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Abstract

In this paper, an analytical framework is developed to measure the economic opportunity cost of capital and foreign exchange. An application of the framework is carried out for the Philippines. The results indicate that the economic cost of capital is approximately 10% real for the Philippines. The economic cost of foreign exchange is about 15% greater than the market exchange rate. These national parameters are the essential determinants for practical application to the economic appraisal of investments in the Philippines.

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ESTIMATION OF THE NATIONAL PARAMETERS FOR ECONOMIC COST-BENEFIT ANALYSIS FOR THE PHILIPPINES*

I. Introduction

The purpose of this paper is to develop an analytical framework that will enable us to estimate the economic cost of capital and foreign exchange in the Philippines. The estimation of these national parameters is necessary for practical application to the economic appraisal of investments located in both the public and private sectors of the economy. The economic cost of capital is needed to discount the net economic benefit stream arising from an investment in order to derive its economic present value. The economic cost of foreign exchange is needed to convert the financial values of the foreign exchange content of tradable inputs and outputs of the project into its corresponding economic values.

The general theoretical approach to the estimation of these national parameters has been outlined by Arnold C. Harberger.[1] The shadow price of capital or foreign exchange is a function of the types of distortions in the economy as well as the mechanism that brings demand and supply into equilibrium. This paper analyzes the economic cost of capital and then the shadow price of foreign exchange in the Philippines.

II. The Economic Cost of Capital

In the economic appraisal of an investment project, the economic benefits and costs of the investment over the life of the project are discounted by the economic cost of capital. If the net present value of these economic benefits and costs is equal to or greater than zero, the project is potentially worth while to implement from the economic point of view.[2] This implies that the project

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[1] A.C. Harberger, Project Evaluation -- Collected Papers, (Chicago: the University of Chicago Press, 1972), and "Three Basic Postulates for Applied Welfare Economics: an Interpretive Essay", Journal of Economic Literature (September 1971).

[2] M. Roemer and J.J Stern, The Appraisal of Development Projects, (New York: Praeger Publisher, Inc., 1975).

would generate more benefits than if the resources had been used elsewhere in the country. On the other hand, if the net present value is less than zero, the project should be rejected on the ground that the investment resources of the country could be put to better use elsewhere.

Methodology

The economic cost of capital can be practically measured by the economic opportunity cost of public funds where the funds will be drawn from various sectors of the economy according to their response to changes in interest rates due to borrowing in capital markets.[3] In a small, open and developing economy, there are normally three alternative sources for these funds.[4] They include those invested on other investment activities either displaced or postponed, those spent on private consumption forgone due to an increase of domestic savings, and additional foreign capital inflows. The economic cost of capital (EOCK) can then be estimated as a weighted average of the rate of return on displaced investment (π), the rate of time preference to savers (γ), and the cost of foreign capital inflows (MC_f). That is,

$$EOCK = f_1 \bullet p + f_2 \bullet g + f_3 \bullet MC_f \qquad (1)$$

where π is measured by the forgone gross-of-tax return to domestic investment, γ is the cost of postponed consumption due to the response by households to save more, and MC_f is valued at the marginal cost of foreign capital. The corresponding weights (f_1, f_2, and f_3) equal the proportion of funds diverted or sourced from each sector.

The weights can be expressed in terms of elasticities of demand and supply of funds with respect to changes in interest rates. Equation (1) can then be rewritten as follows:

[3] A.C. Harberger, "On Measuring the Social Opportunity Cost of Public Funds", in Project Evaluation -- Collected Papers, (Chicago: the University of Chicago Press, 1972), Chapter 4.

[4] Examples include the application of this general formula to the Canadian case by G. P. Jenkins, "The Measurement of Rates of Return and Taxation from Private Capital in Canada" in W. A. Niskanen et al., eds., Benefit-Cost and Policy Analysis (Chicago: Aldine, 1973); G. P. Jenkins, "The Public-Sector Discount Rate for Canada: Some Further Observations", Canadian Public Policy, (Summer 1981); and D. F. Burgess, "The Social Discount Rate for Canada: Theory and Evidence", Canadian Public Policy, (summer 1981).

$$EOCK = \frac{e_r(S_r/S_t)\bullet g + e_f(S_f/S_t)\bullet MC_f - h \bullet p}{e_r(S_r/S_t) + e_f(S_f/S_t) - h} \qquad (2)$$

where ε_r is the supply elasticity of household savings, ε_f is the supply elasticity of foreign funds, and η is the elasticity of demand for domestic investment relative to changes in the interest rate. S_t is the total saving available in the economy, of which S_r is the contribution to the total savings by households, and S_f is the total contribution of net foreign capital inflows.

Empirical Estimation

Following equation (2), we begin to estimate each variable of the equation. The economic return from the domestic investment is the contribution of capital to GDP, which can be measured by the gross-of-tax return on capital. Taxes include any corporate income taxes, capital taxes (either asset taxes or property tax) as well as sales and excise taxes generated from the investment.

There are alternative ways to estimate this variable. Our approach is aggregate and top-down.[5] Conceptually, we need to estimate the GDP net of the contributions made by labor and land. To do this, we first need to estimate the total contribution of labor to the economy, which is the sum of wages and salaries paid by corporations and by unincorporated businesses. Due to the unavailability of data on the labor content of unincorporated businesses in the Philippines, it is assumed that 10% of GDP is created by labor in this sector. This value is consistent with the size of the sector and the relative contribution of wage to capital in the Philippines. Second, the contribution of land is set at 1/3 of value added in the agriculture sector and 1/10 of value added in housing sector. Again, this is consistent with what has been estimated in countries of a similar level of development.[6] Third, indirect taxes paid on the contribution of labor to GDP are also estimated. Finally, the contribution by productive capital is calculated as a residual by subtracting the contribution to the economy by labor,

[5] The methodology used for the estimation of the rate of return to non-governmental capital is outlined by A.C. Harberger, "Private and Social Rates of Return to Capital in Uruguay", Economic Development and Cultural Change, (April 1977). A more recent approach of this basic methodology can be found in J. M. Peterba, "The Rate of Return to Corporate Capital and Factor Shares: New Estimates Using Revised National Income Accounts and Capital", National Bureau of Economic Research, Inc. (November 1997).

[6] E. Robles, "An Exploration into the Sources and Causes of Economic Growth in the United States and Fourteen Latin American Countries", a Ph.D. dissertation submitted to the University of California, Los Angels (1997).

land and the associated indirect taxes from GDP. The amount of return to capital is then divided by the total capital stock to arrive at its rate of return.

The detailed computations of the rate of return to domestic investment are presented in Appendix A. For the past 25 years, the average real rate of return to investment in the Philippines would be about 11.99% in 1971-75, 11.13% in 1976-80, 9.75% in 1981-85, 9.77% in 1986-90, and 9.51% in 1991-95. For the purpose of this analysis, we assume 9.75% for π.

The rate of time preference to savers can be measured by the real net-of-tax rate of return on household savings. That is,

$$g = \frac{\left[i_d\left(1-t_p\right)-gP^d\right]}{\left(1+gP^d\right)} \qquad (3)$$

where i_d represents the nominal interest rates, gP^d the domestic inflation and t_p the marginal personal income tax rate. The personal income tax system in the Philippines is progressive in nature. At present, there are nine income tax brackets. The tax rate ranges from 1% to 35%. We estimate that the marginal personal income tax rate for savers is approximately 15%, whose annual gross income falls between 40,000 to 60,000 Pesos. In the Philippines, the average nominal rate of return on savings in money markets was 12.94% in1994, 11.64% in 1995, and 13.14% in the first six months of 1996.[7] The corresponding inflation rate was 9.06%, 8.11%, and 8.41%, respectively.[8] For the purpose of this study, we use a 13% nominal rate of return on savings with an inflation of 8.25%. Based on equation (3), the real net of tax rate of return on savings or time preference of foregone consumption is approximately 2.6%.

The economic cost of foreign borrowing should be measured by the interest rate charged on loans for the projects plus the marginal change in the cost of foreign borrowing times the quantity of

[7] Bangko Sentral Ng Pilipinas, Selected Philippine Economic Indicators, Second Quarter 1996.

[8] An increase in consumer prices is the one used here. International Monetary Fund, International Financial Statistics, (August 1997).

the stock of foreign debt with variable interest rates that will be rolled over in the future periods.[9] This can be calculated in the following way:

$$MC_f = r_f \bullet (1 - t_f) \bullet \left[1 + k \bullet \left({}^{1}\!/\!_{e_f} \right) \right] \qquad (4)$$

where r_f is the interest rate charged on the foreign loan prevailing in the markets, t_f the withholding tax rate on foreign borrowing, k the ratio of the total stock foreign borrowing whose interest rate is floating to the total stock of foreign capital inflows, and ε_f is the supply elasticity of the stock of foreign funds. With the adjustment for the foreign inflation, equation (4) can be written below:

$$MC_f = \left[\frac{i_f \bullet (1 - t_f) - gP^f}{1 + gP^f} \right] \bullet \left[1 + k \bullet \left({}^{1}\!/\!_{e_f} \right) \right] \qquad (5)$$

where i_f is the nominal interest rate, and gP^f is the GDP deflator in the U.S. if the foreign borrowing is denominated in the U.S. dollars.

The real marginal cost of foreign borrowing for the Philippines can be measured according to equation (5). Most of their long-term debts are denominated in Japanese Yen and the U.S. dollars. They accounted for 38% and 30% of the total outstanding debts, respectively. In the Philippines, interest paid to non-residents is subject to a 20% withholding tax. However, as capital is very mobile internationally, the net-of-withholding tax rate of return from loans to the Philippines can not be lower than the interest rate on loans made to countries (with the same level of risk) where interest income is tax-free. Thus, the foreign lending rates to the Philippines must be higher so that the net-of-tax returns on the foreign loans can be equalized. In this analysis, we begin with the U.S. prime lending interest rate of 8.83% in 1995.[10] The interest rates charged on the foreign currency denominated loans borrowed by the Philippines would be the normal market rates plus an additional charge for country

[9] For a complete discussion of the marginal economic cost of foreign funds, see S. Edwards, "Country Risk, Foreign Borrowing, and the Social Discount Rate in an Open Developing Economy", Journal of International Money and Finance, (1986); and A. C. Harberger, "On Country Risk and the Social Cost of Foreign Borrowing by Developing Countries", paper prepared for University of Chicago-Department of State Project on the International Economic System, (Summer 1976).

[10] International Monetary Fund, International Financial Statistics, (August 1997).

risk. Currently the country risk premium for the Philippines is assumed to be approximately 1.75%, hence the nominal borrowing rate by the Philippines for U.S dollars would be 13.23%.[11] The GDP deflator in the U.S. was 2.50% in 1995 and 1.97% in 1996. For this study, we assume the GDP deflator will remain low at 2.25%. Hence, the average real cost of foreign borrowing would be 8.15%.

Since the relevant economic cost of foreign borrowing is valued at its marginal economic cost, not the interest rate paid for the funds, the proportion of the total stock of foreign debt that is responsive to the prevailing market is a key variable. From the financial data available to us, it is reasonable to assume that concessional loans are not sensitive to the market interest rates. With this observation, one can derive the ratio of the amount of foreign debt whose interest cost will respond to the market interest rate to the total amount of foreign debt by the country. This ratio in the Philippines was 64.9% in 1993, 65.3% in 1994, 66.0% in 1995.[12] In this study, we assume 65% for the ratio (k). The supply elasticity of the stock of foreign funds (in terms of the stock of foreign investment) is assumed at 2.0, which may be on the high side, but a sensitivity analysis is performed later to determine the impact of this variable on the estimate of the marginal cost of foreign funds. With the above information, one can calculate the marginal cost of foreign borrowing to be about 10.80% real.

The share of household savings in the total savings in the Philippines was 40% in 1995.[13] Using the averages of a number of international empirical results, we set the long run elasticity of supply of the stock of personal savings at 0.5, the elasticity of supply of the stock of foreign funds at 2.0, and the elasticity of demand for capital in response to changes in interest rates at -1.0. With these assumptions, one can derive the proportions of funds diverted to finance the investment project in question. They would be 8.33% from residents' savings, 50.00% from foreign capital, and 41.67% from displaced or postponed domestic investment. Substituting these data into the equation (1), one can obtain the economic cost of capital for the Philippines as 9.68%.

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[11] The 13.23% figure is obtained by dividing the sum of 8.83% and 1.75% by [1-0.2].

[12] This figure was calculated by one minus the ratio of concessional loans to the total outstanding debt in the country. See the World Bank, Global Development Finance, 1997: Volume 2 Country Tables.

[13] National Statistics Office, The 1995 Philippine Yearbook.

For the sensitivity analysis, if we assume 1.5 instead of 2.0 for the elasticity of supply of the stock of foreign capital in the Philippines, the share of financing from foreign funds becomes smaller but the marginal cost of foreign funds would be higher.[14] As a consequence, the economic opportunity cost of capital becomes 9.98% as shown in Table 1.[15] This result is 0.30 of one percentage point higher than that derived earlier. On the other hand, if the supply elasticity of foreign capital is 2.5, the economic cost of capital would be 0.27 of one percentage point lower. Therefore, an approximate estimate of the economic cost of capital to be used as the discount rate in the economic appraisal of investments in the Philippines is about a real rate of 10%.

Table 1
Estimates of the Economic Cost of Capital for Various Assumptions about the Supply Elasticity of Foreign Capital
(percentage)

	Shares of Sources of Funds			
Supply Elasticity of Foreign Funds	*Household Saving*	*Foreign Funds*	*Domestic Investment*	*Economic Cost of Capital*
1.5	9.52	47.62	42.68	9.98
2.0	8.33	50.00	41.67	9.68
2.5	7.41	37.04	55.55	9.41

III. The Foreign Exchange Premium

When the numeraire used for the measurement of economic benefits and/or costs of a project is units of domestic currency at the domestic price level, then it is necessary to value the quantity of foreign exchange used or produced by the project by its economic value rather than its market value. The use of the domestic currency and domestic price level has a number of important advantages.

[14] The marginal cost of foreign funds would be 11.68% according to Equation (5).
[15] The sources of funds under this assumption would be 9.52% from residents' savings, 42.86% from foreign capital inflows, and 47.62% from the displacement of other domestic investment in the economy.

The most important being that the financial and economic value of benefits and costs can be directly compared in any given period.

When a project demands additional foreign exchange, it will exert pressure to cause the value of domestic currency to depreciate. Some importers will react to cut back their demand for imported goods while exporters will increase their supply of exports. Since the demand for imported goods is generally distorted by import tariffs and the supply of exports by subsidies and export taxes, there will be a divergence between the market and the economic price of foreign exchange rate.[16] The difference represents the loss of tariff revenues associated with foregone imports as well as other distortions associated with additional production of exported goods in the external sector.

A further distortion must be considered in the area of domestic sales and other indirect taxes. While the demand for imports declines because of additional demand for foreign exchange and the resulting devaluation of the domestic currency, the domestic indirect taxes associated with these goods are also foregone. On the supply side, the resources required to produce additional exports have to come from non-traded goods sector, which will reduce the supply and, due to the change in prices, the corresponding quantity demanded for non-traded goods. The associated value added tax (VAT) and other indirect tax revenues on non-traded goods will also be reduced. All these repercussions in the economy have to be accounted for as part of the distortions associated with foreign exchange.

In the case of foreign exchange generated by the project, the reverse result will hold. Thus, a foreign exchange premium must be applied to the foreign exchange component of the goods demanded as well as supplied by the project in the economic appraisal. This adjustment will ensure that the project's use and generation of foreign exchange adequately reflect the economic opportunity cost of foreign exchange in the country.

[16] See, e.g., G. P. Jenkins and A. C. Harberger, Cost-Benefit Analysis of Investment Decisions, a manual for Program on Investment Appraisal and Management, Harvard Institute for International Development, (1997). However, the manual does not extend its analysis to the effect in the non-traded sectors.

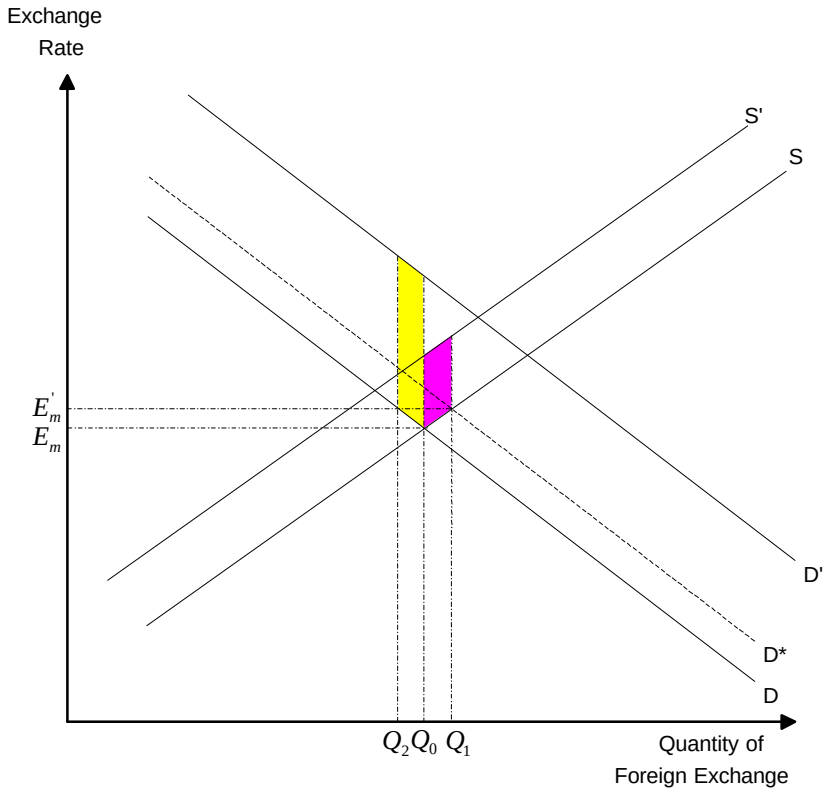
Methodology

The economic price of foreign exchange measures the value of a unit of foreign exchange to the economy in terms of domestic resource costs. The extent to which the economic cost of foreign exchange exceeds the free market foreign exchange rate is termed as the foreign exchange premium. The foreign exchange premium is composed of two components. The first component is the distortions directly caused in the external trade sector. This is calculated by taking the ratio of the weighted average of the value of forgone imports and the cost of resources used to produce additional exports to the market exchange value minus one. The value of the imported goods to demanders is measured by the c.i.f. prices plus tariffs while the resource cost of producing exports are measured by the f.o.b. prices less export taxes plus export subsidies.

For convenience, we choose the units of the goods so that the initial supply prices of importable goods (P_m), exportable goods (P_x), and non-traded goods sectors (P_{nt}), are equal to one. That is, $P_m = P_x = P_{nt} = 1$. Thus, the quantities demanded or supplied are equal to their values.

The market exchange rate (E_m) is determined by the demand curve for imports exclusive of tariffs and the supply of exports inclusive of export subsidies and exclusive of export taxes. When goods are imported for use in a project (say, Q_2Q_1), the demand curve for foreign exchange is shown as a shift to the right from D to D* in Figure 1. The economic value of foreign exchange is, in turn, determined by the value of imported goods inclusive of tariffs (represented by the demand curve D') and the resource cost of producing all exported goods exclusive of export subsidies but inclusive of export taxes (represented by the supply curve S'). The excess amount of the economic value over the market value represents the first component of the foreign exchange premium (ρ_1), which is indicated as the shaded area in Figure 1. This can also be expressed mathematically in the following manner:

Figure 1: DETERMINATION OF ρ_1



$$r_1 = f_s \cdot t_x + f_d \cdot t_i \qquad (6)$$

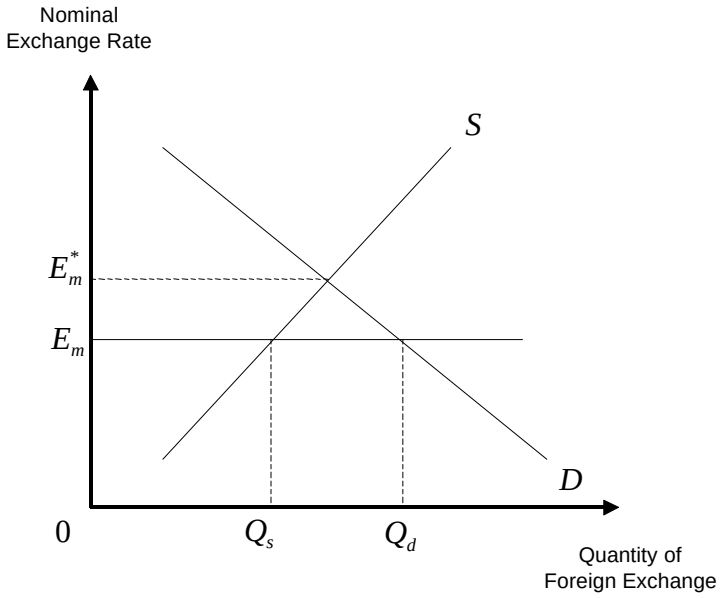
where t_x is the weighted average rate of subsidies (in excess of export taxes) on those exports that are responsive to changes in the exchange rate, t_i is the weighted average rate of import tariffs on those imports that are responsive to changes in the exchange rate, f_s and f_d are the weights on the supply and demand sides, respectively. The weights, f_s and f_d, depend upon the demand elasticities of imports, the supply elasticities of exports, and other factors. Equation (6) can then be re-written as:

$$r_1 = \frac{e^s \cdot t_x - h^d (q_i / q_x) \cdot t_i}{e^s - h^d (q_i / q_x)} \qquad (7)$$

where ε^s is the supply elasticity of exports, η^d is the demand elasticity for imports, q_x is the quantity of foreign exchange earned from exports and q_i is the quantity of foreign exchange required to pay for imports.

The above analysis is based on the assumption that the real exchange rate can be maintained. In other words, if there is a trade deficit in a country, the current levels of capital inflows are sufficient to finance the trade imbalance in order to maintain the real exchange rate. If this is not the case, some adjustment must be made to the real exchange rate (perhaps from devaluation of the official exchange rate) to reflect the true economic value of foreign exchange rate. This can be seen in Figure 2. Let Δq stand for the unsustainable part of the current account deficit (Q_sQ_d), there would be a pressure in the market to push up the real exchange rate from E_m to E_m^* in order to equilibrate the demand and supply of foreign exchange.

Figure 2. Foreign Exchange Market under Unsustainable Trade Deficit



The upward adjustment of the foreign exchange rate takes into consideration the effect of unsustainable trade imbalances on the real value of foreign exchange. This is equivalent to an adjustment to ρ_1 which can be calculated as follows:[17]

$$\Delta\rho_1 = (E_m^* - E_m)/E_m = \Delta q/[\varepsilon^s \bullet q_x - \eta^d \bullet q_i] \qquad (8)$$

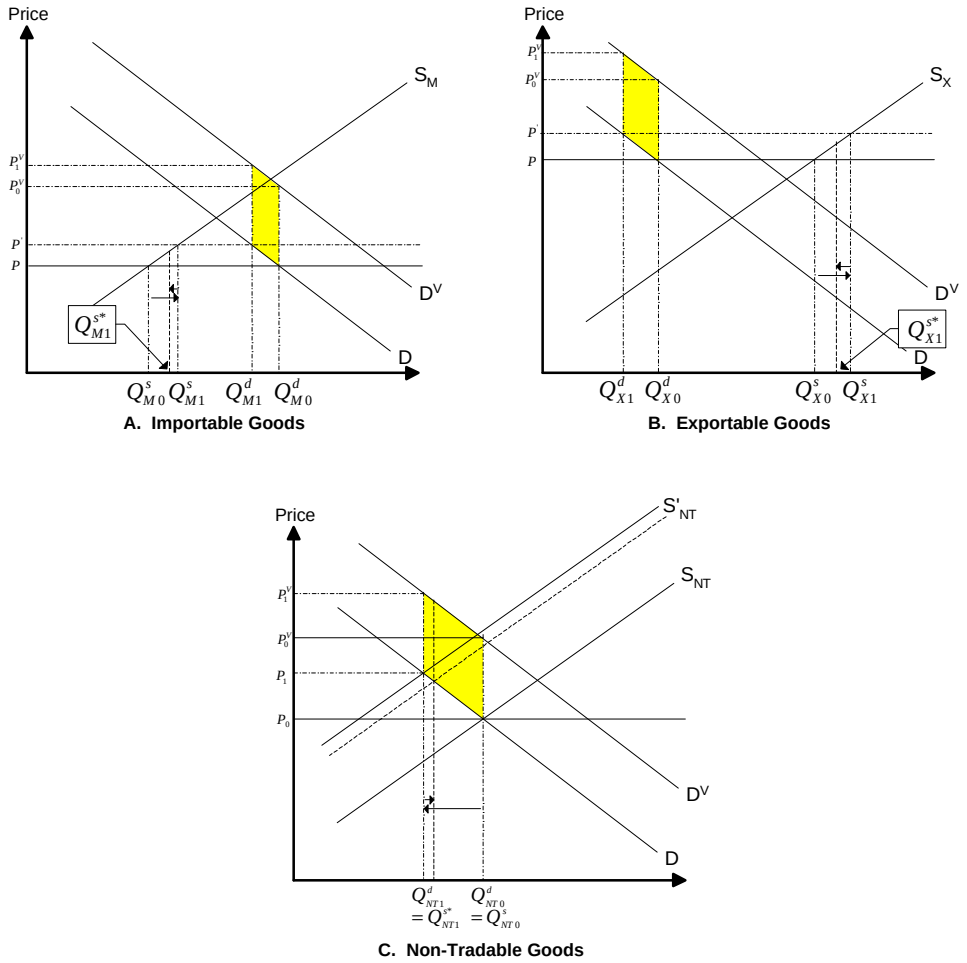
The second component of the foreign exchange premium is caused by the effect of VAT and other indirect taxes on the economic price of foreign exchange. When foreign exchange is demanded by a project, the market exchange rate moves up from E_m to E_m'. Given that the country is a small open economy, this will raise the domestic prices of importable and exportable goods expressed in domestic currency (from P to P' for the net-of-tax price, and P^v_0 to $P^{v'}_1$ for the gross-of-tax price as shown in Figures 3A and 3B). Two events will occur in the economy.

First, the quantity demanded of importable goods will decline from $Q^d_{M\,0}$ to $Q^d_{M\,1}$ and the quantity supplied of importable goods will go up from $Q^s_{M\,0}$ to $Q^s_{M\,1}$. Accordingly, the excess demand for importable goods will be reduced from $Q^s_{M\,0}Q^d_{M\,0}$ to $Q^s_{M\,1}Q^d_{M\,1}$ (Figure 3A). A similar situation will take place in the market of exportable goods sector. The quantity demanded will decline and the quantity supplied will increase. The net excess supply of exportable goods will increase from $Q^d_{X\,0}Q^s_{X\,0}$ to $Q^d_{X\,1}Q^s_{X\,1}$ as shown in Figure 3B.

Additional resources will be required to produce the above additional importable and exportable goods. Given our assumption of full employment, the economy is on its production possibility frontier and there is no incremental foreign borrowing as a consequence of this action, these resources must be released from the non-traded goods sector. Due to the increase in the relative prices of traded goods, the supply of non-traded goods will shift to left from S_{NT} to S'_{NT} as shown in Figure 3C. The reduction of the supply of non-traded goods will push up their net-of-tax prices from P_0 to P_1. Consequently, the relative price of the traded to non-traded goods will be somewhat depressed inducing a further round of adjustment in the quantity supplied of importable and exportable goods. These adjustments will continue until a final equilibrium is re-established.

[17] The detailed derivative of this formula can be found in G. P. Jenkins and M.B. El-Hifnawi, Economic Parameters for the Appraisal of Investment Projects:

Figure 3: DETERMINATION OF ρ_2



At the new equilibrium, the total resources released from non-traded goods to tradable goods sector will be less than the initial response (shown as Q^{s*}_{M1} and Q^{s*}_{X1} instead of Q^s_{M1} and Q^s_{X1} in Figure 3A and 3B). Nevertheless, the resources released from the non-traded goods sector in equilibrium must equal the resources required for the additional production of importable and exportable goods. The extra amount of tradable goods generated must have the same value as the foregone non-traded goods. That is, $Q^{s*}_{NT1}Q^s_{NT0} = Q^s_{M0}Q^{s*}_{M1} + Q^s_{X0}Q^{s*}_{X1}$.[18] In addition, the demand for non-traded goods must be equal to the supply of non-traded goods. Since the non-traded goods are

Bangladesh, Indonesia and the Philippines, report prepared for Economics and Development Resource Center, Asian Development, (December 1993).

[18] It can also be expressed as follows: $-\Delta Q^s_{NT} = \Delta Q^s_M + \Delta Q^s_X$.

also subject to VAT and other indirect taxes, the taxes associated with the reduction of demand from Q^d_{NT0} to Q^d_{NT1} will be foregone. The foregone VAT and other indirect taxes should, therefore, be accounted for as part of foreign exchange premium.

In summary, the three shaded areas identified in Figures 3A, 3B and 3C should be all accounted for by the foreign exchange premium in a general equilibrium framework. One can express the impact of an incremental demand for foreign exchange on domestic indirect taxes as the reduction of VAT and other indirect tax revenues associated with cut back of the demand for importable, exportable, and non-traded goods. The weights are the corresponding responses of their demands to the market exchange rate. Thus, the second component of the foreign exchange premium (r_2) can be expressed as follows:

$$\rho_2 = \frac{-(\partial Q^d_M/\partial E^m)\bullet V_M - (\partial Q^d_X/\partial E^m)\bullet V_X - (\partial Q^d_{NT}/\partial E^m)\bullet V_{NT}}{-(\partial Q^d_M/\partial E^m) - (\partial Q^d_X/\partial E^m) - (\partial Q^d_{NT}/\partial E^m)} \qquad (9)$$

where V_X, V_M, and V_{NT} are average VAT and other indirect tax rate for exportable, importable, and non-tradable goods, respectively.

Given the definition of demand elasticities of importable, exportable and non-traded goods, $\eta^d_M = (\partial Q^d_M/\partial E^m)/(Q^d_M/E^m)$, $\eta^d_X = (\partial Q^d_X/\partial E^m)/(Q^d_X/E^m)$, and $\eta^d_{NT} = (\partial Q^d_{NT}/\partial E^m)/(Q^d_{NT}/E^m)$, equation (9) can be rewritten as:

$$\rho_2 = \frac{-\eta^d_M\bullet(Q^d_M/E^m)\bullet V_M - \eta^d_X\bullet(Q^d_X/E^m)\bullet V_X - \eta^d_{NT}\bullet(Q^d_{NT}/E^m)\bullet V_{NT}}{-\eta^d_M\bullet(Q^d_M/E^m) - \eta^d_X\bullet(Q^d_X/E^m) - \eta^d_{NT}\bullet(Q^d_{NT}/E^m)} \qquad (10)$$

With the multiplication of the numerator and the denominator of the above equation by (E^m/Q^d_T), where Q^d_T denotes the demand for the total tradable goods, the equation can be written as follows:

$$\rho_2 = \frac{-\eta^d_M \bullet (Q^d_M/Q_T^d) \bullet V_M - \eta^d_X \bullet (Q^d_X/Q_T^d) \bullet V_X - \eta^d_{NT} \bullet (Q^d_{NT}/Q_T^d) \bullet V_{NT}}{-\eta^d_M \bullet (Q^d_M/Q_T^d) - \eta^d_X \bullet (Q^d_X/Q_T^d) - \eta^d_{NT} \bullet (Q^d_{NT}/Q_T^d)} \quad (11)$$

Let us assume that the effective VAT and other indirect tax rates for the importable and exportable goods ($V_M = V_X$) are equal, as is most likely to be the case under a comprehensive tax system. We can then combine the importable and exportable goods into a total tradable goods sector as follows:

$$\rho_2 = \frac{-[\eta^d_T \bullet Q^d_T \bullet V_T] - [\eta^d_{NT} \bullet Q^d_{NT} \bullet V_{NT}]}{-[\eta^d_T \bullet Q_T^d] - [\eta^d_{NT} \bullet Q^d_{NT}]} \quad (12)$$

where η^d_T and η^d_{NT} denote the demand elasticities of tradable and non-tradable goods, Q^d_{NT} denotes the quantities of demand for non-tradable goods. Thus, ρ_2 can be considered as a weighted average of the effective VAT and other indirect tax rates of tradable and non-traded goods, where the weights are the demand for tradable goods and non-tradable goods.

While calculating the foreign exchange costs and benefits for a project, one can combine the above two components, ρ_1 and ρ_2. Recall that ρ_1 is associated with the amount of foreign exchange acquired for or earned by the project while ρ_2 is related to the corresponding changes in the amount of tradable goods. The amount of foreign exchange acquired and the corresponding sum of the changes in the demand and supply of tradable goods are equal.[19] Therefore, ρ_1 and ρ_2 can be both applied to the amount of foreign exchange acquired or earned by the project in question. Estimating the foreign exchange premium in this way is an approximation to a general equilibrium estimation of the foreign exchange premium.[20]

[19] Details are shown in Appendix B.

[20] For a general equilibrium treatment of impact of distortions on the economic cost of foreign exchange, see G.P. Jenkins and C.Y. Kuo, "On Measuring the Social Opportunity Cost of Foreign Exchange", Canadian Journal of Economics, (May 1985).

Empirical Estimation

Since the foreign exchange premium depends on the extent of trade distortions as well as VAT and other indirect taxes, we need to take into account the ASEAN Agreement and the global trade liberalization in the future when an investment project is undertaken in the Philippines. However, to calculate the premium that can be used for future years, we make the estimation for the latest three years, 1992 to 1994. The import tariffs, production subsidies, and trade statistics are presented in Table 2.

In order to calculate the effective import tariff rates, one has to exclude re-exported imports. There is no reliable data available in the Philippines, as is the experience of similar countries, we assume that 10% of exports are the re-exports of imported goods. Furthermore, the government purchase of goods and services is generally subject to import tariff in the same manner as the private sector. Since there are no data on the breakdown of customs duties paid on the public and private purchases, it is assumed that the public purchases are responsive to changes of the market exchange rates in the same fashion as does private users.

Table 2
Trade Statistics, 1992-94
(billions of Pesos)

	Imports			**Exports**		
	1992	***1993***	***1994***	***1992***	***1993***	***1994***
Gross of Re-exported Imports	459.9	586.9	679.4	393.7	462.4	572.6
Less: Re-exports	39.4	46.2	57.3	39.4	46.2	57.3
Net of Re-exported Imports	420.5	540.7	622.1	354.3	416.2	515.3
Tariffs and Subsidies	67.8	76.8	76.5	3.7	5.8	7.3
Average Tariff and Subsidy Rates	19.24%	16.56%	14.03%	1.02%	1.37%	1.40%

Sources: International Monetary Fund, International Financial Statistics, (August 1997).
International Monetary Fund, Government Finance Statistics Yearbook, (1996).
National Statistical Coordination Board, Economic and Social Statistics Office, "Gross Domestic Product and Expenditure Account: 1988-1994".

Assuming that the price elasticities of demand for imports and supply of exports are -1.5 and 0.75, respectively, one can derive the weights for the demand and supply of foreign exchange. Substituting these data into equation (7), one can obtain ρ_1 at 13.84% in 1992, 12.34% in1993, and 10.33% in 1994.

From Table 2, one can observe that the trade deficit expressed as a percentage of exports was in the neighborhood of 10% of exports in 1993 and 1994.[21] With this magnitude of trade deficit, it is not difficult for the country to mobilize sufficient capital inflows to maintain the real exchange rate. We, therefore, conclude that for the purpose of this analysis, there is no unsustainable trade deficit in the balance of payments in the Philippines during this period.

The second component (ρ_2) of the foreign exchange premium is the weighted average of the effective VAT and other indirect tax rates of tradable goods as well as non-traded goods. If we assume that the demand elasticities of tradable and non-traded goods are approximately equal, ρ_2 can be estimated simply as the ratio of the total indirect tax collections to the total of domestic consumption plus investment in the economy.[22]

Details for the estimation of the ratio of the VAT and other indirect tax revenues to the net-of-tax consumption and investment are shown in Table 3. It is estimated that ρ_2 was 4.57% in 1992, 4.56% in 1993, and 4.70% in 1994. Therefore, the total foreign exchange premium, as shown in percentage terms in Table 4, was estimated at 18.41% in 1992, 16.90% in 1993, and 15.03% in 1994.

[21] The ratio was about 7% in 1994 and 11% in 1993.

[22] This can be derived from equation (12). That is, $\rho_2 = [Q^d_T \bullet V_T + Q^d_{NT} \bullet V_{NT}]/[Q^d_T + Q^d_{NT}]$.

Table 3
Domestic Sales and Excise Taxes
(billions of pesos)

Categories	**1992**	**1993**	**1994**
Taxes			
Value-Added Tax Collections	23.14	27.82	26.83
Excises	27.52	30.26	39.59
Taxes on Motor Vehicles and Other goods and services	11.94	12.67	16.31
Total	62.60	70.75	82.73
Expenditures			
Private Consumption	1,019.2	1,122.5	1,258.8
Public Consumption	130.5	149.1	182.8
Gross Fixed Capital Formation	282.8	350.5	400.1
Total	1,432.5	1,622.1	1,841.7
Effective Tax Rates	4.57%	4.56%	4.70%

Sources: International Monetary Fund, *International Financial Statistics*, (August 1997).
International Monetary Fund, *Government Finance Statistics Yearbook*, (1996).

For use of this parameter in the future, it is essential to take into consideration the ASEAN Agreements and the global trade liberalization process in the calculation of foreign exchange premiums for the Philippines. With continuation of the trade liberalization in the Philippines, the distortions in the external sector will decline and so will the first component of the foreign exchange premium. However, in order to have revenue-neutrality in the public sector budget the reduction of import duties would likely lead to an increase in indirect taxes

Table 4
Decomposition of the Foreign Exchange Premium
(percentage)

	1992	***1993***	***1994***
ρ_1	13.84	12.34	10.33
ρ_2	4.57	4.56	4.70
ρ	18.41	16.90	15.03

levied on domestic consumption of goods and services. Consequently, the second component of the foreign exchange premium would be inclined to rise over time. Therefore, it is likely the foreign exchange premium used in the evaluation of investment projects would be approximately 15% in the Philippines for some time in the future.

IV. Concluding Remarks

This paper has developed a comprehensive framework and a practical approach to the measurement of the economic cost of capital and foreign exchange. These national parameters are the essential determinants in estimating the net economic costs and benefits of investment projects. The empirical results suggest that the economic cost of capital is approximately 10 % in real terms for the Philippines. The economic price of foreign exchange takes into consideration the distortions affecting not only internationally traded goods such as import tariffs and export taxes, but also the interaction between other indirect taxes such as sales, value added and excise taxes. The empirical results indicate that by the mid-1990's the economic rate of foreign exchange had become approximately 15% greater than the market value of foreign exchange in the Philippines. In other words, the current premium on the cost of using or benefit from generating foreign exchange in the Philippines was approximately 15% of its market value. All projects using capital and foreign exchange in the Philippines need to have positive net economic present values using these opportunity costs before they are considered for implementation.

Appendix A: Return to Domestic Investment in Philippines, 1946-1996
(millions of Pesos)

		Expressed in Nominal Pesos						Expressed in Real Pesos							Rate of	5-year
									Capital Stock						Return	Average
Year	GDP	Labor Income	Indirect Taxes	Sub-dies	GVA in Agri.	GVA in Housing	Income to Capital	Construct.	Equip.	Breeding	Ch. In Inv.	Total	Real Deprec.	GDP Deflat.	to Capital	Return to Capital
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
1946	4,481	1,638	176	24	1,632	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.33	N/A	
1947	5,574	2,033	268	40	2,106	N/A	N/A	229,502	21,146	30,443	35,058	316,149	8,951	6.54	N/A	
1948	6,081	2,184	339	1	2,064	N/A	N/A	242,489	22,915	31,875	38,487	335,766	9,489	6.13	N/A	
1949	6,368	2,279	356	7	2,254	N/A	N/A	249,850	24,608	33,575	40,399	348,432	9,894	6.01	N/A	
1950	6,735	2,403	373	3	2,337	N/A	N/A	257,140	25,039	35,365	42,887	360,431	10,200	5.91	N/A	
1951	7,498	2,640	593	86	2,492	N/A	N/A	265,865	25,678	37,284	44,874	373,701	10,565	5.94	N/A	
1952	7,847	2,731	606	22	2,439	N/A	N/A	273,213	26,597	39,077	46,838	385,725	10,912	5.85	N/A	
1953	8,320	2,899	604	27	2,507	N/A	N/A	283,641	28,700	40,985	49,858	403,184	11,436	5.70	N/A	
1954	8,610	2,975	648	34	2,614	N/A	N/A	291,033	31,603	43,131	54,783	420,550	11,961	5.48	N/A	
1955	9,173	3,151	711	40	2,800	N/A	N/A	298,277	34,769	45,478	60,019	438,543	12,512	5.46	N/A	
1956	10,023	3,414	827	37	2,886	N/A	N/A	308,322	38,838	47,598	63,732	458,490	13,195	5.58	N/A	
1957	10,936	4,578	867	8	3,043	N/A	N/A	321,108	43,977	49,844	68,253	483,182	14,038	5.77	N/A	
1958	11,552	4,845	834	16	3,143	N/A	N/A	331,796	48,909	52,034	73,836	506,575	14,809	5.89	N/A	
1959	12,594	5,267	739	14	3,429	N/A	N/A	344,496	55,253	54,437	80,103	534,289	15,754	6.02	N/A	
1960	13,478	5,592	780	27	3,570	N/A	N/A	354,888	60,784	56,659	85,692	558,023	16,568	6.35	N/A	
1961	14,682	6,080	930	9	3,883	N/A	N/A	368,762	67,263	59,031	92,883	587,939	17,552	6.55	N/A	
1962	16,421	6,762	1,113	77	4,372	N/A	N/A	380,565	74,409	61,571	101,348	617,893	18,545	6.99	N/A	
1963	19,126	7,937	1,316	42	5,223	N/A	N/A	396,223	83,047	64,526	111,141	654,937	19,776	7.61	N/A	
1964	20,677	8,556	1,473	107	5,500	N/A	N/A	414,856	94,377	67,375	119,770	696,378	21,290	7.95	N/A	
1965	22,617	9,408	1,313	88	6,141	N/A	N/A	435,436	104,439	70,543	128,836	739,254	22,768	8.26	N/A	
1966	24,878	10,280	1,467	104	6,752	N/A	N/A	453,544	114,091	73,830	138,523	779,988	24,157	8.70	N/A	
1967	26,717	11,055	1,261	116	7,312	1,793	12,548	474,382	128,812	77,385	148,373	828,952	26,034	8.87	13.93%	
1968	29,835	12,484	1,537	197	8,712	1,963	13,660	491,892	145,452	80,898	156,042	874,284	27,978	9.44	13.35%	
1969	33,062	13,770	1,754	184	9,892	2,071	15,097	510,074	160,833	84,775	164,644	920,326	29,857	10.00	13.16%	
1970	39,506	16,634	1,974	166	11,663	2,316	17,951	522,530	178,134	87,217	175,832	963,713	31,675	11.51	12.90%	
1971	47,648	20,986	2,821	133	14,441	2,561	20,334	533,657	197,855	90,403	186,166	1,008,081	33,690	13.17	11.97%	
1972	53,515	23,527	3,082	143	15,761	2,681	23,095	548,240	213,792	93,532	197,993	1,053,557	35,486	14.03	12.26%	
1973	68,123	30,307	4,034	284	20,817	3,382	28,765	564,014	230,292	96,804	217,603	1,108,713	37,364	16.39	12.46%	
1974	93,545	42,129	5,516	714	29,051	4,459	38,988	587,776	251,144	100,321	248,060	1,187,301	39,802	21.74	11.75%	
1975	107,950	47,644	7,695	661	32,752	4,855	45,560	626,671	282,075	102,619	276,288	1,287,653	43,364	23.76	11.52%	11.99%

1976	127,211	57,242	7,346	612	37,233	5,257	53,816	685,344	308,037	104,777	308,537	1,406,695	47,015	25.74	11.52%	
1977	145,451	65,264	8,671	456	41,771	5,983	61,745	746,857	328,664	107,031	336,991	1,519,543	50,316	27.87	11.27%	
1978	167,249	73,794	12,657	573	47,190	6,865	71,270	809,109	352,888	109,524	366,672	1,638,193	53,935	30.47	10.99%	
1979	202,900	89,488	14,723	588	55,684	8,183	87,310	869,154	382,502	112,190	399,199	1,763,045	57,939	34.99	10.87%	
1980	243,749	105,093	20,739	607	61,219	9,078	107,855	940,673	412,153	119,064	410,577	1,882,467	62,442	39.97	11.02%	11.13%
1981	281,596	122,157	22,169	535	70,092	10,571	124,831	1,020,125	439,220	125,115	408,756	1,993,216	66,896	44.65	10.67%	
1982	317,177	136,070	25,119	565	74,055	13,281	143,654	1,098,366	468,707	130,402	411,000	2,108,475	71,476	48.54	10.65%	
1983	369,077	156,281	30,102	582	82,545	15,344	170,137	1,191,214	499,141	134,359	409,304	2,234,018	76,430	55.44	10.32%	
1984	524,481	221,317	38,691	325	129,824	20,040	240,406	1,250,086	503,789	136,748	392,502	2,283,125	78,393	85.01	8.95%	
1985	571,883	238,828	41,793	937	140,554	26,530	265,143	1,270,076	496,746	139,575	380,381	2,286,778	78,470	100.00	8.16%	9.75%
1986	608,887	250,958	45,778	2,290	145,807	29,163	287,029	1,286,375	494,977	141,484	379,902	2,302,738	78,832	102.95	8.68%	
1987	682,764	274,159	61,913	2,288	163,927	32,257	324,407	1,307,827	493,430	144,546	386,058	2,331,861	79,397	110.67	9.17%	
1988	799,182	319,043	59,454	2,718	183,515	36,592	390,838	1,334,650	500,887	148,072	391,799	2,375,408	80,841	121.35	10.16%	
1989	925,444	370,745	82,705	6,208	210,009	43,251	446,718	1,375,670	520,546	152,167	397,367	2,445,750	83,644	132.31	10.38%	
1990	1,077,237	428,296	101,185	13,300	235,956	50,490	526,676	1,427,999	547,121	156,174	404,768	2,536,062	87,278	149.47	10.45%	9.77%
1991	1,248,011	497,274	122,473	8,246	261,868	60,118	606,969	1,461,113	566,231	160,289	406,019	2,593,652	89,841	174.18	9.97%	
1992	1,351,559	550,154	138,202	4,670	294,922	71,687	635,384	1,494,990	588,185	165,039	409,008	2,657,222	92,682	187.99	9.23%	
1993	1,474,457	591,407	156,187	5,768	318,546	82,488	701,138	1,531,735	629,206	169,133	410,527	2,740,601	97,087	200.84	9.20%	
1994	1,693,278	670,539	182,122	6,439	372,507	96,174	810,998	1,568,211	672,811	173,066	413,799	2,827,887	101,683	220.95	9.38%	
1995	1,906,328	742,190	216,040	8,642	412,197	109,709	924,702	1,606,390	707,333	176,915	413,983	2,904,621	105,592	237.44	9.77%	9.51%
1996	2,196,595	850,604	235,317	6,532	470,341	123,543	1,077,633	1,655,266	745,445	180,841	422,696	3,004,248	110,059	258.89	10.19%	

Column (1), (3), (4), (5), (6) and (14) are obtained from National Statistical Coordination Board, National Accounts of Philippines.

Column (2) is the sum of compensation to emplyees plus 50% of unincorporated business surplus, where the unincorporated business is assumed to be 10% of GDP.

Column (7) = (1) - (2) -(1/3)*(5) - (1/10)*(6) - {(2)/[(1)-(3)]}*[(3)-(4)].

The initial year -- 1947 -- data for Column (8), (9), (10) and (11) are constructed from the average of 1946-48 annual gross investments divided by the sum of their respective depreciation rate and annual real GDP growth rate. For the following years, the capital stock is calculated from the stock in the previous year minus depreciation plus gross investment in the current year. The depreciation rates are assumed at 2.5% for construction, 8% for durable equipment, and 5% for breeding stocks and orchard development.

Column (12) = (8) + (9) + (10) + (11)

Column (13) is composed of 2.5% of construction in stock, 8% of equipment in stock and 5% of breeding stocks.

Column (15) = {[(7)/(14)]*100 - (13)}/(12).

Column (16) is the simple 5-year average of annual rates of return.

Appendix B

Relationship between Excess Demand for Foreign Exchange and Excess Demand for Tradable Goods

Exports (X) are the excess supply of exportable goods, which is the supply of exportable goods (Q^s_X) in excess of the demand for exportable goods (Q^d_X). That is,

$$X = Q_X^s - Q_X^d \tag{B-1}$$

By the same token, imports (M) are equal to the excess demand for importable goods. It can be expressed as the demand for importable goods (Q^d_M) more than the supply of importable goods (Q^s_M). That is,

$$M = Q_M^d - Q_M^s \tag{B-2}$$

Therefore, the trade surplus in an economy can be calculated as follows:

-

$$\begin{aligned} X - M &= \left(Q_X^s - Q_X^d\right) - \left(Q_M^d - Q_M^s\right) \\ \rightarrow\rightarrow\rightarrow &= \left(Q_X^s + Q_M^s\right) - \left(Q_X^d + Q_M^d\right) \\ \rightarrow\rightarrow\rightarrow &= Q_T^s - Q_T^d \end{aligned} \tag{B-3}$$

where Q^s_T is the supply of tradable goods and Q^d_T is the demand for tradable goods. In other words, the following equation expressed in change holds:

$$\Delta X - \Delta M = \Delta Q_T^s - \Delta Q_T^d \tag{B-4}$$

This equation implies that the change in the excess supply or demand for foreign exchange by an investment project $(\Delta X - \Delta M)$ must always equal to the change in excess supply or demand for tradable goods $(\Delta Q_T^s - \Delta Q_T^d)$. Therefore, ρ_2 can be automatically applied to the same amount of the acquired or earned foreign exchange by the project in question. Nevertheless, the weights used in the calculation of ρ_1 and ρ_2 are different.