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DYNAMIC PROPERTIES OF COLONIAL DEVELOPMENT

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Dynamic Properties of Colonial Development

by

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This paper investigates the dynamic properties of colonial development in ten countries in Asia, Africa and Latin America for the period from about 1900 until the outbreak of World War II. Using a previously estimated simultaneous equation model of the trade and government sectors for each of these countries,[1] the model is dynamically simulated in this paper with an adjustment for autoregressive errors. These simulations provide the proper framework for investigating the circular structure of colonial development by tracing through the dynamic effects of assumed changes in exogenous variables, dummies, lagged endogenous variables and in the estimated coefficients. These dynamic simulations describe and explain the rapid growth of colonial exports, the large shifts in the endogenous terms of trade and trade balances, and the dramatic increases in colonial government revenue and expenditures. Dynamic multipliers calculated from the simulations measure the quantitative linkage between each of these endogenous variables and changes in real income and prices in the developed world. The results indicate that colonial rather than regional history is more important in explaining differences in these multipliers. For example, the government reflection ratio is higher for countries tied to either U.S. or Japan than for those tied to U.K. The simulations also indicate that the economic losses from the First World War were highest for countries linked to the U.K., while the largest losses from the depression in the 1930's were for countries linked to the U.S.

The first section of this paper presents the colonial model in its most general form and describes the methods used to analyze the dynamic

properties of this model. The short run reduced form solution is derived; the simulation method for calculating intermediate multipliers is outlined; and the calculation method for the long run balanced growth multipliers in derived. The second section analyzes the calculated multipliers, with emphasis put on the important determinants of colonial development. We then turn our attention in section three to an investigation of the impact of major exogenous events upon colonial development. The final section summarizes our conclusions about the dynamic process of colonial development.

I. The Structural Model and the Reduced Form

In a previous paper, we specified and estimated a model of the trade and government sectors for ten colonial countries.[2] The term colonialism was defined in terms of this macro-econometric model which in turn described a specific process of economic development for these ten countries from about the start of the twentieth century until the outbreak of World War II. This colonial model explained the development of economies under direct foreign control such as in Ceylon, India, Jamaica, Nigeria, Philippines and Taiwan, and also of economies under indirect control where foreign influence was more subtle but no less important such as in Chile, Cuba, Egypt and Thailand. For the convenience of the reader, a general form of the model is presented here, and definitions of all the variables are listed in Table 1.

(1) $$\ln X^R_{S_t} = a_o + a_1 \ln Px_t + a_2 \ln Pm_t + a_3 \ln \sum_{i=1}^{\infty} G^R_{t-i} + a_4 \ln X^R_{S_{t-1}} + a_5 D_{S_t}$$

(2) $$\ln X^R_{D_t} = b_o + b_1 \ln Px_t + b_2 \ln Y^R_t + b_3 \ln Pd_t + b_4 \ln X^R_{D_{t-1}} + b_5 D_{D_t}$$

(3) $$\ln X^R_{S_t} = \ln X^R_{D_t}$$

(4) $$\ln M^R_t = c_1 \ln X^R_t + c_2 \ln Pm_t + c_3 \ln Px_t + c_4 D_{M_t}$$

(5) $$\ln M_t = \ln M^R_t + \ln Pm_t$$

(6) $$\ln X_t = \ln X^R_t + \ln Px_t$$

(7) $$\ln P_{T_t} = \ln Px_t - \ln P_{m_t}$$

(8) $$\ln B_{T_t} = \ln X_t - \ln M_t$$

(9) $$\ln R_t = d_o + d_1 \ln X^R_t + d_2 \ln M_t + d_3 D_{R_t}$$

(10) $$\ln G^R_t = e_1 \ln R_t + e_2 \ln G_{t-1} + e_3 D_{G_t}$$

(11) $$\ln G^R_t = \ln G_t - \ln P_{m_t}$$

(12) $$\sum_{i=1}^{\infty} G^R_{t-i} = \sum_{i=1}^{\infty} G^R_{T_o-i} + \sum_{i=T_o}^{t-1} G^R_i$$

Table 1 - Definitions of Variables

B_t	Nominal commodity trade balance
D_{S_t}, D_{D_t}, D_{M_t}, D_{R_t}, D_{G_t}	Dummy variables measuring the impact of exogenous events on the colony's export supply, export demand, import demand, revenue and government expenditure functions respectively.
G_t	Government expenditures
$\sum_{i=1}^{\infty} G^R_{t-i}$	Lagged sum of real government expenditures using 1913 prices
$\sum_{i=1}^{\infty} G^R_{T_o-i}$	Estimated value of accumulated real government expenditure using 1913 prices for base year T_o-1.
M_t	Commodity imports
M^R_t	Real commodity imports in 1913 prices
Pd_t	Domestic price level in the developed country
Pm_t	Paasche import price index with 1913 = 1
Px_t	Paasche export price index with 1913 = 1
P_{T_t}	Terms of trade with 1913 = 1
R_t	Government revenue
X_t	Commodity exports
X^R_t	Real commodity exports in 1913 prices
Y^R_t	Real GNP in the developed country

Two new equations (7) and (8) define respectively, the terms of trade and the nominal trade balance. These additional endogenous trade variables will be analyzed in this paper and do not change the specification of the remaining ten equations which still form the complete behavioral model. For countries with a variable exchange rate, the demand price in (2) is a new variable Px', defined by the additional equation,

$$\ln Px' = \ln Px + \ln \pi$$

where π is the exchange rate of the colony's currency relative to that of the developed country to which it was tied.

The full simultaneous system in twelve unknowns, namely the logarithms of X_S^R, X_D^R, Px, M^R, M, X, P_T, B_T, R, G, G^R, and $\sum_{i=1}^{\infty} G_{t-i}^{R\ 3}$, will be solved for the impact, dynamic and long-run balanced growth multipliers. The methods used to calculate those multipliers will be explained in this section, while the specific values of the multipliers will be reported in the next section as needed.

This system of twelve behavioral and definitional equations constitutes for each country an econometric representation of the circular flow of colonial development. In outline[4], equations (1)-(3) determine a colony's real exports and its export price. Shifts in the export supply schedule are measured by changes in import prices and by increases in real accumulated government expenditures directed toward promoting the growth of real exports. Shifts in the export demand schedule are measured by changes in the developed country's real income, domestic prices, and trade policies. Equation (4) determines real import demand in the colony as a function of its real exports and both its export and import prices. The trade sector is completed by equations (5) and (6) which define, respectively, nominal imports and nominal exports and

by two new equations, (7) and (8), which have already been described. The behavioral part of the model is completed by equation (9), which explains the generation of nominal government revenues either directly or indirectly from real exports and nominal imports and by equation (10), which specifies that nominal government expenditures are a function of that revenue and lagged expenditures. Equation (11) defines real government expenditures; the government accumulation formula is given by equation (12).

The method for calculating the impact multipliers from the short-run reduced form employs the first eleven double logarithmic equations. Using matrix notation for T observations, these equations can be written as:

$$(13) \quad y_t \Gamma + y_{t-1} A + x_t B + \ln \sum_{i=1}^{\infty} G^R_{t-i}\, c = u_t \qquad t = 1, 2, \ldots, T$$

where y_t is a vector of the logarithmns of all the endogenous variables except $\sum_{i=1}^{\infty} G^R_{t-i}$; c is a vector whose first element is the coefficient a_3 of the variable $\sum_{i=1}^{\infty} G^R_{t-i}$ in the supply equation (1) and whose remaining elements are zero; x_t is a vector of both logarithmic and dummy exogenous variables; and Γ, A, and B are the coefficient matrices. The estimation procedure used[5] assumed that the error vector u_t followed a first order autoregressive pattern:

$$(14) \quad u_t = u_{t-1} R + e_t$$

where the e_t's satisfy the usual assumptions:

$$\text{(i)} \quad E(e_t) = 0 \qquad t = 1, 2, \ldots, T$$

$$\text{(ii)} \quad E(e_t)(e_t') = \Sigma \qquad t = 1, 2, \ldots, T, \ \Sigma \text{ positive definite}$$

$$\text{(iii)} \quad E(e_t)(e_\tau') = 0 \qquad t, \tau = 1, 2, \ldots, T, \ t \neq \tau$$

and where R is a diagonal matrix with elements whose absolute value does not exceed one.

From equations (13) and (14), the model becomes:

$$(15)\quad y_t\Gamma = -y_{t-1}A - x_tB - \ln\sum_{i=1}^{\infty} G_{t-i}^R c - e_t + (-y_{t-1}\Gamma + y_{t-2}A + x_{t-1}B + \ln\sum_{i=2}^{\infty} G_{t-i}^R c)R \qquad t = 1, 2, \ldots, T$$

Let $\hat{\Gamma}$, $\hat{A}$, $\hat{B}$, $\hat{c}$, $\hat{R}$, and $\hat{e}_t$ be estimates of Γ, A, B, c, R and e_t, respectively. Solving for y_t yields:

$$(16)\quad y_t = (-y_{t-1}\hat{A} - x_t\hat{B} - \ln\sum_{i=1}^{\infty} G_{t-i}^R \hat{c} - \hat{e}_t)\hat{\Gamma}^{-1} + (-y_{t-1}\hat{\Gamma} + y_{t-2}\hat{A} + x_{t-1}\hat{B} + \ln\sum_{i=2}^{\infty} G_{t-i}^R \hat{c})\hat{R}\hat{\Gamma}^{-1}$$

Then the short-run reduced form multipliers for the exogenous variables x_t are:

$$(17)\quad \frac{\Delta y_t}{\Delta x_t} = -\hat{B}\hat{\Gamma}^{-1}$$

The short-run reduced form multipliers for the lagged endogenous variables y_{t-1} are:

$$(18)\quad \frac{\Delta y_t}{\Delta y_{t-1}} = -(\hat{A} + \hat{\Gamma}\hat{R})\Gamma^{-1}$$

The second term of (18) occurs because of the autoregressive adjustment. The short-run reduced form multipliers for the lagged endogenous variable $\ln \sum_{i=1}^{\infty} G_{t-i}^R$ are:

$$(19)\quad \frac{\Delta y_t}{\Delta \ln\sum_{i=1}^{\infty} G_{t-i}^R} = -\hat{c}\hat{\Gamma}^{-1}$$

which, unlike (18), does not depend on the autoregressive adjustment.

The calculation of the dynamic multipliers requires that a basic dynamic simulation be performed first. For this dynamic simulation, all the actual values of the exogenous variables and only the actual initial values of the lagged endogenous variables are used. Then, successively for each year of the dynamic simulation, calculate first the simulated values of the endogenous

flow variables $\hat{y}_t$ using the matrix equation (16) and then second the simulated value of the endogenous stock variable $\ln \sum_{i=0}^{\infty} G^R_{t-i}$ using equation (12). For a dynamic simulation, the actual values of the lagged endogenous variables are not used in equations (12) and (16). Instead, the simulated values of the lagged endogenous variables which already have been calculated are used, except in the case of the initial values.

The dynamic multipliers then can be calculated directly by performing a new dynamic simulation in which changes in the values of either an exogenous variable or an initial endogenous variable are specified. Then the dynamic multipliers are the difference between the simulated values of the endogenous variables from the new dynamic simulation (and from the basic dynamic simulation.) These dynamic multipliers take into account all the features of the model including the possible distributed lags in equations (1), (2), and (10); autoregressive processes in each behavioral equation; and the non-double logarithmic accumulation equation (12).

The calculation of the long-run balanced growth multipliers requires that the accumulation equation (12) be replaced by a log linear equation. To derive this equation, begin with the long-run equilibrium condition that the stock variable, accumulated real government expenditures, grows at a constant annual rate $\bar{r}_{\Sigma G}$ where:

$$(20) \qquad \bar{r}_{\Sigma G} = \frac{G^R_t}{\sum_{i=0}^{\infty} G^R_{t-i}} = \frac{G^R_{t-1}}{\sum_{i=1}^{\infty} G^R_{t-i}}$$

Taking logarithms, and letting $\bar{g}_{\Sigma G} = \ln \bar{r}_{\Sigma G}$, where $\bar{g}_{\Sigma G}$ is the corresponding constant continuous growth rate of accumulated real government expenditures, yields:

$$(21) \qquad \ln \sum_{i=1}^{\infty} G^R_{t-i} = \ln G^R_{t-1} - \bar{g}_{\Sigma G}$$

Thus, for long-run balanced growth, equation (12) can be replaced by equation (21). Equation (19) implies, of course, that the flow variable G_t^R grows at the same rate as the stock variable $\sum_{i=1}^{\infty} G_{t-i}^R$.

On the long-run balanced growth path, the endogenous variables are growing at a vector of constant rates $\bar{g}_y$, where:

(22) $\bar{g}_y = y_t - y_{t-1}$

Further, this path has no deviations and, therefore, no autoregressive process. Thus, this path can be derived from equation (13) with no error term after the successive substitution of the two conditions of equations (21) and (22). First, substituting (21) into (13), we obtain:

(23) $y_t \Gamma + y_{t-1} A + x_t B + (\ln G_{t-1}^R - \bar{g}_{\Sigma G})c = 0$

As the last of the 11 lagged endogenous variables is $\ln G_{t-1}^R$, then this expression can be simplified by defining

(24) $A^* = A + u_{11} c$

where u_{11} is an 11 component column unit vector with the last element one and the remaining elements zero. Using (24), equation (23) becomes:

(25) $y_t \Gamma + y_{t-1} A^* + x_t B - \bar{g}_{\Sigma G} c = 0$

Now substituting (22) into (25) yields:

(26) $y_t(\Gamma + A^*) + x_t B - \bar{g}_y A - \bar{g}_{\Sigma G} c = 0$

Now partition B into its column vector of constant terms b_1 and the remaining matrix B*, and denote x_t^* as a vector of exogenous variables omitting the constant term. Then equation (26) becomes:

(27) $y_t(\Gamma + A^*) + x_t^* B^* + b_1 - \bar{g}_y A^* - \bar{g}_{\Sigma G} c = 0$

Solving (27), we obtain the long-run reduced form as:

(28) $y_t = -x_t^* B^* (\Gamma + A^*)^{-1} + (b_1 - \bar{g}_y A^* - \bar{g}_{\Sigma G} c)(\Gamma + A^*)^{-1}$

Then the long-run balanced growth multipliers are:

(29) $\frac{\Delta y_t}{\Delta x_t} = - B^*(\Gamma + A^*)^{-1}$

The estimates of these multipliers are obtained by replacing B^*, Γ and A^* with the corresponding estimated coefficient matrices $\hat{B}^*$, $\hat{\Gamma}$ and $\hat{A}^*$. An important property of these estimated multipliers (is that they) do not require estimates of the long-run growth rates of any of the variables in the model.

Historical Accuracy of the Model and Its Stability Properties

Our confidence in the analysis of the dynamic properties of this system depends upon the quality of the basic dynamic simulations of the model for each country for the full estimation period. These basic simulations revealed no systematic divergences in the simulation plots between the calculated and observed values for each endogenous variable of the model. Thus, these favorable simulation results provide the necessary empirical support for analyzing the dynamic properties of colonial development and measure the historical accuracy of the model in explaining the process of colonial development.

For example, Table 2 compares for each country the standard errors computed from its estimated export supply and demand equations with the standard errors of exports from the dynamic simulations. The accuracy of the model in explaining export development, and thus the reliability of our analysis of the dynamic properties of this development is confirmed by these results which reveal no dramatic difference between these standard errors.

We have shown previously[6] that to explain colonial development required specifying as endogenous both government expenditures and the export price. The simulations indicated that the model explained quite well the historical pattern of the cyclical fluctuations in export prices, a measure of which is the relatively low standard errors of the simulated export price reported in Column (4) of Table 2. Columns (5) and (6) in Table 2 also indicate that accumulated real government expenditures were very accurately explained over

Table 2: Measures of Historical Accuracy of the Model

Country	Standard Errors of:					Residual of $\sum_{i=1}^{8} G^{R}_{t-i}$ in Final Year of Simulation
	Export Supply Equation	Exports Demand Equation	Simulated Exports	Simulated Export Price	Simulated $\sum_{i=1}^{8} G^{R}_{t-i}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Ceylon	.069	.075	.087	.114	.017	.0076
Chile	.195	.176	.190	.129	.064	.1547*
Cuba	.123	.112	.106	.170	.060	.0845
Egypt	.111	.092	.088	.217	.053	.0611
India	.077	.083	.107	.126	.031	.0028
Jamaica	.148	.126	.128	.110	.035	-.0001
Nigeria	.069	.076	.078	.189	.077	-.0172
Philippines	.110	.090	.092	.125	.033	.0181
Taiwan	.086	.118	.097	.087	.020	.0058
Thailand	.091	.087	.079	.183	.043	-.0103
Average	.1079	.1035	.1052	.1458	.0437	.0362**

*Four years earlier the residual was .0258

**Average absolute residual

time by the dynamic simulations. Thus, the results of these dynamic simulations indicate that our econometric model does indeed explain endogenously the time patterns of export prices and of accumulated real government expenditures.

We also investigated the stability properties of the model by analyzing the impact of exogenous shocks on the endogenous variables. These shocks ranged in magnitude from a unit increase to a unit decrease in a given year in the value of each exogenous variable appearing in the equation system. For the exogenous variables appearing as logarithms, this was equivalent to a 172 percent increase or to a 63 percent decrease, respectively. These changes were larger than any which appeared in the data. For each dummy variable appearing in a behavioral equation, this one-year change in the dummy was equivalent to the same change in the error term of that behavioral equation. Such an error was much larger than any of the residuals for any of the fifty equations we estimated. For every country, each simulation of the model with these one-year exogenous shocks converged without oscillations toward the country's original long-run path. Thus, we concluded that the process of colonial development was very stable.

II. Dynamic Multipliers

The dynamic multipliers in elasticity form for all ten countries are presented in Appendix Tables 1-4. The first table reports the multipliers associated with an assumed 1 percent increase in the initial value of the stock variable, accumulated real government expenditures. For each country, reading across a row in Table 1, this initial increase causes the computed percentage changes in the endogenous variables for selected years.[7] For

example, Table 1A reports the real export multipliers for a 1 percent increase in the stock variable. Thus, for Ceylon, real exports would have increased by .207 percent in the first year, by .358 percent in the fifth year, by .317 percent in the tenth year, and so on. Appendix Tables 2-4 report the multipliers associated with the colonies' import prices and with the developed countries' real income and domestic price variables. These multipliers show the impact of these exogenous variables via the international trade linkages upon the economies of the colonies. Tables 2-4 report the multipliers associated with an assumed 1 percent change in an exogenous variable for all years in the simulation. For each country, reading across a row in Tables 2-4, this sustained increase caused the reported percentage changes in the endogenous variable. Thus, Table 3A shows that for Ceylon a 1 percent sustained increase in the real income of the United Kingdom would have caused a .320 percent increase in real exports in the initial year, a .636 percent increase after 5 years, a .694 percent increase after 10 years, and so on. For long-run balanced growth (LRBG) this real export multiplier is 1.026 percent. In all cases, the dynamic multipliers for the exogenous variables are correctly converging toward the long-run balanced growth multipliers. The dynamic multipliers for a change in the initial value of the endogenous government stock variable are converging toward zero in the long run, and since these particular LRBG multipliers are all zero, Table 1 omits these LRBG multipliers.

At this point, we should reemphasize that the impact multipliers, which are the multipliers for the first year, do not take into account the dynamic features of the specified model. The importance of the dynamic features can be clearly seen where multipliers change signs.[8]

(a) Changes in Initial Value of Accumulated Real Government Expenditures

Our previous paper confirmed the importance of the government sector in promoting the development of an export economy by shifting rightward the supply schedule of real exports. A simulation of the model in which accumulated real expenditures is increased in some initial base year T_o yields multipliers which measure the impact of these expenditures on all the endogenous variables of the colonial country. One of the most important of these multipliers is called the government reflection ratio,[9]

$$\Delta \ln G_t / \Delta \ln (\sum_{i=0}^{\infty} G^R_{T_o - i}) \text{ where } t > T_o.$$

Ceteris paribus, this ratio[10] measures the productivity of past government expenditures in generating current expenditures through the circular process of colonial development. Thus, at each point of time the higher the ratio the more productive was the government in allocating its own resources to generate real exports and, via the specified dynamic process of the model, to generate a higher level of future expenditures by the government itself.

As an increase in accumulated real government expenditures shifts the real export supply function rightwards, then real exports will rise and the export price will fall; the actual impact multipliers for real exports and export price can be derived from the structural equations (1)-(3) as:[11]

$$\frac{\Delta \ln X^R_t}{\Delta \ln \sum_{i=1}^{\infty} G^R_{t-i}} = - \frac{a_3 b_1}{a_1 - b_1} > 0$$

$$\frac{\Delta \ln P_x}{\Delta \ln \sum_{i=1}^{\infty} G^R_{t-i}} = - \frac{a_3}{a_1 - b_1} < 0$$

since $a_1 > 0$, $a_3 > 0$, $b_1 < 0$

The larger the coefficient a_3, measuring the export promoting productivity of government expenditures, the larger will be these multipliers, while the larger the supply and demand price elasticities, a_1 and b_1, respectively, the smaller will be these multipliers. Appendix Tables 1A and 1B give the values of these impact multipliers and also the dynamic multipliers. The signs of the impact multipliers are as expected, and over time these signs do not change.

Because real exports are rising while the export price is falling, as a result of this rightward shift of the supply schedule, the impact multiplier for real imports can be either positive or negative

$$\frac{\Delta \ln M_t^R}{\Delta \ln \sum_{i=1}^{\infty} G_{t-i}^R} = -\frac{a_3 (c_1 b_1 + c_3)}{a_1 - b_1} \gtreqless 0, \text{ when } (c_1 b_1 + c_3) \lesseqgtr 0$$

where $a_3 > 0$, $c_1 > 0$ and $c_3 < 0$.

Note that the magnitude but not the sign of this multiplier depends on the marginal productivity a_3 of export promoting government expenditures. The sign of this multiplier depends only on the price elasticity b_1 of export demand and on the coefficients c_1 and c_3 of the import equation. The more price inelastic the demand for real exports, the more likely this multiplier will be negative. Correspondingly, the change in nominal imports cannot be predicted, because with an unchanged import price, the nominal import multiplier equals the real import multiplier. Therefore, even though real exports have increased, the multiplier for revenues can be either positive or negative, because the nominal import multiplier's sign is indeterminate. The actual impact multiplier for government revenue is

$$\frac{\Delta \ln R_t}{\Delta \ln \sum_{i=1}^{\infty} G_{t-i}^R} = \frac{-a_3 (d_1 b_1 + d_2 (c_1 b_1 + c_3))}{a_1 - b_1} \gtreqless 0, \text{ when } d_1 b_1 + d_2 (c_1 b_1 + c_3) \lesseqgtr 0.$$

The sign of the reflection ratio for the first year, like that of the revenue multiplier, is indeterminate. This result occurs because the reflection ratio for the first year is then derived as

$$\frac{\Delta \ln G_t}{\Delta \ln \sum_{i=1}^{\infty} G^R_{t-i}} = e_1 \frac{\Delta \ln R}{\Delta \ln \sum_{i=1}^{\infty} G^R_{t-i}}$$

where e_1 is a positive coefficient measuring the expenditure of the government out of current revenue. According to Table 1F there are countries whose government expenditures fall in the first year as a result of an increase in the stock of real government expenditures and there is one country, Egypt, where there is only a small rise in government expenditures.

The dynamic reflection ratios in Table 1F reveal clearly two groupings of countries: a low productivity bloc, consisting of Egypt, India, Jamaica, and Thailand, in which the multiplier is close to zero; and a bloc of the remaining countries in which the multiplier is positive and significantly different from zero.[12] Nigeria is considered to be a member of the latter bloc because its reflection ratio becomes positive in the second year. Of the ten countries, the Philippines stands out as having the highest reflection ratios. This result is quite consistent with its economic history under American rule during which time much of the colonial government's effort was directed towards development expenditures on transport, education, health and so forth.[13] The countries having the highest government reflection ratio were associated with American influence (Chile and Cuba) or direct American control (the Philippines) or Japanese control (Taiwan). One might conclude that dependence on America or Japan resulted in the relatively efficient development of an export economy.[14] The story for British colonialism is mixed. India, Jamaica, and Egypt had the slowest growth of real exports of

the ten countries, and they are also countries with long historical experience of foreign contact and influence.[15] Historical developments may have acted to establish economic and social barriers which were difficult to overcome, such as the caste system in India or the British emphasis on financial control in Egypt to repay its previous loans. Thailand did have a much higher growth rate of real exports than did these three countries, but the possibility of increased government activity toward development expenditures was constrained by the financial control of the British.[16]

These results suggest that although the process of export development may have been similar, the effects of colonialism differed among the ten countries in terms of the governmental effort to promote an export economy. This conclusion does not depend on the size of the government reflection ratio, for it is equally as important in explaining the low growth of India, which had the lowest ratio, as in explaining the high growth of the Philippines, which had the highest ratio.

For the low productivity bloc, the real export multipliers (see Table 1A) fall over time while for the rest of the countries, an increasing pattern is observed from the short to the intermediate run. The multipliers of the latter group of countries fall in magnitude only as the end of the first decade is approached.

The relative gains from colonial export promoting government expenditures can be measured by the multipliers for real imports. Table 1C reveals that over time a negative or low reflection ratio has, as its dual, a negative import multiplier while a country with a positive reflection ratio has a positive import multiplier. Thus, the Philippines is able to capture some of the real benefits associated with having the highest reflection ratio by also having the highest real import multiplier.

Table 1D shows that the nominal balance of trade would have shifted over time toward a nominal trade deficit as a result of an increase in the stock of real government capital. If we assume that such an increase in the stock of government capital arose from foreign aid by the developed country to its colony,[17] then over time the mother country would have found it necessary to continually finance its colony's trade deficit, although at a diminishing rate. Although colonial foreign aid would have created a nominal trade deficit, colonial real exports would have increased. Thus, if the mother country had been interested more in the gains from increased colonial exports rather than in its colonial balance of payments position, then it would have granted its colonies foreign aid for its own benefit.

The impact multiplier for accumulated real government expenditures itself can be derived from equation (12) as *:

$$\frac{\Delta \ln \sum_{i=0}^{\infty} G^R_{t-i}}{\Delta \ln \sum_{i=1}^{\infty} G^R_{t-i}} = 1 + \frac{G^R_t}{\sum_{i=0}^{\infty} G^R_{t-i}} \left(\frac{\Delta \ln G^R_t}{\Delta \ln \sum_{i=1}^{\infty} G^R_{t-i}} - 1 \right)$$

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*This result can be derived by rewriting equation (12) as:

$$\sum_{i=0}^{\infty} G^R_{t-i} = \sum_{i=1}^{\infty} G^R_{t-i} + G^R_t$$

Taking logarithms and exponentials:

$$\ln \sum_{i=0}^{\infty} G^R_{t-i} = \ln \left(e^{\ln \sum_{i=1}^{\infty} G^R_{t-i}} + e^{\ln G^R_t} \right)$$

Then

$$\frac{\Delta \ln \sum_{i=0}^{\infty} G^R_{t-i}}{\Delta \ln \sum_{i=1}^{\infty} G^R_{t-i}} = \frac{e^{\ln \sum_{i=1}^{\infty} G^R_{t-i}} + e^{\ln G^R_t} \left(\frac{\Delta \ln G^R_t}{\Delta \ln \sum_{i=1}^{\infty} G^R_{t-i}} \right)}{e^{\ln \sum_{i=1}^{\infty} G^R_{t-i}} + e^{\ln G^R_t}}$$

Simplifying:

$$\frac{\Delta \ln \sum_{i=0}^{\infty} G^R_{t-i}}{\Delta \ln \sum_{i=1}^{\infty} G^R_{t-i}} = \frac{\sum_{i=1}^{\infty} G^R_{t-i} + G^R_t \left(\frac{\Delta \ln G^R_t}{\Delta \ln \sum_{i=1}^{\infty} G^R_{t-i}} \right)}{\sum_{i=0}^{\infty} G^R_{t-i}}$$

Rearranging, the desired result is obtained.

This multiplier thus depends on both the government reflection ratio and also on the growth rate at time t of real accumulated government expenditures, which is defined as

$$\varepsilon_t = \frac{G^R_t}{\sum_{i=0}^{\infty} G^R_{t-i}}$$

Furthermore, since

$$\frac{\Delta \ln \sum_{i=0}^{\infty} G^R_{t-i}}{\Delta \ln \sum_{i=1}^{\infty} G^R_{t-i}} \gtreqless 1, \quad \text{when} \quad \frac{\Delta \ln G^R_t}{\Delta \ln \sum_{i=1}^{\infty} G^R_{t-i}} \gtreqless 1,$$

then the multipliers for accumulated real government expenditures can theoretically increase over time when the government reflection ratio is greater than one. For all countries in our sample, however, the multipliers did decrease monotonically over time because their government reflection ratios were always less than one (see Table 1F).

Since in the long run, no colonial country could maintain an initial 1 percent increase in the real stock of its government capital, then colonial countries were characterized by a marginal productivity of government expenditures which diminished over time. Thus, all the other dynamic multipliers for a change in initial value of the endogenous government stock variable must also have diminished toward zero. These results, which occur because the government reflection ratio is less than one, explain our earlier conclusion about the stability of the model--the simulation path for an exogenous shock converging toward each country's original growth path in the long run.[18]

(b) Change in the Import Price

A change in the import price, determined exogenously in the developed world, initially had a depressing effect upon the colonial economy. Ceteris paribus, a rise in import prices shifts the real export supply leftward, thus decreasing real exports and increasing the export price. The impact

multipliers for real exports and the export price are:

$$\frac{\Delta \ln X^R}{\Delta \ln P_M} = - \frac{a_2 b_1}{a_1 - b_1} < 0$$

$$\frac{\Delta \ln P_X}{\Delta \ln P_M} = - \frac{a_2}{a_1 - b_1} > 0, \text{ since } a_2 < 0, \; a_1 > 0 \text{ and } b_1 < 0.$$

Over time, however, a sustained 1 percent increase in the import price would have eventually lead after 30 years to an average 1.018 percent export price increase for all the countries, and for the long run balanced growth path, to a 1.472 percent increase in export prices (see Appendix Table 2B). With import prices changing by 1 percent, the terms of trade multiplier is 1 percent less than the export price multipliers of Table 2B. Thus, if the import price had increased, the results of the model indicate that the average terms-of-trade would have moved first against the colonies and then, as the long run was approached, the terms-of-trade would have moved in their favor. India is the one exception to this finding. This empirical result suggests that one specific value of India as a colony to the United Kingdom was that even in the long run the shift in the terms-of-trade would have remained adverse to India. In the cases of all other U.K. colonies, on the other hand, the initial unfavorable shifts in their terms-of-trade would have been substantially reversed.

This surprising result about the time pattern of the terms-of-trade can only be understood by examining the dynamic properties of the model. Basically, the key effect would have been changes in the government sector, which then would have fed back onto the export sector. Because of the assumed one percent increase in the import price, and the resulting decline in real exports, then real imports would have always fallen for all ten countries

(see Table 2C). To obtain the multipliers for nominal imports, add 1 to the multiplier for real imports reported in Table 2C. Then, nominal imports would have initially risen for all ten countries. However, nominal imports can fall over time as can be seen in the case of Taiwan after 10 years and in the additional cases of Cuba, Chile, and the Philippines as the long run balanced growth path is approached.

Since real exports could have fallen, then the signs of the multipliers for government revenues and expenditures are indeterminate whenever nominal imports are rising, but definitely become negative over time for the four countries whose nominal imports fall over time. Table 2E reveals that the government's nominal expenditures would have not risen as much as the assumed increase in the import price for any of the country's in the sample. Therefore, the real government expenditure multipliers are always negative for all ten countries. Table 2F shows the resulting decrease over time in accumulated real government expenditures. This implies, in turn, a dynamic leftward shift of the export supply curve and thus a downward trend over time in the real export multipliers (see Table 2A) and, finally, an upward trend in export prices. Table 2F indicates that India has the smallest loss over time in terms of the trend of real accumulated government expenditures and thus the smallest recovery in its export price. The low productivity bloc, consisting of Egypt, India, Jamaica, and Thailand, has the smallest decreases over time in real accumulated government expenditures and thus the smallest drop in real exports over time (see Table 2A).

(c) Change in Developed Country's Real Income

Ceteris paribus, a 1 percent increase in the developed country's real income shifts the export demand schedule to the right such that both real

exports and the export price initially rise as shown by the following impact multipliers

$$\frac{\Delta \ln X^R_t}{\Delta \ln Y^R_t} = \frac{a_1 b_2}{a_1 - b_1} > 0$$

$$\frac{\Delta \ln Px_t}{\Delta \ln Y^R_t} = \frac{b_2}{a_1 - b_1} > 0$$

Since both of these impact multipliers are positive, all the remaining impact multipliers are also positive. Both real and nominal imports rise as

$$\frac{\Delta \ln M^R_t}{\Delta \ln Y^R_t} = \frac{\Delta \ln M_t}{\Delta \ln Y^R_t} = \frac{b_2(c_1 a_1 + c_3)}{a_1 - b_1} > 0$$

The impact multipliers for government revenues and expenditures are

$$\frac{\Delta \ln R_t}{\Delta \ln Y^R_t} = \frac{d_1 a_1 b_2 + d_2 b_2 (c_1 a_1 + c_3)}{a_1 - b_1} > 0$$

$$\frac{\Delta \ln G_t}{\Delta \ln Y^R_t} = e_1 \frac{\Delta \ln R_t}{\Delta \ln Y^R_t} > 0$$

The principal dynamic effect over time of a sustained increase in the developed country's real income is a rightward shift in the export supply schedule in response to the rightward shift in real export demand. The response mechanism is the increase of government expenditures which in turn increases the stock of accumulated real government expenditures used to promote exports. With rightward shifts of both supply and demand, the dynamic multipliers for real exports are positive and increase monotonically over time for all countries, as can be seen in Appendix Table 3A.

A sustained increase of real income in the developed world would have produced uneven development over time and between countries in the growth of real colonial exports. This process of uneven development is quantitatively

measured by the dynamic multipliers for real exports, which show that the average gap narrows over time between the colonial real export multipliers and the increase in the developed country's real income, but that the average multiplier is always less than one. Only in three countries--Ceylon Nigeria and Taiwan--would the increase of real exports have exceeded that of the developed countries real income. The Nigerian multiplier first exceeds one after 13 years, while it takes 23 years for Taiwan,[19] and only in the approach to the long run balanced growth path does Ceylon's multiplier exceed one. For all points in time up to 30 years the smallest multipliers are for those countries under U.S. influence. However, as the long run path is approached, the Philippines' multiplier increases substantially and then exceeds those of the U.K. colonies, Egypt, India and Thailand, whose multipliers increase relatively little over time.

Whereas initially the export price and the terms-of-trade[20] move substantially in favor of the colonial countries, over time this price gain diminishes as real export supply increases. Table 3B shows that the export price increase would have been the smallest for the U.S. bloc. The fall from the initial increase in the export price would have been the least for the low productivity bloc and Chile. Ceylon is an exceptional case because it is the only country for which the export price increase turn into a decrease after 20 years. This result occurs because Ceylon had the highest estimated long run coefficient of real accumulated government expenditures in its export supply equation.[21]

Table 3F reveals that the trend of the real accumulated government expenditure multipliers is always positive which is the cause of the downward trend in export prices as export supply shifts rightward. Interestingly

enough, only in the long run were the colonies able to capture the increase of income in the developed countries, the average long run expenditure multiplier being 1.032. Nigeria, however, stands out as the one colony in our sample best able to capture real growth in the center with a long-run multiplier of 3.206. The average long run balanced growth multiplier for the nine countries, excluding Nigeria, is .792, indicating that it takes a very long time for income changes in the developed world to be reflected in the colonial world. A similar pattern can be seen in the real export multipliers (see Table 3A). The time trend of these multipliers is obviously increasing, but the average long run multiplier for all ten countries is .896, and .740 excluding Nigeria.

The real import gains to the colonial countries from an assumed increase in real income in the developed world are measured by the multipliers in Table 3C. On average, the increase in colonial real imports would have been about equal to the increase in the developed country's real income. Over time, however, there is a downward trend in the real import multipliers for the low productivity group, while the multipliers increase for the rest of the countries. Comparing the long run balanced growth multipliers with those after five years, the Philippines shows the largest increase in its real import multiplier due to the corresponding large increase of its real export multiplier. Consistent with the magnitude of the real export multipliers, the U.S. bloc countries show the smallest real import multipliers except as the Philippines approaches the long run. In fact, Chile and Cuba stand out as having the smallest real import gains of all ten countries.

Table 3D reveals that an income increase in the developed world would have always led to a shift in the nominal trade balance of the colonies

toward an export surplus. Ceylon is the one exception to this trend, having a nominal export deficit after 30 years due to the adverse movement of its terms-of-trade. Although the average shift for all countries toward a nominal trade surplus would have diminished through time, the average shift would have remained positive even in the long-run, indicating that income increases in the developed countries would have led to the accumulation of reserves in either London, New York or Tokyo. In fact, the larger was the increase of real income, the larger would have been the accumulation of reserves as a result of this income expansion.

The two countries where this accumulation would have been largest are Egypt and Thailand. A 1 percent increase in the real income of the U.K. would have led to a more than 1 percent shift in the nominal trade balance toward an export surplus in the short, intermediate, or long run position for these two countries. This pattern is consistent with the economic history of Egypt and Thailand where British influence led to a substantial increase in their reserves held in London, rather than in Cairo or Bangkok.[22].

(d) Changes in Developed Country's Domestic Prices

An assumed change in domestic prices in the developed countries produces a set of impact multipliers which only differ in magnitude by a scalar from those produced by a change in real income. This scalar equals the ratio of the domestic price coefficient to the real income coefficient in the estimated demand equation for the colony's real exports.

Previously, we found that for up to 30 years the U.S. bloc countries had the smallest real export multipliers produced by a change in the developed country's real income. A reverse ordering is apparent if we examine the

effects on real exports of a change in the developed country's domestic prices (see Table 4A). This suggests, in contrast to the United Kingdom and Japan, that United States prices were more important than its real income in determining real export activity in its trade dependent countries. This result reflects the greater internal substitution within the United States economy as compared to Japan or the United Kingdom. For example, the long run real export multiplier for the Philippines is greater than one and nearly one for Cuba, suggesting the strong competition in the U.S. between imported sugar and domestically produced beet sugar. A long run coefficient of .503 for Chile indicates the ability of the U.S. economy to produce and buy domestic copper. The high multiplier for Nigeria indicates that it was the colony most influenced by both price and, as previously found, income changes in the developed world.

Table 4B shows that an increase in prices in the developed world would have spilled over into the colonial world by raising export prices. The export price and thus the terms of trade would have shifted in favor of each colony. However, the export price multipliers would have diminished over time reflecting the rightward shift in the supply schedule as the colony responded to the increase in demand for its exports. As described previously, Ceylon is an exception, where after 30 years, its export price multiplier becomes negative.

III. Dynamic Simulations of Exogenous Changes

This section examines the quantitative impact of major exogenous changes on the pattern of colonial development. The percentage gains and losses from the two major historical events, World War I and the Great Depression, will

be investigated. In addition, the losses produced by the restrictive trade policies pursued by the United States during the 1930's will be analyzed. For each year, the percentage gain or loss is calculated from dynamic simulations assuming that these major exogenous events or policies did not occur, and that the exogenous variables continued to grow at their pre-war rates to examine the impact of World War I or to grow at their pre-depression rates to examine the impact of the Great Depression and particular restrictive trade policies. Simulations are also performed for particular countries to measure the effects of dropping specific country dummy variables or starting them at different years.

(a) World War I and Its Aftermath

Table 5 shows the effects produced by World War I on the endogenous variables by simulating the model from 1915[23] onwards, assuming that the exogenous variables grew at their pre-war rates and omitting the dummy variables for World War I. The uneven impact of the war is measured by changes in real exports reported in Table 5A. The three countries associated with the U.S., the Japanese colony, Taiwan, and Thailand all had increased real exports as a result of the war. The remaining five countries under U.K. control incurred real export losses ranging from small in Ceylon and India to large in Egypt, Nigeria, and Jamaica. The largest fall in real exports occurred in Egypt which was under direct British control during the war and was the principal supply base for British troops in the Near East. Egyptian real exports dropped markedly due to shipping shortages, restrictions on trade, and reduced availability of imported goods. The second largest fall in real exports occurred in Nigeria which was cut off from its German export market. Since Germany accounted for 50 percent of Nigeria's pre-war exports, the

elimination of this market disrupted Nigeria's economy. Jamaica's real exports fell due to the lack of shipping space for its bulky exports, particularly bananas and sugar. Ceylon's and India's tea exports were restricted during the war when the colonial administration bought in bulk the tea crop at an average pre-war price.

As Table 5B indicates, export prices rose very rapidly as the result of the war in every colony except Ceylon, where tea prices were controlled by the Government. War induced demand for war materials and food shifted rightwards the demand schedule for exports. This shift is measured by the rise of domestic prices in the developed countries. However, for some colonies, the shortage of shipping space limited the export of bulky products, and therefore, limited this rightward shift of the demand schedule. On the export supply side, the rapid increase in the price of imports increased costs to export producers and shifted leftwards the export supply schedule. The shortage of imported supplies for some countries increased this leftward shift of the supply schedule. With the demand schedule shifting rightwards and the supply schedule shifting leftwards, then real exports could have either risen or fallen as a result of the war. As both the estimated supply and demand schedules are relatively price inelastic, war induced shifts in these schedules caused relatively large increases in export prices during the war.

During the war, real imports in the five countries under direct U.K. control,[24] Ceylon, Egypt, India, Jamaica and Nigeria, were substantially reduced (see Table 5C). These reductions indicate that the U.K. was effectively able to shift part of the substantial costs of its war effort onto its direct colonies, and, therefore, these colonies were used to support indirectly the

British war effort. In contrast, Thailand benefitted because it was not a direct British colony; Taiwan benefitted because Japan was not a war participant; and the U.S. bloc benefitted because the U.S. economy expanded throughout the war period.

Real accumulated government expenditures were reduced in all ten countries as a result of the war (see Table 5G). This reduction in the stock of government capital was caused mainly by the rise in import prices in all ten countries which led to an effective decline in the flow of real government expenditures. Although nominal imports rose for all countries, real exports, as shown above, could have risen or fallen as a result of the War; and correspondingly, nominal revenues and expenditures could have moved in either direction. Table 5F shows that nominal expenditures fell for three U.K. colonies--Ceylon, Egypt, and Nigeria. For these three countries, the revenue lost from the fall in real exports exceeded the gain in revenue from the increase in nominal imports. The U.K. colonies India and Jamaica, on the other hand, experienced a rise in nominal expenditures because the revenue increase from the gain in nominal imports exceeded the revenue decrease from the fall in real exports. For the U.S. bloc countries and also Taiwan and Thailand, both real exports and nominal imports rose; and, therefore, their revenues and expenditures increased.

The gains in nominal government expenditures experienced by these last seven countries were, however, less than the substantial increase in import prices during the war. Thus, real expenditures fell in these countries as well as in the three countries whose nomin al expenditure fell. Therefore, accumulated real government expenditures fell as a result of the war for all the countries in our sample.

Following World War I, the international price inflation that began with the War increased to a peak in 1920 and was followed by a severe world-wide depression and deflation in 1921. In order to identify the dynamic impact of these postwar events as well as the long run impact of the war itself, we have reported our simulation results up to the mid-1920's. With the exception of the Philippines and Thailand, real exports losses occurred throughout this period as can be seen in Table 5A. Chile shifted from a gain during the war to a loss after the war, because of the development of synthetic nitrate production. By the mid-1920's, when prices had stabilized and economic growth had resumed in the developed countries, only two countries--Ceylon and Nigeria--had large real export losses. Ceylon's loss was due to an output restriction scheme on tea established after the war and to the decreased demand for its coconut products as a result of the rapid entry of the Philippines into the coconut market.[25] Nigeria's continued loss occurred primarily because it regained very little of the faster growing German export market and had to shift to a slower growing U.K. export market.

In the postwar period, colonial export prices rose faster than the simulated level of prices based upon prewar trends in every country except Egypt where export prices declined beginning in 1922. The rise in export prices reached a peak in the world-wide inflation of 1920 and then began a relative decline from this peak. This pattern of international price inflation and deflation is clearly shown by the simulations in Table 5B. However, even at the trough of the 1921 deflation, export prices were still higher than their simulated level of prices based upon prewar trends, as a result of the influence of inflationary conditions produced by the war. For the one exception, Egypt, export prices were growing at the very high prewar trend rate of 4.6 percent, and the decline in prices after 1922 reflected the decrease in

U.K. demand for Egyptian cotton as the result of colonial policy to expand other cotton producing areas within the British Empire.

Those countries which showed real export gains from the impact of World War I had a continued favorable shift in their terms of trade after the War. The only exception is Chile where a relatively declining export market for nitrate and rising import prices produced an adverse shift in the terms of trade.

The terms of trade moved against the five U.K. colonies of Ceylon, Egypt, India, Jamaica and Nigeria, all of which showed real export losses from the impact of World War I. The main reason for this was the rapid rise in import prices after the war which, combined with the slow recovery of export demand from the effects of the War, shifted the terms of trade against these countries. The trend in the pattern of the terms of trade of Jamaica became somewhat mixed in the 1920's because of stronger Canadian demand for Jamaican products.[26]

Although World War I and its aftermath had an uneven impact upon the colonial countries--causing expansions of real exports and real imports in some countries (see Table 5C) and declines in others--all but one of the countries in the sample sustained a common long term development loss as measured by the decrease in their accumulated real government expenditures (see Table 5G). The one exception is the Philippines which had fully recovered by 1925. Thus, World War I together with the postwar inflation and the 1921 deflation placed the colonies on a lower development path than would have been the case had this series of major events, produces in the developed world, not occurred.

(b) The Great Depression

The impact of the Great Depression of the 1930's upon the economies of the colonial countries was mixed: quite large real export losses occurred in

the U.S. colonial bloc countries and Ceylon; real exports changed very little for the U.K. colonial bloc, excluding Ceylon; and Taiwan's real exports actually increased as the result of the Great Depression. The calculated percentage decreases or increases in real exports as a result of the Depression are reported in Appendix Table 6A. This table and the ones following provide measures of the real costs or benefits incurred by these colonial countries as a result of this major world-wide depression. For example, the cost of the Depression to Chile in 1932 was a 55 percent reduction in its real exports from the level that would have been reached if U.S. income and prices had grown at pre-Depression rates. At the other extreme, the benefit of the Depression to Taiwan in 1932 was an increase in real exports of 15 percent.

The large real export losses of Chile, Cuba, the Philippines and Ceylon were primarily due to the fact that the United States was the center of the world depression. Thus, the substantial decline in real exports of the U.S. bloc countries as compared to the U.K. bloc countries was a result of the more serious decline of real income and prices experienced by the U.S. economy relative to that of the United Kingdom. In addition, the restrictive trade policies employed by the United States during the 1930's increased the decline in the real exports of Chile, Cuba and the Philippines. The large decline in Ceylon's real exports was due to the depressed state of the U.S. automobile industry during the 1930's, which reduced the demand for Ceylon's rubber that was primarily exported to the United States. Conversely, the expansion of Taiwan's real exports was due to the expansion of the Japanese economy during the 1930's.

The large contraction of real exports for the U.S. bloc countries and Ceylon had a corresponding depressing effect upon real imports, as shown in

Table 6C. Once again, there was a relatively small decline for the U.K. bloc, excluding Ceylon, while Taiwan's real imports increased during the entire period. Real imports for the U.K. bloc began to recover in 1933, especially for Nigeria and Thailand which both showed a gain from 1935-1938, but there is no evidence suggesting a similar recovery for any of the U.S. bloc countries or Ceylon. For these latter countries, the costs of the Great Depression continued until at least the start of World War II, when our simulation period ends.

The Depression caused an unambiguous fall in export prices from 1930 to 1935 for all countries except Taiwan which showed an improvement after 1933 (see Table 6B). From 1930 to 1932, the terms-of-trade moved against all countries with the exception of Taiwan and Jamaica as a result of the Depression (see Table 6D). Ceylon, Cuba, Nigeria and Thailand experienced a recovery in their terms of trade after 1932 due mainly to the more rapid fall in import prices. Chile, Egypt, India and the Philippines did not experience a similar improvement in their terms of trade.

Table 6G measures the cost of the Depression in terms of real accumulated government expenditures. The U.S. bloc clearly suffers in comparison to all the other countries. The increase in real accumulated government expenditures for Ceylon occurred because the decline in its import price index exceeded the decline in its nominal expenditures. The decline in import prices and the steady rise in real accumulated government expenditures for the rest of the U.K. bloc acted to offset the actual, but small, fall in export demand due to the Depression. For all these countries, the supply curve shifted to the right and, as shown in Table 6A, there was only a small change in real exports. Nigeria's exports, in fact, remained slightly positive throughout the period suggesting that this rightward shift outweighed the leftward shift in its

export demand. Of these countries, only India showed a rise in nominal government revenues and expenditures for nearly the whole period. These penditures should have fallen due to the decline in both real exports and nominal imports, which would have produced a corresponding decline in nominal revenues. The explanation for the rise in expenditures was the Indian tariff established in 1931 which counteracted the effects of the Depression.

Table 6E indicates that only Jamaica and Taiwan had a nominal trade surplus between 1930 and 1932. In Ceylon and Chile, the deficit turned into a surplus by 1933 and for Cuba by 1937. The remaining countries--Egypt, India, Nigeria, Philippines and Thailand--continued to run a nominal trade deficit throughout the Depression.

(c) Changes in Dummy Variables

This section examines the impact of exogenous events measured by the dummy variables, whose definitions are listed in Table 3.

(i) U.S. Trade Restrictions

The first set of simulations examined focus upon the effects of the restrictive trade policies pursued by the United States during the 1930's upon Chile, Cuba, the Philippines, and Jamaica, as measured by the dummy variable QUOTA and RESTR. Appendix Table 7A measures the percentage reduction in real exports as a result of U.S. restrictions upon its trade with each of these countries. Chile and Cuba's real exports were about half the level which would have prevailed if there had been no restrictions on their export trade. The Philippines and Jamaica suffered much less. The trade restrictions directed towards the Philippines were not as severe and came somewhat later (1935) in the depression years as compared to those for Chile and Cuba. The reduction in Jamaica's trade with the U.S. was partially offset by an increase

Table 3 - Definitions of Dummy Variables*

FIXED - Thailand, tariffs fixed by Bowring Treaty until 1926, and thereafter increasing tariffs, 1927-1937.

INCOME - Chile, income tax on copper producers, 1926-1938.

INFRA - Nigeria, completion of infrastructure projects--railroad to northern Nigeria and port of Lagos--1917-1938.

LIMIT - Ceylon, international scheme on rubber exports, 1935-1938.

QUOTA - Cuba, U.S. import sugar quotas and tariffs, 1930-1937; Philippines, U.S. import sugar quotas, 1935-1938.

RESTR - U.S. import tariffs and restrictions in Chile, 1932-1938; in Jamaica, 1932-1938.

TARIFF - New tariff schedules in Egypt, 1931-1938; in India, 1931-1937.

*This table does not list the dummy variables for the First World War or for changes in accounting practices.

in the demand for its exports from the U.K., a market during this period that was much less depressed than that of the U.S.. Trade ties with the U.S. economy caused economic difficulties for these four countries during the 1930's, but this partial evidence suggests that legal colonialism as exemplified by the Philippines and Jamaica mitigated the impact of United States trade policies.

The export supply curves as well as the export demand curves shifted leftward in the four countries affected by U.S. restrictive trade policies. These leftward supply shifts occurred in Chile because multinational U.S. copper companies reallocation production from their mines in Chile to their mines in the U.S.; in Cuba because the government employed various internal methods to restrict sugar production; in Jamaica because producers reacted to the loss of the U.S. market by reducing their banana tree plantings; and in the Philippines because producers actually burned their sugar fields. For each country the export price rose or fell depending on whether the leftward supply shift was respectively larger or smaller than the leftward demand shift. Thus, Chile's export price fell because the coefficient of the trade restriction dummy in the demand equation was larger in magnitude than that in the supply equation. The reverse result holds for Cuba, Jamaica, and the Philippines.[27]

The reduction in real exports for these countries and the resulting fall in both real and nominal imports caused a decline in nominal revenues and expenditures, and, therefore, a reduction in real accumulated government expenditures. The most substantial reduction in the real stock of government expenditures occurred in Chile. This reduction implied a further leftward shift in its export supply curve, which thus dampened the falling pattern of Chile's export prices (see Table 7B). In Cuba and Jamaica, the reduction in the real stock of government expenditures and the resulting further leftward shift in their supply curves caused a further rise in export prices. A

similar pattern should hold for the Philippines, but because of the underlying autoregressive structure and the late imposition of the quota, there are only enough observations to just start this dynamic pattern as measured by the small rise in its export price from 1937 to 1938.

Since the pattern of the terms of trade is the same as that of the export price, a favorable shift occurred in the terms of trade for Cuba, Philippines, and Jamaica, and an adverse shift for Chile. Correspondingly, there was a deficit in the nominal balance of trade for Chile and nominal surpluses for the other three countries (see Table 7D). The restrictive trade policies pursued during the 1930's by the U.S. led, then, to an improvement in its nominal balance of trade only with Chile.

We have noted that the Philippines suffered much less of an export loss than did Chile and Cuba from restrictive U.S. policies during the 1930's. One way to measure this differential impact is to assume that the more favorable Philippine trade restrictions were imposed upon Chile and Cuba. These simulations reveal that real exports for Chile and Cuba would have increased an average of 81 percent and 70 percent respectively over the level of real exports that occurred under the actual trade restrictions. Both countries would also have had higher accumulated real government expenditures, the average increase being about 9 percent for Cuba and a dramatic 32 percent for Chile. These results suggest that the restrictive effects of U.S. trade policies could have been mitigated for Cuba and Chile if they had been under formal colonial control as was the Philippines. Like the Philippines, they might have had a stronger bargaining position in Washington; and, therefore, less of the burden of the U.S. depression might have been passed onto their economies.

(ii) Rubber Limitation Agreement

The purpose of the rubber agreement as measured by the dummy LIMIT was to restrict exports from all the important rubber producing countries and thus to raise the price of rubber. The simulation results in Table 8 measure the effectiveness of this scheme for Ceylon. Real exports fell by 18 percent in 1935 and continued to fall to 31.5 percent in 1938. Because of the distributed lag process in the supply equation of Ceylon, export prices fell by 2.5 percent in 1935 but thereafter increased steadily until, in 1938, they were 46.7 percent above the level which would have prevailed without the limitation agreement. Thus, the limitation agreement, in fact, did restrict output and raised export prices.

The restriction scheme led to an improved terms of trade and generated a nominal trade surplus for Ceylon. However, the limit on rubber exports also brought about a depressing influence on Ceylon's government sector, measured by the decline in revenues and expenditures, and a small decline in real accumulated government expenditures. Thus, the benefit to the export sector in the short run was obtained at the cost of the long run export development in Ceylon. One method of describing this possible trade off is to start the LIMIT dummy in 1931 near the beginning of the world depression instead of in 1935. Our results indicate that the terms of trade would have started to improve in 1932, and that nominal trade surpluses were generated from this date onward. Thus, Ceylon would have benefitted in terms of her export prices and her nominal balance of trade position from an earlier start of the restriction scheme. The cost, however, would not only have been that the reduction in real accumulated government expenditures began in 1931 rather than 1935, but also that the reduction in the real stock was 3.1 percent over the longer period as compared to a 1.8 percent reduction for the shorter period of export restriction.

(c) Changes in Tax Policy

Thailand's tariffs were fixed at low rates by the Bowring Treaty with the United Kingdom until 1926; thereafter, the government imposed its own tariff rates. Simulations of the model omitting the dummy FIXED show that government revenues and expenditures were higher from 1927 onward than they would have been if the Bowring Treaty had remained in force. Real accumulated government expenditures were almost 5 percent higher by 1936, and real exports were almost 1 percent higher by this date. As a result of this new taxing power, the terms of trade, however, turned against Thailand and the country ran a smaller nominal trade surplus. Basically, the increased revenues led to a rightward shift in the supply curve, a fall in export prices, and a greater fall in nominal exports than nominal imports. If the Bowring Treaty were eliminated in, say, 1923 rather than 1926, then there would have been a steadily rising pattern of real exports, nominal revenues and expenditures, and real accumulated government expenditures. Conversely, the terms of trade and the nominal trade balance would have moved against Thailand from 1923 onward. Thus, the real export gains and higher stock of government capital as a result of the elimination of this aspect of U.K. control on the Thai government sector must be balanced against the adverse price movements and reduced accumulation of foreign exchange reserves.[28]

Egypt and India imposed new tariff schedules in 1931 as a result of the Great Depression. These changes, measured by the dummy TARIFF, while significant, had only slight effects upon their respective economies. Real exports for Egypt were only .21 percent higher by 1937 and .51 percent higher for India by 1936 than what they would have been had the tariff not been imposed. The terms of trade moved against Egypt by 1.0 percent in 1937 and against

India by 2.3 percent in 1936. Thus, real and nominal imports were somewhat lower in both countries. The basic reason for higher real exports was a higher stock of government capital as a result of the tariff's generation of increased revenues. The export supply curve shifted rightward resulting in a lower export price. Perhaps the most interesting result is not that the magnitude of these effects are small, but rather that a change in the tariff schedule did have an effect, via the government sector, on the growth of real exports

The income tax on copper production in Chile in 1926 provides a good example of the importance of the government sector in affecting the growth of the export economy. Within 3 years, the effect of the tax measured by the dummy INCOME was to raise real exports by 12.4 percent, real imports by 5.3 percent, lower export prices by 8.6 percent, and shift the nominal trade balance toward a deficit position by 2.4 percent. Similar to some of the previous effects, there were then the benefits produced by the tax, higher real exports and imports, and the costs, adverse terms-of-trade and possible balance of payments problems. But what is most interesting about this simulation is that copper producers in Chile had higher real and nominal exports because the government imposed an income tax on copper production.

The final simulation deals with the effects measured by the dummy INFRA upon Nigerian export development from the completion in 1916 of not only the railroad to Northern Nigeria, but also the port of Lagos. Here the real growth effects are substantial and serve to confirm the importance of infrastructure in colonial development. By 1937 real exports were 59 percent higher than what they would have been had the railroad and the port not been completed. Export prices were, of course, substantially lower as a result of the railroad and the port, a clear gain to Nigeria's main export buyers.

The infrastructure completion caused a large decline in internal transportation costs in Nigeria such that the prices paid to producers for export goods changed much more favorably than the export price. Real imports, on the other hand, were reduced due to the dramatic fall in export prices. The nominal trade balance moved against Nigeria, or the railroad caused the U.K. to have a nominal trade surplus with Nigeria.

Tax Effort

The results presented in the previous section suggest that an increase in the colonial tax effort could have had considerable effects on the development of the trade and government sectors. Evidence on the magnitude of these tax effects for all ten countries is presented in Table 9, where we increase the constant term in the revenue equation by 1 percent. Over time, real exports for all ten countries would have increased monitonically, although as might be expected, the low productivity group would have experienced the smallest gain in real exports. Remarkably enough, however, the Philippines, Cuba, and Chile, the U.S. bloc countries, stand out as having had the most dramatic increases in real exports due to increased taxes. We might conclude then that there should have been an increased tax effort in the U.S. colonial countries given the previously identified productivity of their government sectors in promoting export expansion. Table 9 confirms this by showing the dynamic effects on real accumulated government expenditures. The Philippines, Chile, and Cuba are clearly identified as countries having the greatest effect on real accumulated government expenditure due to increased taxes, and thus having the largest rightward shift in their export supply curves.

In general, increased taxes of 1 percent on the trade sector would have expanded, rather than contracted, the export economy. This conclusion depends, of course, on the colonial government expending that revenue on export promoting activities. It seems then that the developed country would have benefitted by higher colonial taxes since real exports expanded, and export prices fell. In the colonial world, however, the fall in export prices could lead to a fall in real imports even though real exports were expanding. In fact, only the U.S. bloc countries, Ceylon and Taiwan show an expansion in real imports, due to increased taxes. For the other five colonies, the cost of increased taxes would have been a fall in their real imports.

IV. Summary

The analysis presented in this paper has described quantitatively and qualitatively the dynamic properties of colonial development. Our previous study provided the specification and the estimates of the structure of colonial development. Using dynamic simulations in the present study, we were able to show that this estimated model described the actual process of colonial development and that this process was stable. Our analysis of the dynamic properties indicated that the record of colonial development was not just dependent upon the developed countries' growth of income and prices as well as their differential trade policies, but that it was also determined by the historical pattern of government expenditures in the colonies. Further, the influence of these external and internal forces upon colonial development did not operate evenly. Blocs of countries were identified often having political rather than geographic characteristics.

Our analysis of the rediced form showed that the accumulation of real government expenditures changed the current level of their real expenditures

and, thus, the future development of the colonial economy. The amount of change was the government reflection ratio. Examination of these ratios over time indicated a low productivity group consisting of Egypt, India, Jamaica, and Thailand, and a high productivity group consisting of Chile, Cuba, Philippines and Taiwan. Nigeria and Ceylon were in an intermediate group although closer to the high rather than the low productivity group. For the time period studied, then, U.S. and Japanese influence upon their respective colonies resulted in a greater colonial government effort being directed toward the promotion of real exports.

There were considerable differences in the ability of colonial countries to capture income increases in the developed countries. Only in Ceylon, Nigeria and Taiwan did an increase in the developed country's income finally lead to a greater increase in these countries' real exports. Although the U.S. bloc was in general the least able to capture income increase in the developed country, there was variation here as well. The Philippines stood out as the one country whose real export multiplier substantially increased over time such that it even exceeded that of some of the U.K. colonies.

Since colonial export prices were endogenously determined in the model, we were able to show how an increase in demand initially led to a rise in export price but, as the colonial economy responded to this increased macro-profitability of export trade, the supply curve shifted dynamically to the right, and thus, over time, the increase in the export price diminished. The crucial relationship within this dynamic adjustment of export supply to a change in price was the role of the government sector in taxing the expanding trade sector and spending that increased revenue on further export development.

A change in import prices was shown initially to lead to an unfavorable shift in the colonies' terms-of-trade, but over time to a favorable shift, except in the case of India. This terms-of-trade reversal was explained in our analysis of the dynamic multipliers by a leftward shift over time in the export supply curve due to the decrease in real government expenditures caused by the higher import prices.

Our results indicated different impacts upon colonial development from the two main exogenous events which occurred during the estimation period. The U.S. bloc, Taiwan, and Thailand gained from the effects of World War I while the U.K. bloc, excluding Thailand, lost. The U.S. bloc suffered considerable losses due to the Great Depression and the restrictive trade policies pursued by the U.S. during this time. The depression's impact upon the U.K. bloc was small, while Taiwan benefitted from the expansionary policies pursued by the Japanese government during the 1930's.

Footnotes

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[1]See Birnberg and Resnick (1).

[2]The sample period of estimation for each country was: Ceylon, 1897-1938; Chile, 1890-1938; Cuba, 1903-1937; Egypt, 1891-1937; India, 1890-1936; Jamaica, 1886-1938; Nigeria, 1901-1937; Philippines, 1902-1938; Taiwan, 1904-1936; and Thailand, 1902-1936.

[3]Equation (12) can also be written in terms of the logarithms of the real government variables as (12A): $\ln \sum_{i=1}^{\infty} G^R_{t-i} = \ln(e^{\ln G^R_{t-1}} + e^{\ln \sum_{i=2}^{\infty} G^R_{t-1}})$.

[4]For further discussion of the specification of the structural model, see Birnberg and Resnick (1).

[5]The estimation procedure for a simultaneous equation model with autoregressive errors is given in Birnberg and Resnick (1).

[6]See Birnberg and Resnick (1).

[7]With the exception of Taiwan and Thailand, the simulation period exceeds 30 years. For these two countries, the periods were 26 and 28 years, respectively.

[8]For example, the impact multiplier for Nigeria in Appendix Table 1E is negative, while all of its other dynamic multipliers are positive.

[9]For the theoretical model deriving this concept, see Hymer and Resnick (6).

[10]The reflection ratio for real government expenditures is the same as that for nominal government expenditures since import prices are not changing.

[11]For nominal exports, the impact multiplier is:

$$\frac{\Delta \ln X}{\Delta \ln \sum_{i=1}^{\infty} G^{R}_{t-i}} = \frac{-a_3(b_1+1)}{a_1-b_1} \gtreqless 0, \quad \text{when} \quad |b_1| \gtreqless 1.$$

Thus, nominal exports will rise if the demand schedule is price elastic and will fall if the schedule is inelastic.

[12]This result differs from that in Hymer and Resnick (6), where the reflection ratio was a positive partial derivative. The negative ratio found in our analysis results from a different specification of the model.

[13]See, for example, Resnick (10). It is interesting to note that the empirical results of the present model confirm the historical analysis in that paper which suggested that the Thai government had not been as productive as the Philippine government.

[14]It is possible to argue that the U.S. and Japan were "latecomers" to the colonial process and thus could draw upon and make improvements over the experiences of the older colonial powers in running or influencing a colonial government.

[15]Chile, Cuba and the Philippines also had long histories of Spanish influence. Chile was a colony of Spain until the early 19th century. Cuba and the Philippines remained colonies of Spain until the Spanish-American War. One could argue, however, that Spanish colonialism rested on an inferior mode of development as compared with British colonialism with its more favorable history of British industrial development.

[16]See Ingram for historical examples of this financial control. One could also argue that if the Thai government had either attempted to alter the foreign enforced tax rates or refused to build up its enormous foreign reserve

position, then these actions might have invited a direct confrontation with British colonialism. Thus, to preserve the integrity of Thai institutions, the government was effectively constrained from controlling and utilizing the gains from her export trade.

[17]Nigeria received decreasing British grants-in-aid from 1900-1918, and Taiwan received decreasing Japanese grants from 1900-1915.

[18]The theoretically possible case of the reflection ratio exceeding one can also yield stability, but with the simulation path converging toward a new long-run balanced growth path.

[19]Exact year figures are from the actual simulations which Table 1 summarizes.

[20]Since the import price is not being changed for this set of simulations, the multipliers for the terms-of-trade and the export price are the same.

[21]See Birnberg and Resnick.(1).

[22]See Feis (15) and Ingram (7).

[23]Since the war begun in August of 1914, the impact becomes apparent in 1915, and the simulations begin to show the effects at the latter date.

[24]Egypt was under direct U.K. control throughout the war.

[25]Snodgrass (11).

[26]Eisner (14).

[27]This conclusion can be derived by using the same dummy variable D in equations (1) and (2), so that $D = D_S = D_D$. Then the impact multiplier for the trade restrictions, with $\Delta D = 1$, is:

$$\Delta \ln P_x = \frac{b_5 - a_5}{a_1 - b_1}.$$

As b_5 and a_5 are both negative, then:

$$\ln P_x \gtreqless 0, \quad \text{when} \quad |a_5| \gtreqless |b_5|.$$

[28]Thailand historically had been accumulating vast foreign exchange reserves so that on balance its welfare was probably improved by the elimination of the Treaty in 1926, and the economy would have been even better off had the elimination come earlier. See Ingram, (7).

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Table 1: Dynamic Multipliers for a 1 Percent Increase in the Initial Value of Accumulated Real Government Expenditures*

1.A Real Exports

	YEARS:				
COUNTRY	1	5	10	20	30
CEYLON	0.207	0.358	0.317	0.231	0.180
CHILE	0.392	0.400	0.355	0.273	0.221
CUBA	0.361	0.395	0.316	0.248	0.194
EGYPT	0.146	0.123	0.101	0.073	0.062
INDIA	0.090	0.080	0.068	0.053	0.046
JAMAICA	0.277	0.223	0.176	0.112	0.080
NIGERIA	0.206	0.359	0.265	0.200	0.157
PHILIPPINES	0.599	0.656	0.586	0.476	0.38[illegible]
TAIWAN	0.340	0.565	0.412	0.292	0.246
THAILAND	0.207	0.109	0.054	0.028	0.017
AVERAGES	0.284	0.327	0.265	0.199	0.158

1.B Export Price

	YEARS:				
COUNTRY	1	5	10	20	30
CEYLON	-0.469	-0.813	-0.719	-0.523	-0.408
CHILE	-0.388	-0.261	-0.231	-0.178	-0.145
CUBA	-0.485	-0.504	-0.403	-0.316	-0.247
EGYPT	-0.639	-0.542	-0.443	-0.321	-0.273
INDIA	-0.420	-0.373	-0.320	-0.250	-0.214
JAMAICA	-0.614	-0.495	-0.390	-0.248	-0.177
NIGERIA	-1.091	-0.499	-0.308	-0.268	-0.206
PHILIPPINES	-1.201	-0.517	-0.465	-0.377	-0.302
TAIWAN	-0.311	-0.516	-0.376	-0.267	-0.224
THAILAND	-0.976	-0.516	-0.256	-0.130	-0.083
AVERAGES	-0.659	-0.504	-0.391	-0.288	-0.228

*For this increase, the long run balanced growth multipliers (LRBG) are zero (see text).

Table 1 (cont): Dynamic Multipliers for a 1 Percent Increase in the Initial Value of Accumulated Real Government Expenditures

1.C Real Imports

COUNTRY	YEARS: 1	5	10	20	30
CEYLON	0.047	0.081	0.072	0.052	0.041
CHILE	0.112	0.209	0.186	0.142	0.115
CUBA	0.199	0.206	0.165	0.129	0.101
EGYPT	-0.033	-0.028	-0.023	-0.017	-0.014
INDIA	-0.082	-0.073	-0.062	-0.049	-0.042
JAMAICA	-0.243	-0.196	-0.154	-0.098	-0.070
NIGERIA	-0.614	-0.017	0.032	-0.002	0.001
PHILIPPINES	0.282	0.514	0.459	0.373	0.298
TAIWAN	0.275	0.457	0.333	0.237	0.199
THAILAND	-0.214	-0.113	-0.056	-0.029	-0.018
AVERAGES	-0.027	0.104	0.095	0.074	0.061

1.D Trade Balance

COUNTRY	YEARS: 1	5	10	20	30
CEYLON	-0.309	-0.535	-0.474	-0.345	-0.269
CHILE	-0.108	-0.070	-0.062	-0.048	-0.039
CUBA	-0.304	-0.315	-0.252	-0.198	-0.155
EGYPT	-0.461	-0.391	-0.319	-0.231	-0.196
INDIA	-0.248	-0.221	-0.189	-0.148	-0.126
JAMAICA	-0.094	-0.076	-0.060	-0.038	-0.027
NIGERIA	-0.271	-0.122	-0.075	-0.066	-0.050
PHILIPPINES	-0.885	-0.376	-0.338	-0.274	-0.219
TAIWAN	-0.246	-0.408	-0.297	-0.211	-0.177
THAILAND	-0.555	-0.294	-0.146	-0.074	-0.047
AVERAGES	-0.348	-0.281	-0.221	-0.163	-0.130

Table 1 (cont): Dynamic Multipliers for a 1 Percent Increase in the Initial Value of Accumulated Real Government Expenditures

1.E Government Expenditures

	YEARS:				
COUNTRY	1	5	10	20	30
CEYLON	0.083	0.269	0.259	0.190	0.147
CHILE	0.448	0.481	0.426	0.328	0.266
CUBA	0.103	0.337	0.346	0.276	0.218
EGYPT	0.040	0.062	0.051	0.037	0.031
INDIA	-0.035	-0.037	-0.032	-0.025	-0.021
JAMAICA	-0.032	-0.045	-0.036	-0.023	-0.016
NIGERIA	-0.046	0.236	0.270	0.185	0.147
PHILIPPINES	0.263	0.567	0.510	0.414	0.332
TAIWAN	0.175	0.340	0.250	0.177	0.148
THAILAND	-0.014	-0.012	-0.006	-0.003	-0.002
AVERAGES	0.098	0.220	0.204	0.156	0.125

1.F Accumulated Real Government Expenditures

	YEARS:				
COUNTRY	1	5	10	20	30
CEYLON	0.964	0.834	0.726	0.527	0.414
CHILE	0.971	0.894	0.785	0.610	0.500
CUBA	0.895	0.680	0.559	0.445	0.351
EGYPT	0.964	0.812	0.666	0.491	0.419
INDIA	0.973	0.861	0.739	0.584	0.503
JAMAICA	0.951	0.768	0.605	0.388	0.283
NIGERIA	0.913	0.589	0.457	0.363	0.289
PHILIPPINES	0.947	0.843	0.754	0.612	0.491
TAIWAN	0.967	0.849	0.596	0.433	0.365
THAILAND	0.846	0.459	0.242	0.127	0.079
AVERAGES	0.939	0.759	0.613	0.458	0.369

Table 2: Dynamic Multipliers for a 1 Percent Increase in all Years in the Colony's Import Price

2.A Real Exports

COUNTRY	YEARS: 1	5	10	20	30	LRBG*
CEYLON	-0.086	-0.210	-0.280	-0.405	-0.477	-0.797
CHILE	-0.303	-0.443	-0.579	-0.821	-0.976	-1.636
CUBA	-0.266	-0.575	-0.778	-1.004	-1.194	-1.877
EGYPT	-0.209	-0.227	-0.245	-0.267	-0.274	-0.325
INDIA	-0.096	-0.101	-0.107	-0.114	-0.118	-0.140
JAMAICA	-0.304	-0.338	-0.367	-0.406	-0.428	-0.482
NIGERIA	-0.133	-0.408	-0.546	-0.716	-0.808	-1.492
PHILIPPINES	-0.143	-0.296	-0.413	-0.597	-0.755	-1.392
TAIWAN	-0.362	-0.759	-0.912	-1.090	-1.218	-1.893
THAILAND	-0.120	-0.217	-0.243	-0.261	-0.275	-0.290
AVERAGES	-0.202	-0.357	-0.447	-0.568	-0.652	-1.032

2.B Export Price

COUNTRY	YEARS: 1	5	10	20	30	LRBG
CEYLON	0.194	0.475	0.634	0.919	1.083	1.807
CHILE	0.300	0.300	0.392	0.547	0.646	1.079
CUBA	0.340	0.733	0.992	1.281	1.523	2.394
EGYPT	0.917	0.998	1.077	1.173	1.203	1.426
INDIA	0.451	0.475	0.500	0.534	0.552	0.655
JAMAICA	0.673	0.750	0.812	0.900	0.948	1.058
NIGERIA	0.704	0.758	0.859	1.035	1.185	2.094
PHILIPPINES	0.287	0.275	0.363	0.509	0.635	1.140
TAIWAN	0.331	0.693	0.833	0.996	1.112	1.729
THAILAND	0.564	1.023	1.148	1.233	1.298	1.329
AVERAGES	0.476	0.648	0.761	0.913	1.018	1.472

*Long Run Balanced Growth Multipliers

Table 2 (cont): Dynamic Multipliers for a 1 Percent Increase in all Years in the Colony's Import Price

2.C Real Imports

COUNTRY	YEARS: 1	5	10	20	30	LREG
CEYLON	-0.366	-0.414	-0.430	-0.458	-0.474	-0.547
CHILE	-0.493	-0.635	-0.704	-0.832	-0.914	-1.257
CUBA	-0.310	-0.470	-0.576	-0.695	-0.794	-1.150
EGYPT	-0.355	-0.351	-0.347	-0.342	-0.340	-0.329
INDIA	-0.362	-0.357	-0.352	-0.345	-0.342	-0.322
JAMAICA	-0.315	-0.285	-0.260	-0.225	-0.206	-0.159
NIGERIA	-0.544	-0.777	-0.839	-0.876	-0.855	-0.853
PHILIPPINES	-0.092	-0.246	-0.339	-0.482	-0.606	-1.105
TAIWAN	-0.581	-0.902	-1.025	-1.170	-1.273	-1.819
THAILAND	-0.425	-0.324	-0.297	-0.278	-0.264	-0.249
AVERAGES	-0.387	-0.476	-0.517	-0.570	-0.607	-0.779

2.D Trade Balance

COUNTRY	YEARS: 1	5	10	20	30	LRBG
CEYLON	-0.506	-0.320	-0.216	-0.028	0.080	0.557
CHILE	-0.505	-0.508	-0.483	-0.442	-0.416	-0.300
CUBA	-0.617	-0.371	-0.210	-0.029	0.122	0.667
EGYPT	0.063	0.121	0.178	0.248	0.269	0.430
INDIA	-0.284	-0.270	-0.255	-0.235	-0.224	-0.163
JAMAICA	-0.316	-0.304	-0.295	-0.281	-0.274	-0.255
NIGERIA	0.116	0.127	0.152	0.195	0.232	0.455
PHILIPPINES	-0.764	-0.775	-0.712	-0.605	-0.514	-0.147
TAIWAN	-0.451	-0.164	-0.054	0.075	0.167	0.655
THAILAND	-0.131	0.130	0.202	0.250	0.287	0.328
AVERAGES	-0.339	-0.233	-0.169	-0.085	-0.027	0.223

Table 2 (cont): Dynamic Multipliers for a 1 Percent Increase in all Years in the Colony's Import Price

2.E Government Expenditures

COUNTRY	YEARS: 1	5	10	20	30	LRBG
CEYLON	0.027	-0.030	-0.091	-0.192	-0.253	-0.514
CHILE	-0.347	-0.530	-0.693	-0.984	-1.170	-1.964
CUBA	-0.030	-0.266	-0.519	-0.819	-1.026	-1.793
EGYPT	0.145	0.248	0.243	0.232	0.228	0.203
INDIA	0.417	0.495	0.497	0.501	0.502	0.513
JAMAICA	0.187	0.324	0.334	0.342	0.346	0.357
NIGERIA	0.041	-0.166	-0.368	-0.565	-0.642	-1.267
PHILIPPINES	0.321	0.351	0.249	0.088	-0.049	-0.605
TAIWAN	0.031	-0.198	-0.292	-0.400	-0.477	-0.885
THAILAND	0.100	0.165	0.170	0.172	0.174	0.175
AVERAGES	0.089	0.039	-0.047	-0.162	-0.237	-0.578

2.F Accumulated Real Government Expenditures

COUNTRY	YEARS: 1	5	10	20	30	LRBG
CEYLON	-0.035	-0.171	-0.323	-0.619	-0.777	-1.514
CHILE	-0.071	-0.296	-0.621	-1.140	-1.469	-2.964
CUBA	-0.120	-0.492	-0.835	-1.226	-1.557	-2.793
EGYPT	-0.032	-0.155	-0.271	-0.409	-0.454	-0.797
INDIA	-0.015	-0.070	-0.129	-0.204	-0.244	-0.487
JAMAICA	-0.038	-0.147	-0.243	-0.379	-0.450	-0.643
NIGERIA	-0.088	-0.310	-0.543	-0.771	-1.001	-2.267
PHILIPPINES	-0.048	-0.196	-0.344	-0.580	-0.784	-1.605
TAIWAN	-0.038	-0.241	-0.425	-0.696	-0.882	-1.855
THAILAND	-0.158	-0.535	-0.626	-0.696	-0.756	-0.825
AVERAGES	-0.064	-0.261	-0.436	-0.672	-0.837	-1.575

Table 3: Dynamic Multipliers for a 1 Percent Increase in all Years in the Developed Country's Real Income

3.A Real Exports

COUNTRY	YEARS: 1	5	10	20	30	LRBG*
CEYLON	0.320	0.636	0.694	0.776	0.822	1.026
CHILE	0.166	0.204	0.225	0.264	0.269	0.395
CUBA	0.143	0.222	0.265	0.319	0.365	0.530
EGYPT	0.477	0.494	0.516	0.544	0.552	0.616
INDIA	0.401	0.408	0.416	0.427	0.433	0.465
JAMAICA	0.560	0.604	0.653	0.722	0.759	0.853
NIGERIA	0.265	0.692	0.901	1.157	1.300	2.302
PHILIPPINES	0.148	0.232	0.294	0.391	0.475	0.813
TAIWAN	0.411	0.796	0.882	0.971	1.034	1.365
THAILAND	0.467	0.530	0.556	0.572	0.583	0.596
AVERAGES	0.336	0.482	0.540	0.614	0.661	0.896

3.B Export Price

COUNTRY	YEARS: 1	5	10	20	30	LRBG
CEYLON	1.059	0.342	0.211	0.027	-0.079	-0.540
CHILE	0.361	0.391	0.376	0.351	0.335	0.266
CUBA	0.643	0.541	0.487	0.419	0.360	0.149
EGYPT	1.781	1.705	1.606	1.486	1.448	1.169
INDIA	0.951	0.919	0.880	0.830	0.804	0.651
JAMAICA	1.045	0.947	0.839	0.686	0.603	0.395
NIGERIA	1.863	2.038	1.859	1.597	1.368	0.038
PHILIPPINES	0.553	0.644	0.597	0.519	0.452	0.185
TAIWAN	1.131	0.780	0.701	0.620	0.562	0.260
THAILAND	2.954	2.655	2.535	2.459	2.405	2.343
AVERAGES	1.234	1.096	1.009	0.899	0.826	0.492

*Long Run Balanced Growth Multipliers

Table 3 (cont): Dynamic Multipliers for a 1 Percent Increase in all Years in the Developed Country's Real Income

3.C Real Imports

COUNTRY	YEARS: 1	5	10	20	30	LRBG
CEYLON	0.668	0.740	0.753	0.771	0.782	0.828
CHILE	0.417	0.473	0.484	0.505	0.518	0.573
CUBA	0.374	0.415	0.437	0.466	0.490	0.576
EGYPT	0.962	0.958	0.953	0.947	0.945	0.930
INDIA	0.778	0.771	0.764	0.754	0.749	0.719
JAMAICA	1.463	1.425	1.382	1.321	1.288	1.206
NIGERIA	1.561	2.216	2.290	2.348	2.317	2.316
PHILIPPINES	0.288	0.394	0.443	0.519	0.585	0.998
TAIWAN	0.606	0.918	0.987	1.059	1.110	1.378
THAILAND	1.661	1.596	1.569	1.553	1.541	1.527
AVERAGES	0.888	0.991	1.006	1.024	1.032	1.105

3.D Trade Balance

COUNTRY	YEARS: 1	5	10	20	30	LRBG
CEYLON	0.711	0.239	0.153	0.031	-0.039	-0.342
CHILE	0.112	0.121	0.118	0.111	0.107	0.088
CUBA	0.412	0.348	0.315	0.271	0.235	0.103
EGYPT	1.296	1.241	1.170	1.083	1.055	0.855
INDIA	0.575	0.555	0.533	0.503	0.488	0.397
JAMAICA	0.141	0.126	0.110	0.086	0.074	0.042
NIGERIA	0.467	0.514	0.471	0.407	0.350	0.024
PHILIPPINES	0.413	0.482	0.448	0.391	0.343	0.000
TAIWAN	0.936	0.658	0.596	0.531	0.486	0.247
THAILAND	1.760	1.590	1.522	1.478	1.448	1.412
AVERAGES	0.682	0.587	0.544	0.489	0.455	0.283

Table 3 (cont): Dynamic Multipliers for a 1 Percent Increase in all Years in the Developed Country's Real Income

3.E Government Expenditures

COUNTRY	YEARS: 1	5	10	20	30	LRBG
CEYLON	0.187	0.575	0.660	0.727	0.767	0.932
CHILE	0.192	0.244	0.270	0.317	0.347	0.474
CUBA	0.054	0.211	0.297	0.375	0.426	0.611
EGYPT	0.495	0.879	0.905	0.920	0.925	0.957
INDIA	0.630	0.741	0.737	0.732	0.729	0.714
JAMAICA	0.646	1.093	1.098	1.084	1.076	1.057
NIGERIA	0.418	1.460	1.862	2.169	2.288	3.206
PHILIPPINES	0.151	0.319	0.376	0.461	0.534	0.828
TAIWAN	0.294	0.572	0.626	0.680	0.718	0.918
THAILAND	0.405	0.630	0.631	0.629	0.628	0.626
AVERAGES	0.347	0.672	0.746	0.809	0.844	1.032

3.F Accumulated Real Government Expenditures

COUNTRY	YEARS: 1	5	10	20	30	LRBG
CEYLON	0.007	0.074	0.170	0.362	0.463	0.932
CHILE	0.010	0.046	0.099	0.182	0.235	0.474
CUBA	0.006	0.062	0.138	0.232	0.312	0.611
EGYPT	0.019	0.155	0.299	0.473	0.529	0.957
INDIA	0.017	0.097	0.185	0.296	0.355	0.714
JAMAICA	0.030	0.197	0.366	0.602	0.726	1.057
NIGERIA	0.038	0.302	0.658	1.006	1.351	3.206
PHILIPPINES	0.011	0.082	0.160	0.286	0.394	0.828
TAIWAN	0.012	0.107	0.200	0.335	0.427	0.918
THAILAND	0.071	0.362	0.452	0.516	0.567	0.626
AVERAGES	0.022	0.148	0.273	0.429	0.536	1.032

Table 4: Dynamic Multipliers for a 1 Percent Increase in all Years in the Developed Country's Domestic Price

4.A Real Exports

COUNTRY	YEARS: 1	5	10	20	30	LRBG*
CEYLON	0.104	0.206	0.225	0.251	0.266	0.332
CHILE	0.239	0.290	0.322	0.377	0.413	0.563
CUBA	0.255	0.397	0.472	0.569	0.651	0.945
EGYPT	0.092	0.095	0.099	0.105	0.106	0.119
INDIA	0.100	0.102	0.104	0.107	0.108	0.117
JAMAICA	0.128	0.138	0.149	0.165	0.174	0.195
NIGERIA	0.157	0.410	0.534	0.685	0.770	1.364
PHILIPPINES	0.210	0.329	0.416	0.555	0.674	1.152
TAIWAN	0.071	0.138	0.153	0.169	0.180	0.237
THAILAND	0.314	0.357	0.374	0.385	0.392	0.401
AVERAGES	0.167	0.246	0.285	0.337	0.373	0.542

4.B Export Price

COUNTRY	YEARS: 1	5	10	20	30	LRBG
CEYLON	0.343	0.111	0.068	0.009	-0.025	-0.175
CHILE	0.514	0.558	0.536	0.501	0.478	0.379
CUBA	1.147	0.966	0.870	0.747	0.642	0.267
EGYPT	0.343	0.328	0.309	0.286	0.279	0.225
INDIA	0.238	0.230	0.220	0.208	0.201	0.163
JAMAICA	0.239	0.217	0.192	0.157	0.138	0.091
NIGERIA	1.104	1.208	1.102	0.947	0.811	0.023
PHILIPPINES	0.784	0.913	0.846	0.736	0.641	0.262
TAIWAN	0.197	0.135	0.122	0.108	0.098	0.045
THAILAND	1.988	1.787	1.706	1.655	1.619	1.577
AVERAGES	0.690	0.645	0.597	0.535	0.488	0.286

*Long Run Balanced Growth Multipliers

Table 4 (cont): Dynamic Multipliers for a 1 Percent Increase in all Years in the Developed Country's Domestic Price

4.C Real Imports

COUNTRY	YEARS: 1	5	10	20	30	LRBG
CEYLON	0.216	0.239	0.244	0.250	0.253	0.268
CHILE	0.594	0.675	0.690	0.720	0.739	0.817
CUBA	0.667	0.741	0.781	0.831	0.874	1.023
EGYPT	0.185	0.184	0.184	0.182	0.182	0.179
INDIA	0.195	0.193	0.191	0.189	0.188	0.180
JAMAICA	0.335	0.326	0.317	0.303	0.295	0.276
NIGERIA	0.984	1.313	1.357	1.391	1.373	1.372
PHILIPPINES	0.408	0.559	0.628	0.736	0.829	1.204
TAIWAN	0.105	0.159	0.171	0.184	0.193	0.239
THAILAND	1.118	1.074	1.056	1.045	1.037	1.028
AVERAGES	0.481	0.546	0.562	0.583	0.596	0.659

4.D Trade Balance

COUNTRY	YEARS: 1	5	10	20	30	LRBG
CEYLON	0.230	0.077	0.049	0.010	-0.012	-0.111
CHILE	0.159	0.173	0.168	0.158	0.152	0.125
CUBA	0.735	0.621	0.561	0.484	0.419	0.184
EGYPT	0.249	0.239	0.225	0.209	0.203	0.165
INDIA	0.144	0.139	0.133	0.126	0.122	0.100
JAMAICA	0.032	0.029	0.025	0.020	0.017	-0.030
NIGERIA	0.277	0.305	0.279	0.241	0.208	0.015
PHILIPPINES	0.586	0.683	0.635	0.555	0.486	0.210
TAIWAN	0.163	0.114	0.103	0.092	0.084	0.043
THAILAND	1.185	1.070	1.024	0.995	0.974	0.950
AVERAGES	0.376	0.345	0.320	0.289	0.265	0.165

Table 4 (cont): Dynamic Multipliers for a 1 Percent Increase in all Years in the Developed Country's Domestic Price

4.E Government Expenditures

COUNTRY	YEARS: 1	5	10	20	30	LRBG
CEYLON	0.060	0.186	0.213	0.235	0.248	0.302
CHILE	0.274	0.348	0.386	0.453	0.495	0.676
CUBA	0.096	0.376	0.531	0.670	0.760	1.090
EGYPT	0.095	0.169	0.174	0.177	0.178	0.184
INDIA	0.158	0.186	0.185	0.183	0.183	0.179
JAMAICA	0.148	0.250	0.251	0.248	0.247	0.242
NIGERIA	0.248	0.865	1.104	1.285	1.355	1.900
PHILIPPINES	0.214	0.453	0.533	0.654	0.757	1.174
TAIWAN	0.051	0.099	0.109	0.118	0.125	0.160
THAILAND	0.272	0.424	0.424	0.423	0.422	0.421
AVERAGES	0.162	0.336	0.391	0.445	0.477	0.633

4.F Accumulated Real Government Expenditures

COUNTRY	YEARS: 1	5	10	20	30	LRBG
CEYLON	0.002	0.024	0.055	0.117	0.150	0.302
CHILE	0.014	0.066	0.141	0.260	0.335	0.676
CUBA	0.011	0.111	0.247	0.414	0.558	1.090
EGYPT	0.004	0.030	0.057	0.091	0.102	0.184
INDIA	0.004	0.024	0.046	0.074	0.089	0.179
JAMAICA	0.007	0.045	0.084	0.138	0.166	0.242
NIGERIA	0.023	0.179	0.389	0.595	0.800	1.900
PHILIPPINES	0.015	0.116	0.227	0.405	0.559	1.174
TAIWAN	0.002	0.019	0.035	0.058	0.074	0.160
THAILAND	0.048	0.243	0.304	0.347	0.381	0.421
AVERAGES	0.013	0.086	0.158	0.250	0.321	0.633

Table 5: Simulated Percentage Changes Caused by World War I and its Aftermath

5.A REAL EXPORTS

YEAR	CEYLON	CHILE	CUBA	EGYPT	INDIA	JAMAICA	NIGERIA	PHIL.	TAIWAN	THAILAND
1915	-3.2	.1	3.5	-10.9	1.6	1.2	-15.5	1.0	16.2	1.8
1916	-6.2	10.5	10.0	-20.0	-.9	-5.8	-19.7	3.7	20.1	3.7
1917	-8.9	6.2	10.0	-24.5	-3.6	-18.3	-22.8	5.5	16.8	5.4
1918	-10.2	2.8	6.4	-26.7	-6.3	-22.8	-26.0	6.0	9.5	N.S.
1919	N.S.	-6.2	10.0	-14.7	-3.0	-19.2	-27.0	3.6	5.1	N.S.
1920	-15.0	-10.9	-3.3	N.S.	-.5	-21.0	-32.7	2.9	N.S.	N.S.
1921	-21.2	-26.3	-11.2	-20.0	-13.0	-22.6	-39.1	1.0	N.S.	10.5
1922	-24.4	-10.7	-6.0	-11.2	-7.9	-9.6	-36.8	2.5	1.9	5.8
1923	-26.6	-9.1	-7.3	-10.3	-5.7	-7.2	-35.6	6.0	-1.1	4.0
1924	-25.8	-9.9	-.4	-7.2	-2.2	-6.6	-35.3	6.8	-1.5	4.3
1925	-25.9	-6.0	-.9	-6.0	-1.5	-5.5	-35.7	7.1	-5.6	4.4

5.B EXPORT PRICES

YEAR	CEYLON	CHILE	CUBA	EGYPT	INDIA	JAMAICA	NIGERIA	PHIL.	TAIWAN	THAILAND
1915	-8.1	2.8	14.9	-33.1	11.1	12.0	13.5	-.7	11.0	16.5
1916	-5.0	19.5	68.4	12.0	22.8	23.2	42.1	17.0	21.0	72.7
1917	-3.2	43.5	134.1	48.5	32.7	55.8	84.7	39.9	42.5	157.4
1918	6.5	46.7	186.2	113.5	44.3	69.1	187.0	73.9	71.9	N.S.
1919	N.S.	54.2	179.9	236.5	57.2	91.4	329.1	81.1	102.1	N.S.
1920	18.5	71.8	229.6	N.S.	85.3	145.7	455.8	96.9	N.S.	N.S.
1921	4.6	14.3	69.3	69.4	10.0	33.2	234.8	55.6	N.S.	228.2
1922	15.4	2.5	54.4	-5.3	17.0	24.0	126.7	37.6	77.4	127.2
1923	18.0	24.1	66.8	-17.3	23.4	33.4	117.4	43.2	65.1	116.3
1924	32.4	16.3	46.7	-9.8	30.4	44.7	152.7	41.0	84.9	139.3
1925	32.6	33.8	55.8	-14.9	22.5	40.4	162.0	39.9	81.6	133.2

N.S. = Year not in country's simulation.

Table 5 (cont): Simulated Percentage Changes Caused by World War I and its Aftermath

5.C REAL IMPORTS

YEAR	CEYLON	CHILE	CUBA	EGYPT	INDIA	JAMAICA	NIGERIA	PHIL.	TAIWAN	THAILAND
1915	-24.5	0.9	9.0	-41.7	1.3	6.8	-42.8	0.9	18.2	6.5
1916	-28.4	27.0	30.5	-51.2	-7.2	-3.2	-44.4	7.8	17.2	13.9
1917	-31.0	23.1	40.4	-55.6	-15.1	-18.8	-44.8	14.4	10.3	22.0
1918	-32.1	17.0	41.1	-57.1	-22.6	-24.4	-45.4	20.9	26.2	N.S.
1919	N.S.	0.1	29.7	-21.0	-17.2	-12.8	-37.3	19.0	-3.8	N.S.
1920	-31.6	-5.3	30.6	N.S.	-15.1	-7.5	-52.1	20.4	N.S.	N.S.
1921	-36.2	-40.0	-4.5	-31.5	-31.0	-29.3	-66.6	12.0	N.S.	47.1
1922	-36.5	-14.5	7.5	-18.3	-21.2	-7.5	-54.3	10.8	0.2	26.3
1923	-36.4	-6.5	17.1	-17.3	-17.3	0.2	-51.0	15.8	-3.0	19.2
1924	-31.7	-9.0	12.6	-11.4	-10.6	4.8	-47.6	16.3	-2.6	21.5
1925	-31.9	3.0	13.4	-9.6	-7.2	5.9	-46.2	16.4	-8.5	22.5

5.D TERMS OF TRADE

YEAR	CEYLON	CHILE	CUBA	EGYPT	INDIA	JAMAICA	NIGERIA	PHIL.	TAIWAN	THAILAND
1915	-12.2	0.1	16.0	-52.3	0.5	4.0	-10.8	4.8	11.9	13.0
1916	-17.2	24.4	52.5	-53.2	-12.0	-4.8	-4.5	12.7	0.2	36.0
1917	-18.8	11.4	61.1	-53.3	-22.7	-19.3	4.2	16.8	-5.4	65.3
1918	-18.6	4.7	60.6	-48.6	-32.5	-24.0	17.7	14.9	-9.5	N.S.
1919	N.S.	-13.8	42.9	20.5	-26.5	-15.6	50.2	5.2	-4.4	N.S.
1920	-44.3	-21.2	51.6	N.S.	-25.4	-13.5	29.4	3.3	N.S.	N.S.
1921	-44.2	-45.6	-5.1	-20.4	-40.0	-24.7	-11.4	3.9	N.S.	127.5
1922	-37.9	-12.1	34.0	-20.6	-28.5	-5.7	-16.6	14.8	16.8	69.7
1923	-32.5	-8.4	47.4	-23.2	-23.9	-0.3	-12.8	29.4	12.6	55.4
1924	-19.3	-8.4	33.2	-14.1	-15.8	2.5	-3.8	30.2	20.5	64.0
1925	-19.8	1.5	33.0	-13.7	-10.8	3.8	0.2	29.0	11.3	65.4

Table 5 (cont): Simulated Percentage Changes Caused by World War I and its Aftermath

5.E TRADE BALANCE

YEAR	CEYLON	CHILE	CUBA	EGYPT	INDIA	JAMAICA	NIGERIA	PHIL.	TAIWAN	THAILAND
1915	12.6	-0.7	10.2	-27.2	0.8	-1.5	31.7	4.9	9.9	8.0
1916	8.6	8.2	28.5	-23.3	-5.9	-7.4	38.0	8.4	2.6	23.9
1917	7.3	-3.9	26.2	-20.7	-12.2	-18.7	45.7	7.7	0.2	42.8
1918	7.7	-8.0	21.1	-12.1	-18.2	-22.4	59.6	0.8	-1.1	N.S.
1919	N.S.	-19.2	10.3	30.0	-13.9	-21.7	74.8	-8.4	4.4	N.S.
1920	-30.8	-25.8	12.2	N.S.	-12.5	-26.1	82.0	-11.7	N.S.	N.S.
1921	-31.1	-33.2	-13.7	-7.0	-24.4	-17.5	61.4	-6.3	N.S.	70.9
1922	-26.1	-8.2	17.1	-13.6	-16.4	-7.8	15.3	6.3	18.7	42.2
1923	-22.0	-11.0	25.0	-16.8	-13.3	-7.6	14.7	18.5	14.8	35.6
1924	-12.4	-9.3	17.8	-9.9	-8.0	-8.6	18.7	19.6	21.8	40.8
1925	-12.7	-7.4	16.3	-10.4	-5.2	-7.3	19.8	18.7	14.8	40.9

5.F GOVERNMENT EXPENDITURES

YEAR	CEYLON	CHILE	CUBA	EGYPT	INDIA	JAMAICA	NIGERIA	PHIL.	TAIWAN	THAILAND
1915	-3.5	0.1	1.2	-10.3	8.5	5.5	-16.9	-1.5	9.3	2.2
1916	-5.9	12.1	5.2	-7.1	20.7	9.6	-20.3	4.9	18.2	9.2
1917	-8.1	7.7	10.2	-1.5	32.2	17.4	-20.8	16.7	24.7	18.6
1918	-9.0	3.6	14.4	8.3	45.3	22.5	-17.5	35.8	28.7	N.S.
1919	N.S.	-6.9	15.9	28.1	55.8	33.5	-10.8	48.8	30.5	N.S.
1920	-6.9	-12.6	16.7	N.S.	78.6	52.9	-6.7	60.4	N.S.	N.S.
1921	-10.3	-29.9	11.3	17.2	24.4	23.1	-15.9	44.8	N.S.	25.8
1922	-13.4	-13.6	7.8	2.0	20.8	14.8	-20.2	28.0	18.8	22.0
1923	-16.4	-11.0	7.1	-6.7	24.4	16.1	-22.4	21.9	13.8	19.9
1924	-17.4	-11.7	6.2	-7.9	28.7	21.0	-21.8	19.2	14.7	20.8
1925	-17.9	-7.3	5.9	-9.2	22.3	22.0	-21.3	18.6	13.5	20.5

Table 5 (cont): Simulated Percentage Changes Caused by World War I and its Aftermath

5.G REAL ACCUMULATED GOVERNMENT EXPENDITURES

YEAR	CEYLON	CHILE	CUBA	EGYPT	INDIA	JAMAICA	NIGERIA	PHIL.	TAIWAN	THAILAND
1915	-0.4	-0.1	0.2	-0.8	-0.0	-0.1	-2.8	0.3	0.6	-0.1
1916	-1.3	0.7	-0.2	-2.3	-0.3	-0.5	-5.5	0.3	0.4	-1.3
1917	-2.5	-0.1	-1.9	-3.8	-0.7	-1.5	-8.5	0.1	-0.5	-3.1
1918	-4.0	-1.4	-4.2	-5.4	-1.3	-2.7	-11.8	-0.5	-2.2	N.S.
1919	N.S.	-3.8	-6.6	-6.5	-1.7	-3.7	-15.5	-1.3	-4.1	N.S.
1920	-6.7	-6.5	-9.2	N.S.	-2.1	-4.9	-19.6	-2.2	N.S.	N.S.
1921	-9.2	-9.4	-11.0	-7.3	-2.6	-5.5	-23.6	-2.2	N.S.	-3.4
1922	-11.6	-10.2	-10.7	-7.4	-3.0	-5.7	-26.3	-1.7	-4.6	-3.8
1923	-13.9	-11.3	-10.4	-7.6	-3.4	-5.9	-29.2	-1.0	-5.4	-4.5
1924	-15.9	-12.2	-10.0	-7.6	-3.6	-6.1	-32.1	-0.4	-6.3	-5.3
1925	-17.9	-13.0	-10.0	-7.7	-3.7	-6.2	-34.2	0.2	-7.3	-5.8

Table 6: Simulated Percentage Changes Caused by The Great Depression

6.A REAL EXPORTS

YEAR	CEYLON	CHILE	CUBA	EGYPT	INDIA	JAMAICA	NIGERIA	PHIL.	TAIWAN	THAILAND
1930	-5.5	-7.0	-24.5	-.9	-3.8	3.4	-.2	-2.7	4.6	-1.3
1931	-11.8	-17.0	-45.7	-1.5	-8.4	2.8	.1	-4.9	14.7	-2.9
1932	-20.7	-55.1	-51.9	-2.7	-9.1	-14.0	.0	-8.3	15.2	-3.1
1933	-21.2	-53.8	-51.8	-.7	-8.4	-10.4	1.4	-9.7	12.2	-1.6
1934	-18.9	-50.3	-52.4	-1.1	-6.4	-6.6	4.0	-10.0	13.6	-.3
1935	-30.0	-47.8	-52.5	-.7	-4.0	-4.8	5.8	-21.0	9.1	2.3
1936	-33.9	-44.0	-52.7	.4	-2.2	-2.0	7.7	-23.1	6.4	5.0
1937	-35.9	-43.6	-53.8	-4.7	N.S.	-3.2	7.4	-24.3	N.S.	N.S.
1938	-42.6	-49.1	N.S.	N.S.	N.S.	-5.3	N.S.	-27.4	N.S.	N.S.

6.B EXPORT PRICE

YEAR	CEYLON	CHILE	CUBA	EGYPT	INDIA	JAMAICA	NIGERIA	PHIL.	TAIWAN	THAILAND
1930	-24.1	-18.3	-15.7	-16.9	-14.6	-21.9	-17.7	-10.7	-9.7	-23.0
1931	-36.3	-40.4	-41.0	-32.2	-27.5	-38.6	-36.7	-28.1	-20.1	-44.0
1932	-47.8	-60.9	-56.1	-38.4	-31.6	-35.4	-43.5	-43.6	-16.3	-54.0
1933	-33.0	-66.1	-47.9	-35.1	-27.9	-38.5	-41.4	-49.0	-5.8	-49.0
1934	-33.7	-62.5	-28.3	-30.0	-21.3	-35.7	-42.5	-43.3	4.3	-46.0
1935	-16.8	-58.6	-14.6	-22.8	-15.8	-30.9	-34.5	-30.7	13.3	-42.0
1936	1.7	-52.8	-.5	-17.6	-7.3	-26.4	-27.2	-31.7	17.7	-36.0
1937	8.4	-44.5	16.9	3.9	N.S.	-17.9	-15.9	-28.2	N.S.	N.S.
1938	-16.0	-53.5	N.S.	N.S.	N.S.	-22.8	N.S.	-30.4	N.S.	N.S.

N.S. = Year not in country's simulation.

Table 6(cont): Simulated Percentage Changes Caused by The Great Depression

6.C REAL IMPORTS

YEAR	CEYLON	CHILE	CUBA	EGYPT	INDIA	JAMAICA	NIGERIA	PHIL.	TAIWAN	THAILAND
1930	-7.5	-17.6	-28.7	-2.3	-5.6	-3.2	-4.1	-5.4	7.7	-4.5
1931	-12.3	-38.9	-52.2	-4.3	-13.2	-12.9	-7.4	-12.2	22.8	-10.5
1932	-24.6	-72.3	-60.8	-6.8	-13.7	-23.1	-11.0	-20.4	18.6	-11.8
1933	-17.6	-71.1	-58.1	-3.1	-13.7	-18.6	-5.1	-23.2	12.8	-8.3
1934	-13.2	-65.5	-55.2	-3.8	-11.1	-10.4	3.8	-21.6	15.6	-5.1
1935	-24.4	-61.0	-53.1	-2.7	-7.3	-4.7	8.0	-27.6	7.6	3.3
1936	-22.2	-54.1	-51.2	-0.5	-5.6	3.0	14.6	-29.8	5.0	11.8
1937	-23.6	-51.8	-50.5	-9.2	N.S.	4.7	10.4	-30.1	N.S.	N.S.
1938	-37.8	-62.1	N.S.	N.S.	N.S.	-2.1	N.S.	-33.6	N.S.	N.S.

6.D TERMS OF TRADE

YEAR	CEYLON	CHILE	CUBA	EGYPT	INDIA	JAMAICA	NIGERIA	PHIL.	TAIWAN	THAILAND
1930	-8.3	-14.3	-15.5	-9.1	-5.9	0.3	-7.9	-9.3	7.0	-11.9
1931	-6.1	-32.3	-20.2	-17.7	-14.3	-5.5	-16.1	-13.9	17.9	-25.4
1932	-18.6	-42.6	-28.4	-23.0	-14.8	1.9	-21.3	-24.7	4.9	-30.6
1933	7.8	-34.6	-13.0	-17.9	-15.6	7.1	-16.3	-27.5	0.7	-25.5
1934	16.2	-21.1	-5.4	-16.4	-13.3	14.9	-10.8	-29.9	9.2	-21.4
1935	19.4	-11.9	3.8	-12.3	-9.3	19.5	-6.2	-16.5	0.6	-10.9
1936	53.1	1.5	12.8	-7.9	-8.4	26.0	0.3	-22.3	2.0	0.9
1937	59.4	0.2	16.8	-10.2	N.S.	25.8	-0.5	-24.1	N.S.	N.S.
1938	19.5	-19.3	N.S.	N.S.	N.S.	19.9	N.S.	-32.3	N.S.	N.S.

Table 6 (cont): Simulated Percentage Changes Caused by The Great Depression

6.E BALANCE OF TRADE

YEAR	CEYLON	CHILE	CUBA	EGYPT	INDIA	JAMAICA	NIGERIA	PHIL.	TAIWAN	THAILAND
1930	-6.3	-3.4	-10.5	-7.7	-4.0	7.1	-4.1	-6.7	4.0	-8.9
1931	-5.5	-8.1	-9.3	-15.3	-9.7	11.6	-9.3	-6.7	10.2	-19.1
1932	-14.4	-7.0	-12.1	-19.6	-10.2	13.9	-11.6	-13.5	1.9	-23.7
1933	3.1	4.7	-0.4	-15.8	-10.4	17.8	-10.6	-14.6	0.1	-20.1
1934	8.6	13.8	0.7	-14.1	-8.7	19.7	-10.6	-19.5	7.3	-17.5
1935	10.5	15.1	5.1	-10.5	-6.0	19.4	-8.0	-9.0	2.0	-11.7
1936	30.1	23.8	9.4	-7.1	-5.1	19.9	-5.8	-14.9	3.3	-5.2
1937	33.7	17.2	9.1	-5.8	N.S.	16.2	-3.2	-17.8	N.S.	N.S.
1938	10.2	8.4	N.S.	N.S.	N.S.	16.0	N.S.	-26.0	N.S.	N.S.

6.F GOVERNMENT EXPENDITURES

YEAR	CEYLON	CHILE	CUBA	EGYPT	INDIA	JAMAICA	NIGERIA	PHIL.	TAIWAN	THAILAND
1930	-4.6	-8.0	-8.2	-4.1	-11.0	-9.1	-3.0	-3.4	-1.7	-3.9
1931	-11.4	-19.5	-23.2	-8.3	25.5	-21.4	-8.4	-13.7	-2.1	-9.6
1932	-19.6	-60.3	-36.0	-10.6	26.7	-32.5	-13.1	-24.2	1.8	-14.0
1933	-23.2	-60.4	-43.9	-8.4	32.7	-37.1	-14.8	-30.6	5.1	-14.2
1934	-23.3	-57.0	-48.5	-4.3	43.0	-36.9	-14.9	-28.3	7.4	-13.6
1935	-28.1	-54.3	-51.4	1.6	52.1	-34.3	-12.4	-31.3	9.6	-12.5
1936	-31.9	-50.4	-53.2	8.1	65.7	-30.6	-8.5	-32.1	9.3	-10.8
1937	-34.5	-49.8	-54.5	17.4	N.S.	-25.8	-4.1	-30.8	N.S.	N.S.
1938	-39.4	-55.3	N.S.	N.S.	N.S.	-26.2	N.S.	-30.2	N.S.	N.S.

Table 6 (cont): Simulated Percentage Changes Caused by The Great Depression

6.G REAL ACCUMULATED GOVERNMENT EXPENDITURES

YEAR	CEYLON	CHILE	CUBA	EGYPT	INDIA	JAMAICA	NIGERIA	PHIL.	TAIWAN	THAILAND
1930	0.6	-0.4	-0.5	0.1	-0.0	0.5	0.3	-0.1	0.7	0.5
1931	1.8	-1.4	-0.3	0.4	0.9	1.0	1.0	0.1	2.5	1.6
1932	2.8	-6.0	0.0	0.7	1.9	1.2	1.8	0.2	3.6	3.0
1933	3.6	-8.0	-0.4	1.1	2.9	1.4	2.5	0.1	3.9	4.2
1934	4.2	-8.1	-2.4	1.5	4.0	1.7	3.7	-0.7	4.3	5.4
1935	4.1	-7.5	-4.9	1.8	5.2	2.1	4.7	-1.7	4.0	6.9
1936	4.1	-6.0	-7.6	2.3	6.3	2.6	5.7	-3.1	3.6	8.6
1937	3.7	-6.4	-10.7	2.3	N.S.	2.9	6.0	-4.7	N.S.	N.S.
1938	2.9	-8.0	N.S.	N.S.	N.S.	3.3	N.S.	-6.5	N.S.	N.S.

Table 7: Simulated Percentage Changes Caused by U.S. Trade Restrictions

7.A REAL EXPORTS

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Chile			-41.6	-46.0	-48.2	-50.2	-52.1	-53.8	-55.1
Cuba	-20.4	-40.9	-46.1	-48.0	-49.0	-49.8	-50.5	-51.1	
Jamaica			-15.5	-15.6	-15.6	-15.7	-15.8	-15.9	-15.9
Phil.						-12.4	-14.9	-15.8	-16.3

7.B EXPORT PRICES

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Chile			-2.6	-11.8	-10.5	-8.2	-5.9	-3.6	-1.9
Cuba	7.1	25.1	40.7	47.2	51.2	54.2	56.8	59.4	
Jamaica			11.2	11.3	11.5	11.7	12.0	12.2	12.4
Phil.						16.4	5.6	4.1	4.2

7.C REAL IMPORTS

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Chile			-42.0	-50.0	-51.4	-52.4	-53.3	-54.2	-55.0
Cuba	-18.2	-35.3	-38.4	-39.5	-40.2	-40.6	-41.1	-41.4	
Jamaica			-7.8	-7.7	-7.7	-7.6	-7.5	-7.5	-7.4
Phil.						-8.7	-13.5	-14.7	-15.2

Table 7 (cont): Simulated Percentage Changes Caused by U.S. Trade Restrictions

7.D TRADE BALANCE

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Chile			-45.9	-52.0	-54.4	-56.6	-58.5	-60.4	-61.7
Cuba	-6.4	-18.0	-27.5	-34.5	-39.5	-43.3	-46.1	-48.3	
Jamaica			-6.2	-8.7	-9.7	-10.1	-10.3	-10.3	-10.4
Phil.						-6.7	-11.5	-13.8	-14.9

7.E GOVERNMENT EXPENDITURES

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Chile			-5.5	-13.1	-20.6	-27.3	-33.2	-37.4	-40.6
Cuba	-.4	-1.8	-4.1	-6.7	-8.9	-11.0	-13.1	-15.0	
Jamaica			-.2	-.5	-.8	-1.1	-1.4	-1.7	-2.0
Phil.						-.4	-1.1	-1.8	-2.5

7.F ACCUMULATED REAL GOVERNMENT EXPENDITURES

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Chile			-1.9	-4.9	-4.6	-3.9	-3.3	-2.7	-2.2
Cuba	4.1	14.4	23.1	26.7	28.8	30.4	31.8	33.1	
Jamaica			1.9	1.9	1.9	1.9	2.0	2.0	2.0
Phil.						11.7	3.9	2.8	2.9

Table 8: CEYLON: Simulated Percentage Changes Caused by Rubber Limitation Agreement

Variable	Year 1935	1936	1937	1938
X^R	-18.0	-25.8	-29.6	-31.5
Px	-2.5	22.4	37.6	46.7
M^R	-18.4	-20.2	-21.2	-21.7
B_T	-2.0	13.8	23.0	28.2
G	-9.1	-16.7	-21.9	-25.2
$\sum_{i=1}^{8} G_{t-i}$	-.4	-1.3	-2.3	-3.4

Table 9: Dynamic Multipliers for a .01 Increase in the Constant Term of the Revenue Equation

9.A Real Exports

COUNTRY	YEARS: 1	5	10	20	30
CEYLON	0.000	0.024	0.085	0.215	0.290
CHILE	0.000	0.061	0.159	0.335	0.446
CUBA	0.000	0.055	0.200	0.411	0.596
EGYPT	0.000	0.012	0.036	0.069	0.079
INDIA	0.000	0.008	0.019	0.034	0.041
JAMAICA	0.000	0.036	0.080	0.143	0.178
NIGERIA	0.000	0.048	0.143	0.286	0.366
PHILIPPINES	0.000	0.145	0.357	0.694	0.983
TAIWAN	0.000	0.068	0.189	0.346	0.458
THAILAND	0.000	0.058	0.109	0.147	0.170
AVERAGES	0.000	0.051	0.138	0.268	0.361

9.B Export Price

COUNTRY	YEARS: 1	5	10	20	30
CEYLON	0.000	-0.054	-0.193	-0.488	-0.658
CHILE	0.000	-0.046	-0.112	-0.225	-0.296
CUBA	0.000	-0.070	-0.255	-0.525	-0.760
EGYPT	0.000	-0.052	-0.157	-0.302	-0.349
INDIA	0.000	-0.035	-0.088	-0.157	-0.193
JAMAICA	0.000	-0.079	-0.178	-0.318	-0.393
NIGERIA	0.000	-0.143	-0.278	-0.428	-0.556
PHILIPPINES	0.000	-0.174	-0.338	-0.606	-0.837
TAIWAN	0.000	-0.062	-0.173	-0.316	-0.418
THAILAND	0.000	-0.273	-0.513	-0.695	-0.804
AVERAGES	0.000	-0.099	-0.228	-0.406	-0.526

Table 9 (cont): Dynamic Multipliers for a .01 Increase in the Constant Term of the Revenue Equation

9.C Real Imports

COUNTRY	YEARS: 1	5	10	20	30
CEYLON	0.000	0.005	0.019	0.049	0.066
CHILE	0.000	0.027	0.077	0.170	0.230
CUBA	0.000	0.029	0.104	0.215	0.311
EGYPT	0.000	-0.003	-0.008	-0.016	-0.018
INDIA	0.000	-0.007	-0.017	-0.031	-0.038
JAMAICA	0.000	-0.031	-0.070	-0.126	-0.156
NIGERIA	0.000	-0.059	-0.066	-0.037	-0.054
PHILIPPINES	0.000	0.099	0.266	0.529	0.755
TAIWAN	0.000	0.055	0.153	0.280	0.370
THAILAND	0.000	-0.060	-0.112	-0.152	-0.176
AVERAGES	0.000	0.005	0.035	0.088	0.129

9.D Trade Balance

COUNTRY	YEARS: 1	5	10	20	30	
CEYLON	0.000	-0.036	-0.127	-0.321	-0.434	1.000
CHILE	0.000	-0.012	-0.030	-0.060	-0.079	0.000
CUBA	0.000	-0.044	-0.159	-0.328	-0.475	0.000
EGYPT	0.000	-0.037	-0.113	-0.217	-0.251	0.000
INDIA	0.000	-0.021	-0.052	-0.093	-0.114	0.000
JAMAICA	0.000	-0.012	-0.027	-0.049	-0.060	0.000
NIGERIA	0.000	-0.035	-0.068	-0.105	-0.137	0.000
PHILIPPINES	0.000	-0.127	-0.246	-0.441	-0.609	0.000
TAIWAN	0.000	-0.049	-0.137	-0.250	-0.330	0.000
THAILAND	0.000	-0.155	-0.292	-0.395	-0.457	0.000
AVERAGES	0.000	-0.053	-0.125	-0.226	-0.295	0.100

Table 9 (cont): Dynamic Multipliers for a .01 Increase in the Constant Term of the Revenue Equation

9.E Government Expenditures

COUNTRY	YEARS: 1	5	10	20	30
CEYLON	0.247	0.902	1.053	1.163	1.226
CHILE	0.559	1.057	1.187	1.399	1.533
CUBA	0.103	0.649	1.056	1.393	1.597
EGYPT	0.194	0.812	0.989	1.030	1.036
INDIA	0.472	0.975	0.991	0.985	0.981
JAMAICA	0.434	0.971	0.985	0.973	0.966
NIGERIA	0.223	0.865	1.069	1.234	1.301
PHILIPPINES	0.448	1.080	1.281	1.575	1.826
TAIWAN	0.502	1.020	1.108	1.203	1.270
THAILAND	0.205	0.797	0.952	0.973	0.971
AVERAGES	0.339	0.913	1.067	1.193	1.271

9.F Accumulated Real Government Expenditures

COUNTRY	YEARS: 1	5	10	20	30
CEYLON	0.009	0.112	0.266	0.575	0.739
CHILE	0.030	0.181	0.416	0.793	1.030
CUBA	0.012	0.171	0.448	0.820	1.143
EGYPT	0.007	0.115	0.276	0.486	0.555
INDIA	0.013	0.111	0.232	0.385	0.466
JAMAICA	0.020	0.164	0.317	0.534	0.646
NIGERIA	0.021	0.177	0.382	0.578	0.772
PHILIPPINES	0.032	0.269	0.540	0.972	1.344
TAIWAN	0.020	0.190	0.355	0.593	0.756
THAILAND	0.036	0.363	0.569	0.728	0.833
AVERAGES	0.020	0.185	0.380	0.646	0.828