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# TESTING FOR RICARDIAN EQUIVALENCE IN INDONESIA

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***Abstract***

*There are competing "views" on the economic effects of debt finance. One view argues that tax and debt finance have identical effects on various economic measures, a view sometimes termed "Ricardian Equivalence". However, this "Ricardian view" remains controversial, with other views (the "Keynesian view" and the "Neoclassical view") concluding that debt finance is likely to have significant impacts on consumption, interest rates, and the current account. Empirical tests of these competing views, conducted mainly for developed countries, have failed to generate much consensus, and there are few studies for developing countries, especially a developing country that is heavily dependent on natural resources (e.g., oil). This paper provides a battery of empirical tests on the effects of government debt finance in one developing country, Indonesia. We focus on three empirical tests: effects on consumption, on interest rates, and on the current account balance. We find, across virtually all of our time series tests, that Ricardian Equivalence does not hold; that is, the predictions of the Ricardian paradigm are consistently and strongly rejected by most of our estimation results. The only results that tend to give some support to Ricardian Equivalence are those that recognize the importance of oil in the Indonesian economy. Even so, our results generally indicate that debt finance will increase the interest rate, will increase current consumption at the expense of future consumption, and will retard exports and stimulate imports through currency appreciation.*

***Keywords:*** *Ricardian equivalence; co-integration; error-correction estimations.*

**JEL Classifications:** *C91; E21; H31; H61*

## 1. Introduction

The effects of government debt finance on the economy havelong been the subject

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of much debate. As summarized by Leiderman and Blejer (1988), Bernheim (1989), Seater (1993), perspectives on the economic effects of debt (and deficit) finance can be usefully classified into three "views".[3] The "Neoclassical view" predicts that deficit spending will increase the interest rate and crowd out private investment, so that the burden of government bonds issued in the current period will be shifted at least partially to future generations; a deficit may also increase current consumption at the expense of future consumption, and retard exports and stimulate imports through currency appreciation. In the "Keynesian view", individuals who are either myopic or liquidity constrained will have a high propensity to consume out of current income.An increase in disposable income generated by a tax cut that is financed by borrowing will have an immediate and positive impact on aggregate demand, and, if unemployment exists, aggregate income will increase further via the usual Keynesian multiplier effects.

In contrast, the "Ricardian view" concludes that debt and tax finance of government spending are equivalent. Under the assumptions of infinite horizons, perfect capital markets, certainty of future income, altruistically and intergenerationally linked households, and non-distortionary taxes, Barro (1974) has shown that tax and debt finance will have the same effects on the economy because individuals will regard an increase in debt now as equivalent to an increase in taxes in the future. Consequently, current consumption will not be affected (as individuals will save any increase in income due to the replacement of tax finance with deficit finance), current interest rates will not be affected (as the decrease in government saving due to debt is replaced by an equal increase in private saving), and the current account will not be affected (as exports, imports, and exchange rates will be unaffected).This view is termed "Ricardian Equivalence", after David Ricardo who first suggested this equivalence two hundred years ago.

Empirical tests of the Neoclassical/Keynesian/Ricardian views have often been performed by examining directly the *assumptions* necessary for Ricardian equivalence to hold (e.g., infinite horizons, perfect capital markets, and so on).There are also more indirect tests of the *predictions* of the Ricardian paradigm, for instance whether aggregate consumption, interest rates, and current account balances are unaltered by public debt.These empirical tests give wildly different results, or at least wildly different interpretations of the empirical tests. Bernheim (1989) writes that "[t]he Ricardian paradigm should be dismissed on theoretical grounds, as well as on the basis of indirect behavioral evidence". In sharp contrast, Seater (1993)concludes that, although it is nearly impossible for Ricardian equivalence to hold exactly in theory, it may still be a reasonably "close" description of the world.

However, nearly all of this empirical literature is for developed countries, and the prevalence of empirical tests for developing countries is much more limited.[4]The

3 Recall that the "debt" is a stock variable that represents the accumulated amount, or stock, of annual budget "deficits".

4 The empirical literature is enormous, and it cannot be cited in any detail. For earlier surveys, see Leiderman and Blejer (1988), Bernheim (1989), and Seater (1993); for more recent surveys, see Ricciuti(2003) and Hebous (2012). Studies of developing countries are limited but increasing. For example, see Afzak (2012) for Pakistan, Sulbaran (2013) for Venezuela, Prazmowski (2014) for Venezuela, and Belingher and Moroianu (2015) for Romania. To our knowledge, there are no tests of Ricardian equivalence for Indonesia.

purpose of this paper is to provide a battery of empirical tests on the effects of deficits in one developing country, Indonesia. Indonesia is a country with 250 million people spread over 17,500 islands, and it has some features that make examination of the debt paradigms especially interesting, such as its heavy reliance on natural resources (e.g., oil) and the likely presence of constraints on borrowing and capital flows. Over the last 40 years, its economy has generally grown, sometimes spectacularly, but its economy was also seriously affected by the Asian financial crisis of the late 1990s. The government has often experienced large budget deficits, and government debt comprises a significant proportion of gross domestic product (GDP).

We focus on three empirical tests of the effects of deficit finance in Indonesia: effects on consumption, on interest rates, and on the current account balance. We find, across virtually all of our tests, that Ricardian equivalence does not hold; that is, the predictions of the Ricardian paradigm are consistently rejected by most of our estimation results. The only results that tend to support Ricardian equivalence are those that recognize the importance of oil in the Indonesian economy. Even so, our results are largely consistent with the Neoclassical paradigm.

## 2. The Indonesian context[5]

In this section we present some historical data from Indonesia on the main economic variables of interest. We also discuss the institutional features that have affected the evolution of these variables over time.

The modern history of Indonesia largely begins with the New Order regime of Soeharto, who came to power following the overthrow of Sukarno in the mid-1960s. Under Soeharto, the Government of Indonesia (GOI) adopted in 1969 a "balanced budget rule," in which total government expenditures were required to be covered by total government revenues that included foreign debt. Because the GOI put foreign debt under "development revenues" in the budget, the difference between government tax plus non-tax revenues and government expenditures was effectively financed by foreign debt. Despite this rhetoric, the GOI actually ran budget deficits.

Even so, debt has been a dominant part of the Indonesian economy. Per capita GOI debt and deficits are shown in Figure 1. Overall, the fiscal objective of reducing debt has not been achieved, despite the success story of the adjustment policies implemented in the late 1980s. Indeed, during the economic crisis of 1997-1999 debt skyrocketed to more than 70 percent of GDP, before gradually declining to 29 percent of GDP in 2003.

The budget has often been driven by changes in the price of oil. Figure 2 shows the movements of oil prices over time. There have been two "oil booms", one in 1973-1974 and a second from 1979-1982. In 1974, the international oil price quadrupled, creating a massive amount of windfall revenue that accrued to the government; another round of extraordinary increases in the oil price emerged in 1979-1982.During these periods

5 See Prawiro (1993) and Hill (2000) for useful discussions of Indonesia's history during recent decades.

revenue from oil played a major role in the Indonesian government budget.

Figure 3 shows the trends in government revenues (broken down by oil and gas revenues), tax revenues, and non-tax revenues as a percent of total domestic revenues. From 1974 to 1986 revenues from the oil and gas sector dominated total domestic revenues, ranging from 53 to 70 percent of total domestic revenues and peaking at 71 percent in 1981. The decline in oil prices in the mid-1980s decreased the role of oil and gas revenues, and the GOI shifted to other channels of revenue, including a 1984 tax reform that (among other measures) introduced a value-added tax (VAT). Since 1990/1991 the income tax has tended to dominate tax collections.

Figure 4 shows the trend of government expenditures and private consumption expenditures in per capita terms. Private consumption expenditures have constituted a large portion of GDP, averaging approximately 63 percent of GDP during the period 1969-2007. The proportion of government expenditures to GDP has averaged around 9 percent of GDP during 1969-2007, and has been relatively stable. Overall, real GDP grew at 6.0 percent per annum during 1970-2007, while real private consumption expenditures and real government expenditures grew by 5.1 percent and 6.1 percent, respectively.

As for the financial sector, Figure 5 shows movements in real and nominal interest rates over time. During the oil boom period of 1974-1982, the windfall revenues from oil enabled the GOI to conduct a state-led model of development. This interventionist model of development led Indonesia to experience financial repression until 1983.The collapse of oil prices in 1983 shifted the government's orientation from a heavy import substitution industry toward financial and manufacturing industries, and the government was forced to liberalize the financial sector. On 1 June 1983, the Indonesian government ended the era of financial repression. Its financial liberalization package removed the credit ceiling, and allowed the nominal interest rate to be market-determined by removing deposit and lending interest rate control, removing deposit interest rate subsidies to state banks, and reducing the subsidized credit program. A further series of financial liberalization packages followed the 1 June 1983 package.The effects of liberalization were immediate, dramatic, and largely positive (Fukuchi, 1995). In particular, a positive real interest rate was realized, and credit also expanded. However, the extraordinary growth of the money supply created inflationary pressures, and the monetary authority responded by implementing a tight money policy. The economic crisis of 1997-1999 also adversely affected the banking sector. The nominal interest rate skyrocketed to 39 percent in 1998; with inflation at about 58 percent in 1998, the result was a negative real interest rate of 19 percent. These developments also affected the exchange rate and the current account, as discussed next.

From 1971 to 1977, Indonesia adopted a fixed exchange rate by pegging the Rupiah to the U.S. dollar, with 1 U.S. dollar=415 Rupiah. Exchange rate stability was accompanied by a dramatic decrease in the inflation rate, which constituted a main economic achievement of the New Order regime of the Soeharto administration. The capital account was also liberalized after 1971, and most restrictions on international transactions were eliminated. However, the cost of exchange rate stability was a

dramatic increase in the rate of inflation, and the inflation rate reached as high as 40 percent during 1973-1976. To overcome problems in the export sector and to anticipate the decline in international oil prices, the Rupiah was devalued in November 1978 to 1 U.S. dollar=625 Rupiah.

The Gulf War in 1978-1979 led to a second period of skyrocketing oil prices, followed by an expansion of monetary aggregates. A tight fiscal policy, the 1978 devaluation, and the sudden increase in international oil prices generated the first period of current account surplus; see Figure 6.However, the positive impact of devaluation quickly faded away. The Rupiah was further devalued in March 1983 to 1 U.S. dollar=Rp 970 and in September 1986 to 1 U.S. dollar=Rp 1641.After the 1986 devaluation, the fixed exchange rate system was replaced by amanaged floating exchange rate system. With the onset of the Asian economic crisis, the exchange rate was freely floated in July 1997, and the nominal exchange rate depreciated 400 percent compared to the pre-crisis level.

As shown in Figure 6, the current account balance has always been negative, except during the second oil boom period and during the post-crisis period in 1999-2003. Current account deficits and large capital inflows have largely characterized the pattern of the balance of payments.

## 3. Testing for consumption effects

This section examines the impact of government deficits on consumption. Utilizing Indonesian annual time series data, we test for the effects of debt on the aggregate consumption function and also on the Euler equation consumption function.

### *3.1. A brief digression on econometric methods and data*

We use time series data, here and in our subsequent analyses. The most common assumption with time series regressions is that the series are stationary. Granger and Newbold (1974) argue that regressions involving the levels of non-stationary data may yield misleading standard significance tests and spurious regression. Therefore, it is essential to conduct a test for the stationarity of the data. We utilize unit root tests for the stationarity of the series, especially the Augmented Dickey-Fuller (ADF) test. Also, we test for cointegration of our variables. Regressions involving cointegrated variables yield meaningful, non-spurious results, and provide long run information. However, disequilibrium may exist in the short run, and the estimated residuals from the long run cointegrating relationship can be utilized to tie the short run behavior of a variable to its long run equilibrium. The mechanism of adjustment from short run disequilibrium to a long run solution exists because individuals are assumed to be able to recognize deviations between their current position and the desired long run position. This mechanism is known as the error correction model (ECM), and represents a dynamic vehicle to bridge the shortrun disequilibrium with its long run equilibrium solution. We use these methods in most of our empirical tests here. See especially Engle and Granger (1987) for a detailed discussion.

The data cover the period 1972-2003. Data on household consumption expenditures, government expenditures, government budget deficit (surplus), government debt, gross domestic product, GDP deflator, and population are taken from *International Financial Statistics* of the Monetary Fund. Data on private credit by deposit money banks are taken from Beck, Demirguc-Kunt, and Levine (2000). All nominal variables are deflated by the GDP deflator (2000 constant price). Private credit data are only available during 1981-2003. The private consumption variable should exclude purchases on durables and should include imputed services on the stock of consumer durables; due to the unavailability of data on durables and its imputed services, household consumption expenditure is used as the proxy for consumption. The income variable should include only labor income after taxes; since data on labor income are also not available, real GDP is used as the proxy for income. Table 1 presents descriptive statistics.

### *3.2. Estimating the aggregate consumption function*

Following the approach pioneered by Feldstein (1972) and Kormendi (1983), we estimate the aggregate consumption function using equation (1):

$$C_t = \beta_0 + \beta_1 Y_t + \beta_2 G_t + \beta_3 T_t + \beta_4 B_t + \beta_5 Credit_t + u_t \quad (1)$$

where the subscript *t* denotes the period and where *C* is real per capita private consumption expenditures, *Y* is real per capita gross domestic product, *G* is real per capita government expenditures, *T* is real per capita tax revenues, *B* is real per capita net government debt, *Credit* is real private credit per capita, and *u* is a white noise error term. Most of these variables are standard explanatory variables in the aggregate consumption function approach. Note that we expect consumers to be liquidity constrained in making their consumption choices in Indonesia, and the variable *Credit* proxies for the presence of liquidity constraints. We also include in some specifications a dummy variable to capture the effect of the economic crisis (*Crisis*), equal to 1 for the period 1997-1999 and 0 otherwise, and also a dummy variable to reflect the 1984 tax reform (*TaxReform*), equal to 1 after 1984 and 0 otherwise. Under Ricardian equivalence, we expect $ß_2 < 0$ and$ß_3 = ß_4 = 0$.

Table 2 presents our basic estimates. Our tests for unit roots indicate that all series are integrated of order one. The Breusch-Godfrey LM test suggests that there is no serial correlation, and cointegration tests are conducted to test for stationarity. The residuals are integrated of order zero, although each individual variable is integrated of order one and the linear combination among them is stationary, indicating the presence of cointegration. This finding implies the existence of a long run equilibrium relationship among the variables.

As shown in Table 2, net government debt significantly affects private consumption expenditure; that is, government debt affects private consumption, invalidating Ricardian equivalence. Also, the coefficient on government expenditures is significantly positive, again invalidating Ricardian equivalence, and the magnitude and the positive association between government expenditures and private consumption

suggest the strong complementarity between them. This finding can be explained by the fact that during the observation period the government subsidized basic private goods such as electricity, fuel, fertilizer, and education, goods that complemented private consumption bundles. In the early period of economic development in the late 1960s and early 1970s, 30 percent of the government budget was allocated for agriculture and irrigation and 20 percent was allocated to road rehabilitation to facilitate farmers' access to agricultural input and output marketing. During the oil bonanza, approximately 10 percent of the budget was allocated for the Presidential Instruction grants (*InstruksiPresiden*, or*Inpres*) for local governments at county*(kabupaten)*and municipal (*kota*) levels, grants that were earmarked for infrastructure, education, and health. In the 1980s, about 40 percent of the budget was allocated to energy, transportation, and education. In the 1990s, routine expenditures dominated the total budget.

The presence of liquidity constraints may cause consumption to have an excessive sensitivity to income (Baxter and Jermann,1999). Indeed, our estimates show that GDP has a very significant impact on private consumption expenditures, signaling the presence of excess sensitivity of private consumption to changes in GDP. An increase of GDP per capita by Rp 1 billion will increase consumption expenditures by Rp 0.57 billion. This magnitude does not change much when private credit is included in the estimation.

The coefficient on tax revenues is less than zero, although insignificant. Also, private credit does not affect private consumption, although its sign is positive asexpected. The insignificant nature of private credit perhaps can be rationalized by noting that most loans are made for investment rather than for consumption. The financial and capital market liberalization packages in 1983 and 1988 broadened the Indonesian financial system, and the expansion of the banking infrastructure provided financial services that have reached portions of the population that were previously excluded from the banking sector, including those in remote village areas. Villages throughout the archipelago became engaged in formal banking, since individuals were encouraged to open bank accounts.Competition among commercial banks became intense. To attract new customers, commercial banks competed to provide lotteries, gifts, or more attractive rates and fees. A lower reserve requirement enabled commercial banks to be in surplus of loanable funds, thereby increasing lending. Due to low salaries in the formal sector, employees engaged in moonlighting activities, mostly in the form of self-employment such as opening retail stores. This phenomenon may help to explain why the variable of private credit, although it has the predicted sign, fails to explain consumption behavior; that is, private credit may have been utilized more for investment than for consumption.

Table 3 presents the error-correction estimates.The estimated equilibrium error shows significantly negative signs, indicating the existence of an error correction mechanism that implies that fluctuations around equilibrium will vanish in the long run.The error correction estimates do not differ much from the cointegrating regression estimates. GDP significantly affects private consumption, a result that is consistent with a "rule of thumb" approach by consumers (Campbell et al., 1989). Similar to the cointegrating

regression results, private credit and tax revenues do not significantly affect private consumption expenditures.

### *3.3. Estimating the Euler equation consumption function*

Following Hall(1978) and Aschauer(1985), we estimate the following Eulerequation consumption functions, using the same notation is in equation (1):

$$C_t = \alpha + \beta\, C_{t-1} + \beta\, \theta\, G_{t-1} - \theta E_{t-1}\, G_t + u_t, \quad (2)$$

$$E_{t-1}G_t = \gamma + \varepsilon_1 G_{t-1} + \varepsilon_2 G_{t-2} + \omega_1 B_{t-1} + \omega_2 B_{t-2} + u_t, \quad (3)$$

where *E* is the expectation operator. Substitution of equation (2) into (3) generates:

$$C_t = \delta + \beta\, C_{t-1} + \eta_1 G_{t-1} - \eta_2 G_{t-2} + \mu_1 B_{t-1} + \mu_2 B_{t-2} + v_t, \quad (4)$$

with$v_t = (1- \theta)u_t$. For Ricardian equivalence to hold, the following restrictions are necessary:

$\delta = \alpha - \theta\gamma$
$\eta_1 = \theta(\beta - \varepsilon_1)$
$\eta_2 = -\theta\varepsilon_2$
$\mu_1 = \theta\, \omega_1$
$\mu_2 = \theta\, \omega_2$

We conduct the Wald test to examine the validity of the restrictions.Table 4 summarizes the estimation results.

The difference between the values of the unconstrained and the hypothesized estimates indicates that the restrictions of the joint debt neutrality-rational expectations hypothesis are not confirmed by the data. Aformal statistical Wald test rejects the joint restrictions at the 10 percent level (Wald statistic= 7.19).

Note also that the coefficient ($\theta$) that shows the substitutability of public spending for private consumption expenditures plays a role in explaining the behavior of private consumption. This parameter explains the degree of direct crowding out, or ultra rationality, in the extent to which the public sector can be subsumed under the private sector (Buiter, 1977). The $\theta$ coefficient is negative and significantly differs from zero at 1 percent level, whichimplies that public spending is a complement to private expenditures and so affects private consumption. Also, the coefficient $\beta$ of past consumption has significant values both in constrained and unconstrained estimations.This finding designates consumption as a random walk pattern, lending some support for the permanent income hypothesis (Campbell et al., 1989). These results are not affected by the choice of different lag lengths.

## 4. Testing for interest rate effects

In this section we estimate the impact of government debt and deficits on interest rates. Ricardian equivalence implies that government debt and deficits will not affect the interest rate; in contrast, the Neoclassical view suggests that deficits will raise the interest rate. Now for a small open economy with perfect capital mobility, theory suggests that the interest rate must equal the world interest rate, inclusive of a country-specific risk premium that captures both the perceived political risk of making loans in a country and the expected change in the real exchange rate. Consequently, it is still appropriate to investigate the effect of deficit finance on interest rates even for a small open economy.

Our estimation results also incorporate the possible impacts of oil price shocks on interest rates. We assess the implications of the oil price increase for Ricardian equivalence, examining whether windfall revenue generated by the increase in the oil price has had a permanent effect on the economy as suggested by Giavazzi, Sheen, and Wyplosz(1988). With only a few exceptions (Lee, Lee, and Ratti, 2001), previous studies have not considered the natural resource implications of oil shocks.[6]

Following the standard approach that began with Feldstein and Eckstein (1970), we estimate the determinants of the interest rate with equation (5):

$$R_t = \alpha_0 + \alpha_1 G_t + \alpha_2 B_t + \alpha_3 D_t + \alpha_4 M_t + \alpha_5 T_t + \alpha_6 Inflation_t + u_t \quad (5)$$

where $R$ is the real interest rate on three months' deposits, $G$ is the ratio of the real value of government consumption expenditures to the real value of trend GDP[7] multiplied by 100, $B$ is the real value of the ratio of the government budget deficit to the real trend GDP multiplied by 100[8], $D$ is the ratio of the real value of the stock of domestic debt and foreign debt to the real trend GDP multiplied by 100, $M$ measures of the real money supply (e.g., base money or narrow money), measured as the ratio of the real money supply to the real trend of GDP and multiplied by 100[9], $T$ is the ratio of real tax revenue to the real trend of GDP multiplied by 100, *Inflation* measures either *actual* inflation (calculated as$[(CPI_t - CPI_{t-1})/CPI_{t-1}]$) or *expected* inflation(calculated as an ARMA (2,2) process), and $u$ is a white noise error term. Government expenditures$G$, budget deficits$B$, government debt$D$, money supply $M$, and tax revenue $T$ are measured as percentages of trend real GDP. Government

6 Most of these studies use OLS estimation; some employ VAR methods. Only a few studies include government spending in the interest rate test of Ricardian equivalence. Several consider endogeneity and simultaneity issues. In many of the studies, debt and deficit variables enter the equation together. Most studies use quarterly or monthly data rather than annual data. Studies on developing country are infrequent.

7 The trend value of GDP is obtained from the Hodrick-Prescott filter procedure.

8 The deficit is calculated as the difference between revenue plus grants received, and expenditures plus lending minus repayments. Lending minus repayments consists of government lending for public policy purposes, minus repayments to government and government acquisition of equity participation for public policy purposes, and minus any sales of such equities by government.

9 We use two measures of $M$, real narrow money and real base money, both expressed in terms of trend real GDP. Narrow money is the sum of currency outside deposit money banks and demand deposits other than those of the central government; base money consists of currencies and reserves.

spending is decomposed into its temporary and permanent components. Ricardian equivalence requires that $a_2 = a_3 = 0$.

Table 5 presents descriptive statistics, and Table 6 presents our estimates of equation (5). As with the consumption estimates, it is essential first to examine the stationarity properties of the various series by testing for unit roots, using the generalized form of the ADF tests for unit roots. These tests show that all series are I(1). Note that cointegration tests indicate that the residuals from estimates of equation (5) are stationary and that the variables in the system are cointegrated, so that the results in Table 6 provide information on the long run relationships. Note also that the period of estimation varies across specifications due to data availability.

The estimates in Table 6 provide strong evidence that rejects the Ricardian view and supports the Neoclassical view. The Ricardian view predicts that deficits and debt will have no effect on interest rates and that only the level of government spending will matter. The results indicate that temporary government consumption expenditures significantly increased the interest rate during 1980-2003, while deficits and debt significantly raised the interest rate in all estimated equations during 1972-2003 and 1980-2003. These estimates suggest that an increase in debt by 1 percent of GDP generates an increase in the rate of interest by around 0.30 percent. Money variables and tax variables do not explain the movement in the interest rate, while inflation and expected inflation decrease the real interest rate.

The ECM estimates are presented in Table 7. Similar to cointegrating estimates, the shortrun dynamics reject Ricardian equivalence. Deficits and debt significantly raise the real interest rate, and temporary government consumption expenditures increase the real interest rate as well. Compared to the cointegrating solution, in the ECM estimates, base money seems to better explain the behavior of the interest rate, and base money also better explains the movement of the interest rate than narrow money does.Tax revenues remain insignificant.

In unreported results for equation (5) that use permanent government consumption expenditures instead of temporary expenditures, we find that permanent expenditures do not influence the real interest rate. This result suggests that decomposition of government spending is necessary. Even so, other variables, notably the debt and the deficit, continue to have a significant positive impact on the interest rate. In other unreported work, we estimate the interest rate function with the relevant variables expressed in billions of Rupiah rather than as the ratio to trend real GDP.Our results are unaffected, and again reject Ricardian equivalence. In still other unreported regressions, we estimate equation (5) with the addition of the price of oil (*OilPrice)*, measured as the official export price of crude petroleum (2000=100) in U.S. dollars, in order to examine the importance of resources for Ricardian equivalence. The inclusion of oil price weakens the evidence in support of the Neoclassicalview. The deficit no longer affects the interest rate, as predicted by the Ricardian view. The significance of debt in affecting the interest rate also decreases.

These results point to the crucial importance of considering oil prices (or more

generally resource endowments) for developing countries like Indonesia. Oil revenues and government debt have been an important means of government financing in the Indonesian economy. The revenue picture has been dominated by the changing relative importance of the three main aggregates: oil revenue, foreign debt, and non-oil domestic revenue (NODR). In the late 1960s, foreign government debt played a major role, providing 25 to 30 percent of government revenue. Before oil prices began to rise steeply, oil revenue contributed 10 to 20 percent of the total revenue, with the remaining 50 to 60 percent coming from NODR. Increasing oil prices in the 1970s resulted in significant changes in these shares. The share of oil almost doubled from 1971 to 1974 (from 25 to 48 percent of the total), rising further to its peak share of 62 percent in 1981. Over this period, the share of foreign debt fell to less than 20 percent, and during the early 1980s it was as low as 12 to 13 percent. Declining oil prices in the mid-1980s produced another major change in revenue composition. In 1986, oil's share in revenue had fallen to 29 percent. The share of debt to government revenue rose from around 16 percent in 1986 to 30 percent in 1988. During the oil boom, debt funded an increasingly small percentage of the development budget (e.g., the government budget that is allocated for investment expenditures). The share was 70-75 percent of the total development budget prior to initial the oil boom period,and fell to 25 percent in the boom periods in 1974 and in 1980-1982. After the oil boom, the share rose back to 70 percent. The real interest rate dropped to almost -30 percent during the oil price shock in 1974. With the nominal interest rate held constant by the central bank, the fall in the real interest rate was due to the skyrocketing inflation.

The GOI did not utilize the momentum of an increase in oil price to retire debt during the oil boom period; rather, the government appropriated the resource income by increasing public outlays, especially in the health and education sectors.The behavior of the government helps to explain the weakening of the Neoclassical results when the oil price is included in the estimation. Indeed, the reluctance to retire debt generates results that are closer to the Ricardian prediction.

## 5. Testing for current account effects

"Twin deficits" are said to exist if the government budget deficit leads to a current account deficit. The Neoclassical view predicts the prevalence of twin deficits. With a decline in national saving when the government runs a budget deficit, there will also be a decline in net exports, causing a trade deficit. However, the Ricardian view predicts that there is no association between government budget deficits and trade deficits.Individuals should respond to an increase in deficit finance by increasing private saving by an equal amount, in order to pay the future taxes necessary to pay for the debt, leaving national saving unchanged.

In a regression of the trade balance on government budget balance and other control variables, Ricardian equivalence is said to hold if the coefficient on government budget balance is not statistically different from zero. However, if the coefficient on government budget balance is statistically greater than zero, then an improvement in the government budget balance will lead to an improvement in the trade balance.

Note that interest rate tests of Ricardian equivalence, as in section 4, are complicated by international capital flows; that is, the failure to find any impact of government debt or deficits on the interest rate may be due to Ricardian equivalence, or it may be due to international capital markets that require that a small open economy faces a perfect elastic supply of capital (even with risk premia for country-specific factors).In the presence of perfectly mobile capital, a government budget deficit will have no impact on the interest rate regardless of Ricardian mechanism. A budget deficit will lead to an incipient rise of interest rate, which will generate a capital inflow from abroad and which in turn prevent the interest rate from rising. However, this mechanism, if present, has implications for the trade account. If, as a result of the capital inflow, the domestic currency appreciates, then the current account balance will deteriorate. Because of this difficulty in testing Ricardian equivalence via the interest rate only, it is important to conduct a current account test on Ricardian equivalence. In our empirical work, capital inflows are taken into account by incorporating a debt securities variable. In addition, as emphasized in section 4, oil has played a dominant role in the Indonesian economy, and the role of oil is also considered in our current account tests.

We use the two-step Engle-Granger ECM with a single lag length, which is most appropriate for the short span of the Indonesian series. We also consider the role of natural resources via the price of oil and the role of international capital flows by incorporating debt securities in the balance of payment accounts.

We specify a model of the current account based on variables that are most commonly used by existing literature in explaining the behavior of the current account. We also take into account the institutional history of the Indonesian current account (e.g., the exchange rate regime and the devaluation events) via dummy variables, and we incorporate the impact of oil via its price. Our basic model is specified in equation (6):

$$CurrentAccount_t = \alpha_1 + \alpha_2 ExchangeRate_t + \alpha_3 Budget_t + \alpha_4 OilPrice_t + \alpha_5 M2_t + \alpha_6 Inflation_t + \alpha_7 DebtSecurites_t + u_t \quad (6)$$

where *Current Account* equals exports minus imports of goods and services divided by trend GDP[10] multiplied by 100, *Exchange Rate* is the real exchange rate (2000 constant price, Rupiah/U.S. dollar)[11], *Budget* is the government budget balance (the difference between revenue plus grants received and expenditures plus lending minus repayments) divided by trend GDP multiplied by 100, *Oil Price* is the official price of crude petroleum export price (2000=100), *M2* is broad money (the sum of narrow money[12] plus quasi money[13]) divided by trend GDP and multiplied by 100, *Inflation*is the inflation rate $[(CPI_t - CPI_{t-1})/CPI_{t-1}]$, *Debt Securities* is debt securities divided by trend GDP multiplied by 100, and *u*is awhite noise error term.Under Ricardian equivalence, $\alpha_3 = 0$.

The model is estimated over the period 1969-2003, except for the estimation involving

10 As before, the trend value of GDP is obtained from the Hodrick-Prescott filter procedure.

11 The real exchange rate is computed by dividing the nominal value of Rupiah per U.S. dollar by the foreign consumer price index (U.S. CPI) over domestic consumer price index.

12 Narrow money is the sum of currency outside deposit money banks and demand deposits other than those of the central government.

13 Quasi money is the sum of time and saving deposits plus the foreign currency deposit of resident sectors other than central government.

the debt securities variable, which covers the period 1981-2003 due to data availability. The institutional history of the current account shows that Indonesia experienced a surge of capital inflows in the 1990s, and debt securities, as a proxy for capital inflows, are expected to explain the behavior of current account balances. However, debt securities data are only available from 1981. To capture the effect of the Indonesian exchange rate regime and the economic crisis, the model also includes a set of dummy variables: *Fixed Exchange Rate* represents the fixed exchange rate regime, taking the value of 0 prior to 1978 and 1 otherwise; *Devaluation1978*represents devaluation in 1978, taking the value of 1 for year 1978 and 0 otherwise; *Devaluation1986* represents devaluation in 1986, taking the value of 1 for year 1986 and 0 otherwise; and, as before,*Crisis* takes the value of 1 for the years 1997-1999 and 0 otherwise.Table 8 presents the descriptive statistics.

The main variables of interest are exports minus imports of goods and services and the government budget balance. The two series often move in the same direction during the periods of 1970-1973, 1975-1978, 1984-1987, 1991-1992, 1993-1994, and 2000-2002. Beyond those periods, they either move in the opposite direction or show no clear pattern. The balance on goods and services show huge surpluses during the oil booms in 1974-1975 and 1978-1981 and during the late 1990s and early 2000s. The government budget balance series does not show much movement. During the years 1984-1987, the goods and services balance and the government budget balance move closely together, suggesting the presence of twin deficits. This was also the period during which fiscal severity was implemented. The economy was adjusting to the decline in oil price, the government cut back some development projects, and some portion of foreign debt was due. The GOI had to pay an increasing amount of foreign debt principal repayment. During this period of adjustment to the lower oil price, the debt retirement measures partly explain the twin deficits movement. This phenomenon confirms the Giavazzi, Sheen, and Wyplosz (1988) argument that, when the government retires its debt, fiscal policy will matter to the economy, thereby invalidating the Ricardian equivalence. However, beyond 1987, the movement of goods and services balance and government budget balance is less clear.

The ADF unit root tests show the series achieve stationarity after being differenced once, or I(1).Since all series are integrated of the same order, they may also becointegrated.Table 9presents the cointegrating regressions of Equation (6), and Table 10 presents the ECM estimates.

The estimates in Table 9 are generally, though not universally, supportive of the Neoclassical view. An increase in government budget balance or a decrease in the budget deficit will significantly increase the trade balance by about one-to-one, so that a one percent of GDP increase in the budget balance will improve trade balance by one percent of GDP.This result confirms the twin deficits hypothesis of the Neoclassical view. However, when the debt securities variable is included for the shorter estimation period 1981-2003, the government budget no longer affects the balance of goods and services, suggesting some support for Ricardian equivalence. The debt securities variable seems to assume some of the explanatory power of the government budget in influencing the trade balance. If debt securities increase by 1 percent of GDP, then

thetrade balance will worsen by 1.6-1.9 percent of GDP in the long run.

Also, when the exchange rate depreciates, the current account improves. If the Rupiah depreciates by Rp 1000 per U.S. dollar, the current account balance increases by 22-29 percent of GDP.This relationship holds in all estimated periods and equations. The inflation rate does not explain the behavior trade balance during 1981-2003, and it explains only marginally the impact during 1969-2003.

The estimates in Table 9 suggest that an increase in oil price significantly improves the trade balance. An increase in oil price indices by 1 U.S. dollar will improve the trade balance by 5-10 percent of GDP. However, once again Ricardian results emerge in the 1981-2003 period, when Indonesia no longer experienced an oil bonanza. Since the GOI no longer had windfall funds to retire its debt, it appropriated the oil revenue to finance government spending. These Ricardian results may stem from the use of oil revenue to finance government expenditures. Before and after the oil boom periods, foreign debt constituted an important source of budget financing. Although the government did not appropriate majority of windfall revenues from oil to retire its debt, the importance of foreign debt in financing development budget diminished during the oil booms. During the oil booms, the government had more flexible choices in allocating the resource revenue between retiring its debt and increasing government spending. Although a huge proportion of oil revenue during the oil boom was allocated to finance huge government projects, the allocation was recorded "off-budget". The GOI did indeed increase the level of development expenditures, especially for defense, health, education, and transmigration sectors; however, the declining proportion of foreign debt in the budget shows that the government also utilized some of the oil revenues to retire its debt. This may partly explain the results that fiscal policy matters during the period where both oil boom periods (1973-1974 and 1978-1979) are included in the estimation.

As for the ECM estimates in Table 10, all of the error correction terms (*EC(t)*)are significantly different from zero, indicating the existence of error correction mechanism and implying that the *D(CurrentAccount)*, *D(Budget)*, *D(ExchangeRate)*, *D(OilPrice)*, *D(M2)*, *D(π)*, and *D(DebtSecurities)* converge to their long run equilibrium relationship. The coefficients of the error correction terms provide information on the speed of adjustment to long run equilibrium.

The ECM estimates also indicate a positive association between government budget deficits and trade deficits. This association is statistically significant for all estimated equations. An increase in government spending will decrease national saving and will induce a trade deficit due to the need of investment financing from abroad. If the government budget balance increases by 1 percent of GDP, then the trade balance will improve by around 0.72-0.79 percent of GDP for the period 1970-2003. However, as with the long run results, the magnitude of the association diminishes when debt securities are included in the estimation during 1982-2003. If the budget balance rises by 1 percent of GDP, then the trade balance will increase by around 0.41-0.46 percent of GDP for the period 1982-2003. Depreciation in the exchange rate will also improve the trade balance. If the real exchange rate increases (or the Rupiah depreciates) by

Rp1000 per U.S. dollar, then the trade balance will improve by around 19-25 percent of GDP, a relationship that holds in all estimated equations.

Finally, the trade balance was slightly lower by 2 percent of GDP during the fixed exchange rate regime. The devaluation in 1978 improved the trade balance by 5.8 percent of GDP in the short run. However, the devaluation in 1986 seems to have worsened the trade balance; however, that 1986 was also the year when oil price collapsed, which generated a large trade deficit.

## 6. Conclusions

Overall, the Ricardian equivalence proposition is not supported by the data. Nearly all – although not all – of our results provide support for the Neoclassical view of debt and deficits, regardless of whether we focus on consumption, interest rate, or current account effects. Even so, some weak support for the Ricardian view is sometimes found, typically when the estimation period is shorter and especially when the role of oil in the Indonesian economy is considered.

For example, our estimates of the aggregate consumption function reject Ricardian equivalence, and are consistent with "rule-of-thumb behavior" of consuming current income, designating the excess sensitivity of consumption to income. Our Euler equation results also reject the parameter restrictions necessary for the joint hypotheses of rational expectations and debt neutrality, although the Euler equation estimates lend some support for the random walk pattern of consumption behavior. Similarly, our interest rate estimates indicate that, when the oil price is excluded in the interest rate function estimation, deficits and debt significantly increase the real interest rate, invalidating Ricardian equivalence and supporting the Neoclassical hypothesis. However, when the oil price is included as one of interest rate determinants,an increase in the oil price significantly lowers the real interest rate, and helps generate results that provide some support for the Ricardian paradigm. Finally, our estimation results generally lend support for the "twin deficits" hypothesis rather than for Ricardian equivalence.

These results are largely consistent with the conclusion that fiscal deficits will impose significant long run costs on an economy. Deficit spending can help stabilize an economy that is at less than full employment in the short run, as argued by the Keynesian view. However, in the long run, our results suggest that deficits will lead to reduced capital formation, lower productivity, and reduced economic growth. These issues remain fruitful topics for future research, especially given the world-wide recession that began in the United States in 2007 and its possible impacts on developing countries.

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**Table 1.** Descriptive statistics for consumption function (Rupiah billions per 1 million population)

| | Real Consumption Per Capita | Real GDP Per Capita | Real Government Expenditures Per Capita | Real Tax Revenues Per Capita | Real Net Debt Per Capita | Real Budget Deficit Per Capita | Real Private Credit Per Capita |
|---|---|---|---|---|---|---|---|
| Mean | 45.314 | 72.568 | 13.662 | 11.362 | 0.595 | -0.406 | 14.455 |
| Maximum | 106.850 | 160.140 | 29.679 | 24.083 | 3.848 | 1.459 | 33.072 |
| Minimum | 21.831 | 29.291 | 4.608 | 3.645 | -0.751 | -1.829 | 2.485 |
| Standard Deviation | 21.813 | 31.595 | 5.647 | 4.472 | 0.777 | 0.663 | 9.363 |
| Skewness | 1.504 | 1.239 | 1.237 | 1.073 | 2.032 | 0.691 | 0.487 |
| Kurtosis | 4.382 | 3.898 | 4.175 | 4.171 | 10.989 | 3.803 | 2.122 |
| Jarque-Bera | 14.615 | 9.257 | 10.007 | 7.970 | 107.112 | 3.404 | 1.646 |
| Observations | 32 | 32 | 32 | 32 | 32 | 32 | 23 |
| Period | 1972-2003 | 1972-2003 | 1972-2003 | 1972-2003 | 1972-2003 | 1972-2003 | 1981-2003 |

**Table 2.** Cointegrating regressions of aggregate consumption function

| **Dependent Variable: Private Consumption** | **1972-2003** | **1981-2003** |
|---|---|---|
| **Constant** | -1.3745 | -7.6559 |
| [t-statistic] | [-0.6135] | [-2.8840] |
| **Gross Domestic Product** | 0.5693*** | 0.5264*** |
| [t-statistic] | [7.9070] | [5.7086] |
| **Government Expenditures** | 1.2352**** | 1.5163**** |
| [t-statistic] | [2.4467] | [2.4339] |
| **Tax Revenues** | -0.8625 | -0.6393 |
| [t-statistic] | [-1.6508 | [-1.0610] |
| **Government Debt** | -2.8554** | -2.2164* |
| [t-statistic] | [-2.5651] | [-2.0581] |
| **Private Credit** | | 0.0901 |
| [t-statistic] | | [0.6972] |
| **R-squared** | 0.9727 | 0.9823 |
| **F-statistic** | 240.3271*** | 188.8010*** |
| **Prob (F-statistic)** | 0.0000 | 0.0000 |
| **Durbin-Watson statistic** | 1.2703 | 1.8895 |
| **LM Test** | 1.8311 | 0.5601 |
| **Prob. (LM Test)** | {0.1811} | {0.5826} |

***, **, and * denote significance at 1 percent, 5 percent, and 10 percent, respectively.

**Table 3.** Error correction regressions of aggregate consumption function

| Dependent Variable: Private Consumption | 1972-2003 | 1981-2003 |
|---|---|---|
| **Constant** | 0.5280 | 0.6011 |
| [t-statistic] | [0.5490] | [0.8545] |
| **D(Gross Domestic Product)** | 0.4503*** | 0.4337*** |
| [t-statistic] | [6.3285] | [5.8541] |
| **D(Government Expenditures)** | 0.5813 | 1.2002* |
| [t-statistic] | [0.9534] | [2.1056] |
| **D(Tax Revenues)** | 0.3036 | 0.1647 |
| [t-statistic] | [0.4408] | [0.2164] |
| **D(Government Debt)** | -1.6624** | -2.0503** |
| [t-statistic] | [-2.1189] | [-2.5791] |
| **D(Private Credit)** | | -0.2015 |
| [t-statistic] | | [-0.9610] |
| **EC1(-1)** | -0.6224*** | |
| [t-statistic] | [-3.2523] | |
| **EC2(-1)** | | -1.0556*** |
| [t-statistic] | | [-4.2714] |
| **Crisis** | 5.3284* | |
| [t-statistic] | [1.9929] | |
| **Tax Reform** | -1.6134 | |
| [t-statistic] | [-1.1928] | |
| **R-squared** | 0.9155 | 0.9392 |
| **F-statistic** | 35.6173*** | 38.6459*** |
| **Prob (F-statistic)** | 0.0000 | 0.0000 |
| **Durbin-Watson stat** | 2.2662 | 1.8833 |
| **LM Test** | 1.9930 | 0.0215 |
| **Prob. (LM Test)** | 0.1612 | 0.9788 |

Note: ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent, respectively; EC(1) and EC(2) are residuals terms from the regression in columns 1 and 2 of Table 3; D( ) denotes first difference operator.

**Table 4.** Estimation of the Euler equation consumption function for n = m = 2

| Constrained Coefficients | Unconstrained Coefficients | Hypothesized Coefficients |
|---|---|---|
| $\alpha$ = 4.1505<br>(-0.5392)<br>[0.5920] | $\delta$ = 9.0517<br>(1.5486)<br>[0.1346] | $\delta$ = 11.1617 |
| $\beta$ = 0.5753***<br>(3.8904)<br>[0.0003] | $\beta$ = 0.9649***<br>(3.5772)<br>[0.0015] | $\beta$ = 0.5753 |
| $\theta$ = -3.9510***<br>(-3.5093)<br>[0.0009] | $\eta_1$ = 1.1506<br>(1.1689)<br>[0.2539] | $\eta_1$ = 2.1068 |

| | | |
|---|---|---|
| $\gamma = 3.8755^{**}$<br>(2.0320)<br>[0.0473] | $\gamma = 4.0302^{**}$<br>(2.6167)<br>[0.0148] | $\gamma = 3.8755$ |
| $\varepsilon_1 = 1.1085^{***}$<br>(4.6640)<br>[0.0000] | $\varepsilon_1 = 1.1220^{***}$<br>(5.5433)<br>[0.0000] | $\varepsilon_1 = 1.1085$ |
| $\varepsilon_2 = -0.3320$<br>(-1.6039)<br>[0.1148] | $\varepsilon_2 = -0.3576^{*}$<br>(-2.0381)<br>[0.0522] | $\varepsilon_2 = -0.3320$ |
| $\omega_1 = 1.5647^{**}$<br>(2.1213)<br>[0.0387] | $\omega_1 = 1.5524^{*}$<br>(2.0120)<br>[0.0551] | $\omega_1 = 1.5647$ |
| $\omega_2 = -0.2478$<br>(-0.2389)<br>[0.8121] | $\omega_2 = -0.2396$<br>(-0.2991)<br>[0.7673] | $\omega_2 = -0.2478$ |
| | $\mu_1 = 3.8033$<br>(1.1441)<br>[ 0.2639] | $\mu_1 = 6.1822$ |
| | $\mu_2 = -2.4014$<br>(-0.7659)<br>[0.4512] | $\mu_2 = -0.9789$ |
| | $\eta_2 = -1.6084^{**}$<br>(-2.2881)<br>[0.0312] | $\eta_2 = -1.3119$ |
| $R_C^2 = 0.8707$<br>$R_G^2 = 0.8532$ | $R_C^2 = 0.8812$<br>$R_G^2 = 0.8534$ | |

Note: t-ratios (in parentheses) follow coefficient values, followed by probability values (in square brackets).
***, **, and * denote significance at 1 percent, 5 percent, and 10 percent, respectively.

**Table 5.** Descriptive statistics for interest rate function

| Variables | Mean | Maximum | Minimum | Standard Deviation | Skewness | Kurtosis |
|---|---|---|---|---|---|---|
| Deposit Rate | 1.17 | 13.91 | -28.60 | 10.64 | -1.02 | 3.43 |
| Money Market Rate | 2.14 | 21.59 | -29.18 | 8.03 | -1.62 | 9.65 |
| Government Consumption/Trend GDP | 9.15 | 11.66 | 4.82 | 1.82 | -0.46 | 2.55 |
| Temporary Government Consumption/ Trend GDP | -0.04 | 1.11 | -2.28 | 0.88 | -1.06 | 3.67 |
| Permanent Government Consumption/ Trend GDP | 9.19 | 10.98 | 6.97 | 1.51 | -0.35 | 1.55 |
| Government Budget/Trend GDP | -1.38 | 2.26 | -4.32 | 1.63 | 0.42 | 2.36 |
| Narrow Money/Trend GDP | 10.46 | 13.17 | 8.03 | 1.09 | 0.28 | 3.59 |
| Base Money/Trend GDP | 7.48 | 12.80 | 4.78 | 2.02 | 1.20 | 3.91 |
| Tax Revenues/Trend GDP | 15.73 | 22.16 | 11.68 | 2.67 | 0.47 | 2.81 |
| Inflation | 13.55 | 58.39 | 3.72 | 11.21 | 2.59 | 9.94 |
| Expected Inflation | 13.92 | 32.74 | 2.49 | 7.58 | 0.98 | 3.06 |
| Oil Price | 70.70 | 122.67 | 9.76 | 28.41 | -0.01 | 2.52 |

**Table 6.** Cointegrating regressions of interest rate function: long run information

| Dependent Variable: Real Interest Rate | 1972-2003 | 1972-2003 | 1980-2003 | 1980-2003 |
|---|---|---|---|---|
| **Constant** | 27.5037 | 13.3059 | -3.4721 | 9.3108 |
| [t-statistic] | [2.4852] | [0.7757] | [-0.6753] | [0.8369] |
| **Temporary Government Consumption** | 0.1218 | 2.9122 | 5.3601 | 5.6419 |
| [t-statistic] | [0.0872] | [1.3982] | [3.8811] | [4.1030] |
| **Deficit** | 1.3679 | 2.3309 | 2.4869 | 2.2115 |
| [t-statistic] | [2.7446] | [3.1378] | [3.2434] | [2.8231] |
| **Debt** | 0.3392 | 0.3866 | 0.3475 | 0.3114 |
| [t-statistic] | [5.3680] | [3.9339] | [3.8511] | [3.3488] |
| **Base Money** | | | -0.4315 | -0.7299 |
| [t-statistic] | | | [-0.7219] | [-1.1559] |
| **Narrow Money** | -2.4496 | -1.3569 | | |
| [t-statistic] | [-2.3471] | [-0.8428] | | |
| **Tax Revenues** | | | | -0.6074 |
| [t-statistic] | | | | [-1.2897] |
| **Inflation** | -0.7941 | | | |
| [t-statistic] | [-7.5396] | | | |
| **Expected Inflation** | | -0.5913 | | |
| [t-statistic] | | [-2.8168] | | |
| **R-squared** | 0.8660 | 0.6728 | 0.6430 | 0.6732 |
| **F-statistic** | 33.6017 | 10.6936 | 8.5566 | 7.4169 |
| **Prob. (F-statistic)** | 0.0000*** | 0.0000*** | 0.0004*** | 0.0006*** |
| **Durbin-Watson statistic** | 1.7961 | 2.2641 | 1.9697 | 2.0638 |

Note: ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent, respectively.

**Table 7.** Error correction regressions of interest rate function

| Dependent Variable: D(Real Interest Rate) | 1973-2003 | 1973-2003 | 1981-2003 | 1981-2003 |
|---|---|---|---|---|
| **Constant** | 0.3278 | 0.4747 | -9.3989 | -6.4809 |
| [t-statistic] | [0.5162] | [0.4721] | [-2.6076] | [-1.6228] |
| **D(Temporary Government Consumption)** | 1.2878 | 5.5855 | 8.9284 | 8.7437 |
| [t-statistic] | [1.7337] | [4.5523] | [7.3799] | [6.5962] |
| **D(Deficit)** | 0.5242 | 2.0823 | 2.5691 | 2.3258 |
| [t-statistic] | [1.3480] | [3.3469] | [4.6169] | [3.3654] |
| **D(Debt)** | 0.1228 | 0.4306 | 0.3941 | 0.3806 |
| [t-statistic] | [2.0704] | [4.3127] | [4.9005] | [4.0994] |
| **D(Base Money)** | | | -2.4655 | -2.2942 |
| [t-statistic] | | | [-2.2464] | [-1.9433] |
| **D(Narrow Money)** | -2.0924 | -1.5380 | | |
| [t-statistic] | [-3.1270] | [-1.2726] | | |
| **D(Tax Revenues)** | | | | -0.4621 |
| [t-statistic] | | | | [-0.6002] |

| | | | | |
|---|---|---|---|---|
| **D(Inflation)** | -0.8243 | | | |
| [t-statistic] | [-16.1974] | | | |
| **D(Expected Inflation)** | | -0.5642 | | |
| [t-statistic] | | [-2.7471] | | |
| **EC(1)[-1]** | | | -1.2588 | |
| [t-statistic] | | | [-5.7451] | |
| **EC(2)[-1]** | -0.9817 | | | |
| [t-statistic] | [-5.8197] | | | |
| **EC(3)[-1]** | | -1.4303 | | |
| [t-statistic] | | [-8.7016] | | |
| **EC(4)[-1]** | | | | -1.2365 |
| [t-statistic] | | | | [-5.3212] |
| **D(Inflation)** | -0.8243 | | | |
| [t-statistic] | [-16.1974] | | | |
| **D(Expected Inflation)** | | -0.5642 | | |
| [t-statistic] | | [-2.7471] | | |
| **EC(1)[-1]** | | | -1.2588 | |
| [t-statistic] | | | [-5.7451] | |
| **EC(2)[-1]** | -0.9817 | | | |
| [t-statistic] | [-5.8197] | | | |
| **EC(3)[-1]** | | -1.4303 | | |
| [t-statistic] | | [-8.7016] | | |
| **EC(4)[-1]** | | | | -1.2365 |
| [t-statistic] | | | | [-5.3212] |
| **Crisis** | 3.4436 | | | |
| [t-statistic] | [1.7921] | | | |
| **R-squared** | 0.9493 | 0.8465 | 0.8559 | 0.8473 |
| **F-statistic** | 51.4419 | 18.1172 | 15.8399 | 11.8869 |
| **Prob. (F-statistic)** | 0.0000*** | 0.0000*** | 0.0000*** | 0.0000*** |
| **Durbin-Watson statistic** | 1.4619 | 1.4250 | 1.7130 | 1.4655 |

Note: ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent, respectively; EC(1), EC(2), EC(3), and EC(4) are residuals terms from the regression in columns 1, 2, 3, and 4 of Table 6; and D( ) denotes first difference operator.

**Table 8.** Descriptive statistics for current account function

| | Mean | Maximum | Minimum | Standard Deviation | Skewness | Kurtosis |
|---|---|---|---|---|---|---|
| Balance on Goods and Services | 2.85 | 17.91 | -18.40 | 5.75 | -0.76 | 7.10 |
| Government Budget | -1.79 | 1.84 | -8.90 | 2.07 | -0.79 | 5.27 |
| Real Exchange Rate | 4407.16 | 11845.63 | 1807.92 | 2264.03 | 1.44 | 4.92 |
| Oil Price | 61.98 | 122.67 | 5.85 | 34.58 | -0.14 | 2.18 |
| Broad Money | 31.46 | 58.15 | 11.26 | 14.77 | 0.20 | 1.81 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Inflation | 16.51 | 128.57 | 3.72 | 21.97 | 4.05 | 20.35 |
| Debt Securities | 0.27 | 2.54 | -0.68 | 0.70 | 1.51 | 5.89 |

**Table 9.** Cointegrating regressions for current account function

| **Dependent Variable: Current Account** | **1969-2003** | **1981-2003** | **1969-2003** | **1981-2003** |
|---|---|---|---|---|
| **Constant** | -2.09539 | -5.51703 | -3.59135 | -6.41033 |
| [t-statistic] | [-0.97420] | [-1.80886] | [-1.61827] | [-1.97785] |
| **Government Budget** | 1.01489 | 0.46941 | 1.06518 | 0.45457 |
| [t-statistic] | [2.94502] | [1.65526] | [3.20412] | [1.58825] |
| **Exchange Rate** | 0.00296 | 0.00254 | 0.00243 | 0.00222 |
| t-statistic] | [4.44227] | [4.88558] | [3.48603] | [3.43783] |
| **Oil Price** | 0.10060 | 0.05827 | 0.10398 | 0.06154 |
| [t-statistic] | [4.34712] | [3.07803] | [4.65791] | [3.16527] |
| **Broad Money** | -0.42780 | -0.22022 | -0.36113 | -0.17374 |
| [t-statistic] | [-3.72214] | [-1.98755] | [-3.10815] | [-1.40285] |
| **Inflation** | | | 0.11994 | 0.05463 |
| [t-statistic] | | | [1.85795] | [0.86628] |
| **Debt Securities** | | -1.61782 | | -1.95930 |
| [t-statistic] | | [-2.83612] | | [-2.81155] |
| **R-squared** | 0.58054 | 0.83804 | 0.62516 | 0.84529 |
| **F-statistic** | 10.37995 | 17.59257 | 9.67305 | 14.57033 |
| **Prob (F-statistic)** | 0.00002*** | 0.00000*** | 0.00002*** | 0.00001*** |
| **Durbin-Watson statistic** | 0.77929 | 1.68408 | 0.85813 | 1.72706 |

Note: ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent, respectively.

**Table 10.** Error correction regressions of current account function: short run information

| Dependent Variable: Current Account | 1970-2003 | 1970-2003 | 1982-2003 | 1982-2003 | 1970-2003 | 1970-2003 | 1982-2003 | 1982-2003 |
|---|---|---|---|---|---|---|---|---|
| **Constant** | 0.1847 | 1.3949 | -0.2075 | -0.1022 | 0.3316 | -0.0340 | -0.2181 | -0.0713 |
| t-statistic | [0.3673] | [1.5004] | [-0.6118] | [-0.2840] | [0.6944] | [-0.0740] | [-0.5202] | [-0.1782] |
| **D(Government Budget)** | 0.7326 | 0.7302 | 0.4885 | 0.4136 | 0.7200 | 0.7918 | 0.4611 | 0.3719 |
| t-statistic | [2.7376] | [2.8462] | [2.9198] | [2.3658] | [2.8723] | [3.4249] | [2.5681] | [2.1236] |
| **D(Exchange Rate)** | 0.0025 | 0.0024 | 0.0024 | 0.0023 | 0.0020 | 0.0019 | 0.0022 | 0.0022 |
| t-statistic | [5.0888] | [4.9928] | [4.8968] | [4.6891] | [3.5080] | [3.6213] | [4.0973] | [4.3450] |
| **D(Oil Price)** | 0.1318 | 0.1251 | 0.0868 | 0.0882 | 0.1294 | 0.1371 | 0.0827 | 0.0856 |
| t-statistic | [3.1949] | [3.1445] | [3.0617] | [3.2001] | [3.4026] | [3.9071] | [2.3383] | [2.5921] |
| **D(Broad Money)** | -0.3772 | -0.3471 | -0.1463 | -0.1586 | -0.4642 | -0.4951 | -0.1124 | -0.1224 |
| t-statistic | [-2.3589] | [-2.1260] | [-0.9605] | [-1.0828] | [-3.0173] | [-3.3524] | [-0.5710] | [-0.6661] |
| **D(Debt Securities)** | | | -1.6090 | -1.4417 | | | -1.5863 | -1.5533 |
| t-statistic | | | [-2.8488] | [-2.1045] | | | [-1.8623] | [-1.9534] |
| **D(Inflation)** | | | | | 0.1130 | 0.1280 | 0.0252 | 0.0270 |
| t-statistic | | | | | [2.1750] | [2.6346] | [0.3156] | [0.3614] |
| **EC(1)[-1]** | -0.5340 | -0.4995 | | | | | | |
| t-statistic | [-3.2095] | [-3.1055] | | | | | | |
| **EC(2)[-1]** | | | -1.2097 | -1.2152 | | | | |
| t-statistic | | | [-4.5938] | [-4.8194] | | | | |
| **EC(3)[-1]** | | | | | -0.5173 | -0.5366 | | |
| t-statistic | | | | | [-3.1851] | [-3.3632] | | |
| **EC(4)[-1]** | | | | | | | -1.2212 | -1.2272 |
| t-statistic | | | | | | | [-4.2506] | [-4.5763] |
| **Crisis** | 2.3876 | | | 0.3497 | | 2.1518 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| t-statistic | [1.3901] | | | [0.2889] | | [1.3375] | | |
| **Fixed Exchange Rate** | -1.9105 | | | | | | | |
| t-statistic | [-1.7398] | | | | | | | |
| **Devaluation 1978** | | | | | | 5.8085 | | |
| t-statistic | | | | | | [2.3234] | | |
| **Devaluation 1986** | | | | -2.7253 | | | | -2.7379 |
| t-statistic | | | | [-1.7790] | | | | [-1.7528] |
| **R-squared** | 0.6137 | 0.6707 | 0.8437 | 0.8761 | 0.6732 | 0.7464 | 0.8387 | 0.8696 |
| **F-statistic** | 8.8982 | 7.5661 | 13.4902 | 11.4917 | 9.2680 | 9.1991 | 10.4026 | 10.8338 |
| **Prob(F-statistic)** | 0.0000*** | 0.0001*** | 0.0000*** | 0.0001*** | 0.0000*** | 0.0000*** | 0.0001*** | 0.0001*** |
| **Durbin-Watson statistic** | 1.5933 | 1.7939 | 1.6166 | 1.6832 | 1.4882 | 1.6361 | 1.5485 | 1.5934 |

Note: ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent, respectively; EC(1), EC(2), EC(3) and EC(4) are residuals terms from the regressions in columns 1, 2, 3, and 4 of Table 9; and D( ) denotes first difference operator.

**Figure 1.** Government debt and deficits (rupiah per capita)

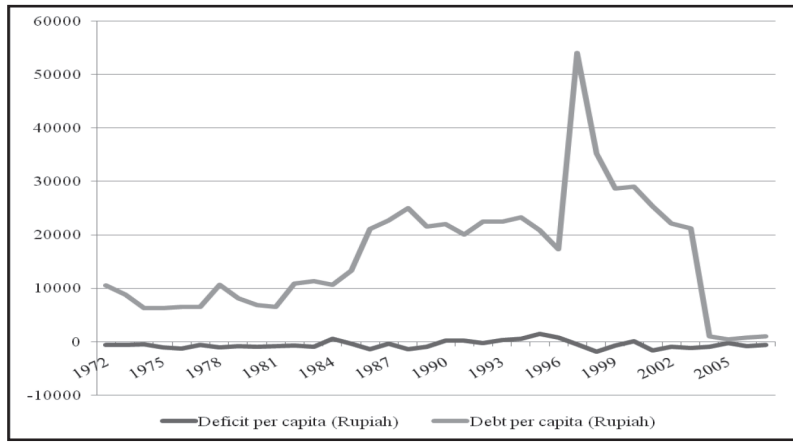


**Figure 2.** Oil price (index of unit values in U.S. Dollars)

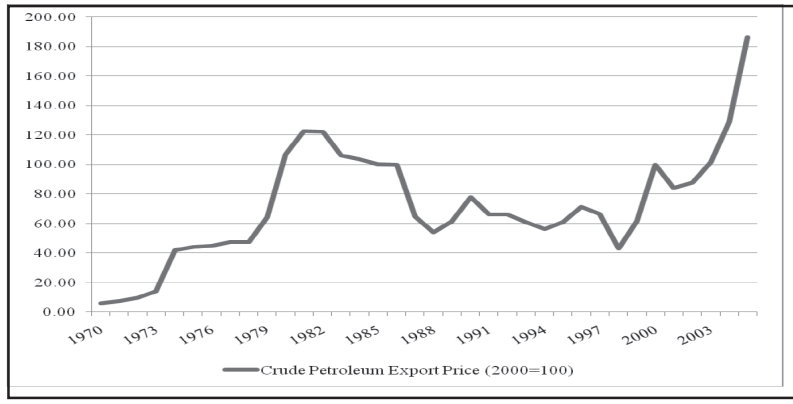


**Figure 3.** Oil and gas revenues, tax revenues, and non-tax revenues (percent of total revenues)

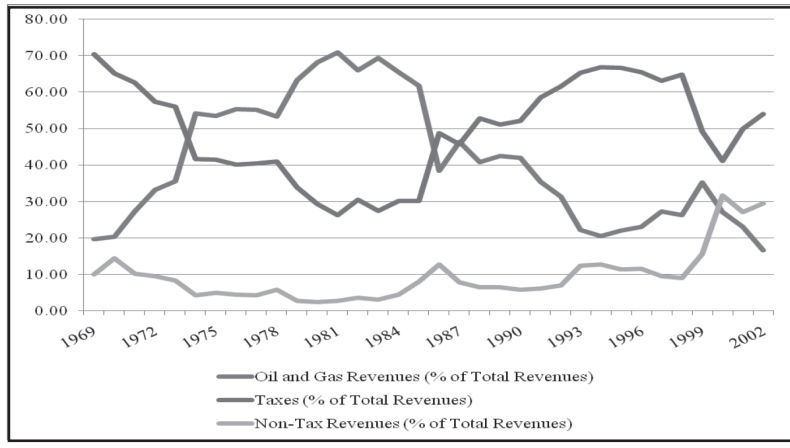

**Figure 4.** Private consumption, government consumption, and tax revenues (rupiah per capita)

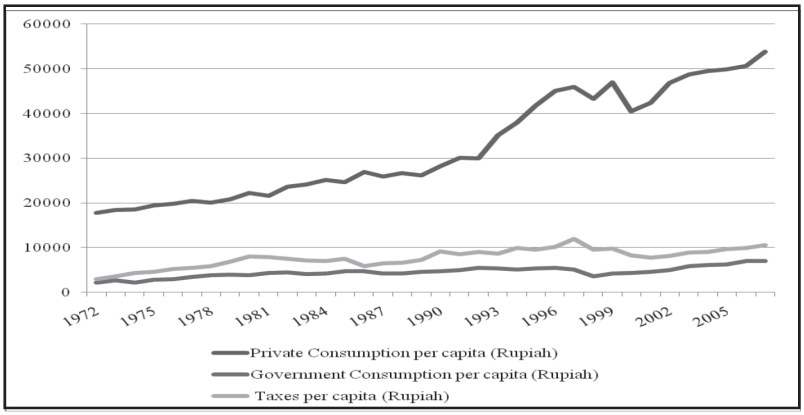


**Figure 5.** Real and nominal interest rates

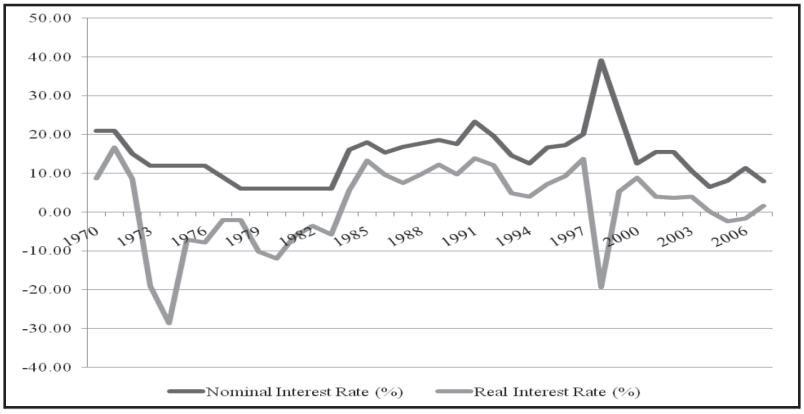


**Figure 6.** Current account (percent of GDP)