "Time Series Regression *with A Unit Root",* **Econometrica,** 33, p. 311-340.

Scarth, William M. (1988), **Macroeconomics: An Introduction to Advanced Methods,** Hartcourt Brace Jovanovich.

Seater, John J. (1993), "Ricardfan *Equivalence",* **Journal of Economic Literature,** Vol. XXXI, March, p. 142-190.

Wickens M.R., and T.S. Breusch (1988), "Dynamic Speci/ication, *The Longrun and the Estimation of Transformed Regression Models",* **Economic Journal,** 98, p. 189-205.