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MARKET NEUTRALITY CONDITIONS AND VALUATION OF A FOREIGN AFFILIATE

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Over the last decade the Financial Accounting Standards Board (FASB) has issued a series of pronouncements concerning the translation of foreign financial statements by US firms. These pronouncements have elicited much controversy.¹ Statement of Financial Accounting Standard (SFAS) No. 8, issued in 1975, required firms (1) to translate income and expense items (except depreciation charges and the value of goods sold) at average exchange rates, monetary assets and liabilities at current exchange rates, and fixed assets at historic rates; and (2) to report all foreign translation gains and losses on the current period income statement. Criticism of SFAS No. 8 focused on its disparate treatment of fixed assets and debt and on its apparent effect of increasing the volatility of reported income.

These complaints led to the recent replacement of SFAS No. 8 by SFAS Nos. 52 and 70. SFAS No. 52, adopted in December 1981, requires translation of all foreign financial statement items at either the average or current exchange rate, irrespective of whether they are carried at market or historical values on a firm's books. Perhaps more importantly from the viewpoint of many firms, it allows translation effects to be reported separately from the income statement.² SFAS No. 70 requires that SFAS No. 52 reports be supplemented by figures for foreign fixed assets adjusted to reflect the effects of inflation on their market value. However, even these latest pronouncements have met with some objections, in part because they do not require that all foreign currency items be measured at market value.

Managers, accountants, and financial analysts are understandably concerned that the financial statements of foreign operations provide accurate information about their economic condition. A reason for the continuing controversy over accounting rules is the lack of an established framework that provides criteria for choosing among the alternative ways of translating foreign currency items in financial statements.

In a recent article, Beaver and Wolfson (1982) have attempted to construct

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such a normative framework. They assume perfect and complete markets characterized by exchange rate, inflation, and interest rate neutrality. They demonstrate that of the three accounting model-translation methods – historical cost accounting with translation at the historical rate, historical cost accounting with translation at the current rate, and market value accounting with translation at the current rate – only the last meets their criteria of economic interpretability and symmetry between domestic and foreign financial statements. These criteria imply that balance sheet items equal the present value of their associated future cash flows and that economically-equivalent domestic and foreign transactions result in the same financial picture when reported in domestic currency terms. Their analysis points out the deficiencies of SFAS No. 52, which is a hybrid of historical cost and market-value accounting models with translation at the current rate, but suggests that the additional information required by SFAS No. 70 at least partially meets their criteria.

This paper supplements the work of Beaver and Wolfson in two ways. First, it explicitly considers the relation between the revenues and costs, assets and liabilities, and cash flows generated by a foreign affiliate's operating and financing decisions within a given period and over time. Since financial statements should provide guidance about future as well as current cash flows, these interrelationships should not be ignored.³ Second, it shows how the value of the affiliate depends on deviations from neutrality conditions. This results in a standard of reference for evaluating the impact of neutrality deviations on the information provided by market value accounting with translation at the current rate.

In order to simplify the analysis certainty is assumed throughout. The multiperiod cash flow model is presented in the next section and the role of exchange rate, inflation, and interest rate neutrality conditions is introduced in the third section. It is demonstrated that when these conditions hold, the value of the foreign affiliate determined from market value accounting of cash flows with translation at the current exchange rate is unaffected by future exchange rate, price level, and interest rate changes. Financial statements reporting information about current cash flows then provide a meaningful picture of future cash flows. This conclusion supports the findings of Beaver and Wolfson.

In the fourth section the impact of deviations from neutrality conditions on the foreign affiliate's cash flows is discussed. Such deviations may occur because of price and capital controls, transaction costs, tariffs, tax differentials, and other institutional factors. It is shown that when deviations from neutrality conditions exist even market value accounting with translation at the current exchange rate, as required by SFAS No. 70, provides a distorted assessment of future cash flows. The analysis suggests precisely how financial statements should then be adjusted to provide more meaningful information in the presence of such deviations.

MULTIPERIOD CASH FLOW MODEL

In this section an expression is derived for the value of a foreign affiliate in terms of the discounted sum of its cash flows. The following assumptions are made: first, the home country is the United States and its currency is the dollar; second, the stock of foreign borrowing is continuously 'rolled over' at the foreign interest rate in the sense that total borrowing at each instant of time is paid back before new borrowing takes place at the next instant of time;⁴ and third, the affiliate borrows directly only in the foreign capital market.

The cash flows from the affiliate to the parent, F_t , are constrained by the following sources and uses of funds relationship expressed in foreign currency:⁵

$$R_{t}^{*} + \dot{B}_{t}^{*} = q_{t}^{*} I_{t}^{*} + r_{t}^{*} B_{t}^{*} + F_{t}^{*}$$
(1)

The affiliate's sources of funds include (i) net operating revenue, R_i^* , defined as current operating revenue less current operating costs (which do not include fixed investment costs) and (ii) additional external borrowing in the foreign capital market, \dot{B}_i^* . The affiliate's uses of funds are (i) gross investment in fixed assets, $q_i I_i^*$, where q_i^* is the per unit foreign currency cost of the quantity of fixed asset investment, I_i^* , (ii) financing costs, $r_i^* B_i^*$, on the existing stock of foreign borrowing, B_i^* , at the instantaneous foreign market rate, r_i^* , and (iii) cash flows to the parent, $F_i^{*,6}$

Rearranging equation (1) gives:

$$F_{t}^{*} = (R_{t}^{*} - q_{t}^{*}I_{t}^{*}) - (\dot{B}_{t}^{*} - r_{t}^{*}B_{t}^{*})$$
⁽²⁾

The cash flows from the affiliate to the parent are the sum of two components: first, net production cash flows, defined as current operating revenue *less* current fixed investment costs, $R_i^* - q_i I_{ii}^*$; and second, net finance cash flows, defined as new foreign borrowing *less* interest costs on foreign debt, $\dot{B}_i^* - r_i B_i^*$. The net production cash flows depend upon the firm's real decisions concerning output and fixed investment, while the finance cash flows depend on the firm's financing decisions.

The value of the foreign affiliate is the discounted dollar value of its cash flows to the parent, $x_i F_i^{*:7}$

$$V_0 = \int_0^\infty x_i F_i k_i dt \tag{3}$$

where V_0 is the value of the foreign affiliate at time t = 0, x_i is the dollar price of foreign exchange at time t, and k_i is the domestic market discount factor at time t, used to discount the cash flows back to time 0,

$$k_t = \exp\left[-\int_0^t r_s ds\right]$$

and r is the parent's instantaneous (nominal) domestic interest rate.

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By using equation (2) to substitute for F_t in equation (3), one gets:

$$V_{0} = \int_{0}^{\infty} x_{i} (R_{i}^{*} - q_{i}^{*}I_{i}^{*})k_{i}dt + \int_{0}^{\infty} x_{i} (\dot{B}_{i}^{*} - r_{i}^{*}B_{i}^{*})k_{i}dt \qquad (4)$$
$$= VP_{0} + VF_{0}$$

Thus the value of the foreign affiliate depends on the discounted dollar value of its net production (VP_0) and net finance (VF_0) cash flows to the parent. Since cash flows at all points in time are expressed in market value terms and are translated at the corresponding exchange rate then prevailing, this formulation is consistent with market value accounting and translation at the current rate. It is evident that these cash flows depend on the exchange rate, interest rates, and price levels. The expressions for VF_0 and VP_0 in equation (4) can now be transformed to facilitate understanding of the interdependencies among these variables in the following section.

Integrating the expression for VF_0 by parts gives:⁸

$$VF_0 = \int_0^\infty x_i B_i^{*}(r_i - r_i^{*} - x_i^{*}/x_i) k_i dt - x_0 B_0^{*}$$
(5)

The affiliate's finance cash flows depend on the cumulative arbitrage gains of possibly borrowing at a lower effective rate abroad, $r_i + \dot{x_i}/x_i$, relative to the prevailing domestic rate, r_i , at different points in time, *minus* the initial amount of borrowing, $x_0B_0^2$.

The expression for VP_0 is transformed in stages. First, additions to the dollar value of foreign gross fixed assets can be described by the following equation:⁹

$$x_{i}q_{i}^{*}I_{i}^{*} = \frac{d}{dt}(x_{i}q_{i}^{*}K_{i}^{*}) + (\delta - q_{i}^{*}/q_{i}^{*} - x_{i}^{*}/x_{i})x_{i}q_{i}^{*}K_{i}^{*}, \qquad (6)$$

where K_i is the physical stock of net fixed assets abroad and δ is its constant rate of depreciation. The dollar value of foreign gross fixed investment is given by net fixed investment plus replacement investment, where the latter is net of capital gains due to changes in the foreign currency price of capital goods, q_i'/q_i , and of foreign currency appreciation, x_i/x_i . Substituting the expression for $x_iq_iI_i$ by equation (6) into VP_0 given in equation (4), and integrating by parts gives:

$$VP_{0} = \int_{0}^{\infty} x_{i}(R_{i}^{*} - c_{i}^{*}K_{i}^{*})k_{i}dt + x_{0}q_{0}^{*}K_{0}^{*}$$
(7)

where $c_i = (r_i + \delta - q_i/q_i - x_i/x_i)q_i$ is the foreign user cost of current capital services – the domestic opportunity cost of funds, r_i , and the physical depreciation rate, δ , *less* appreciation in the foreign price of fixed investment assets, q_i/q_i , and the dollar price of foreign currency, x_i/x_i . Equation (7) expresses the affiliate's discounted net production cash flows as the sum of discounted

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operating revenue less the current value of fixed capital services and of the initial net value of the affiliate's fixed assets.¹⁰

Second, the revenues and costs underlying the dollar value of the foreign affiliate's net operating revenue at time t, are specified as follows (time subscripts omitted):

$$x(R^* - c^*K^*) = x(p^*Q^* - w^*L^* - c^*K^*), \qquad (8)$$

where Q^* is units of affiliate output (all assumed sold locally), p^* is the per unit sales price in foreign currency, L^* is units of foreign labor used in production, and w^* is the per unit foreign currency price of foreign labor. Assuming all factor inputs are utilized in fixed proportions to output,¹¹ i.e. $L^* = a_L Q^*$, $K^* = a_K Q^*$, where a_L and a_K are non-negative constants, the equation may be rewritten as:

$$x(R^* - c^*K^*) = x(p^* - w^*a_L - c^*a_K)Q^*$$
(9)

In this form, the foreign affiliate's dollar profits depend on the exchange rate, per unit foreign profit, and the volume of output. VP_0 in equation (7) may then be rewritten as:

$$VP_{0} = \int_{0}^{\infty} x_{i}(p_{i}^{*} - w_{i}^{*}a_{L} - c_{i}^{*}a_{K})Q_{i}^{*}k_{i}dt + x_{0}q_{0}^{*}K_{0}^{*}$$
(10)

NEUTRALITY CONDITIONS

The role that neutrality conditions play in linking the exchange rate, prices, and interest rates is now discussed. Exchange rate neutrality, also known as purchasing power parity, prevails if price increases of goods sold in the parent country are equal to dollar-equivalent price increases of goods sold in the host country. Inflation neutrality prevails if all output and factor prices increase at the same rate. International interest neutrality, also known as interest parity,¹² holds if the domestic interest rate equals the effective dollar cost of borrowing abroad. Domestic interest neutrality, also referred to as the Fisher Closed Relation, prevails when the market interest rate is equal to the real interest rate plus the rate of inflation.

To incorporate these neutrality conditions equation (4) is first rewritten by utilizing equations (5) and (10) as follows:

$$V_{0} = \int_{0}^{\infty} x_{i}(p_{i}^{*} - w_{i}^{*}a_{L} - c_{i}^{*}a_{K})Q_{i}^{*}k_{i}dt + \int_{0}^{\infty} x_{i}(r_{i} - r_{i}^{*} - x_{i}^{*}/x_{i})B_{i}^{*}k_{i}dt + x_{0}(q_{0}^{*}K_{0}^{*} - B_{0}^{*})$$
(11)

Next it is assumed for convenience that the interest rates r and r^* are constant

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over time, and that x_i, p_i, p_i, w_i , and c_i grow at the constant rates g_x, g_p, g_y, g_w and g_c , respectively. This implies, for example, that $x_i = x_0 e^{tx}$ and $k_i = e^{-rt}$. Incorporating these assumptions in equation (11) and multiplying and dividing appropriately gives:

$$V_0 = \int_0^\infty \{ (x_0 p_0) \exp[d_x t] - (x_0 w_0 a_L) \exp[(d_x + d_w) t] - (x_0 c_0 a_K) \exp[(d_x + d_c) t] \} Q_i$$

 $\exp\left[-(\bar{r}-d)t\right]dt + \int_{0}^{\infty} x_{0}d_{r} \exp\left[(d_{x}-g_{p}^{\star})t\right] B_{t}^{\star} \exp\left[-(\bar{r}-d)t\right]dt + x_{0}(q_{0}^{\star}K_{0}^{\star}-B_{0}^{\star})(12)$

which, assuming that Q^* and B^* are constant over time, reduces to:

$$V_{0} = \frac{x_{0}\dot{p_{0}}\dot{Q_{0}}}{\overline{r-d-d_{x}}} - \frac{x_{0}\dot{w_{0}}a_{L}\dot{Q_{0}}}{\overline{r-d-d_{x}-d_{w}}} - \frac{x_{0}\dot{c_{0}}a_{K}\dot{Q_{0}}}{\overline{r-d-d_{x}-d_{c}}} + \frac{x_{0}\dot{d_{x}}\dot{B_{0}}}{\overline{r-d-d_{x}+g_{p}}} + x_{0}(\dot{q_{0}}\dot{K_{0}}-\dot{B_{0}})$$
(13)

where $d_x = g_x + g_p - g_p$; $d_w = g_w - g_p$; $d_c = g_c - g_p$; $d_r = r - r^* - g_x$; and $d = \overline{r-r} + g_p$, where r is the real domestic interest rate. The d parameters may be interpreted as deviations from neutrality conditions that link international financial variables. Exchange rate neutrality holds if $d_x = g_x + g_p - g_p = 0$; inflation neutrality prevails if $d_w = g_w - g_p = 0$ and $d_c = g_c - g_p = 0$; international interest neutrality holds if $d_r = r - r^* - g_x = 0$; and domestic interest neutrality prevails when $d = \overline{r-r} + g_p = 0$.

In equation (13) the value of the affiliate is expressed as the sum of three terms: the capitalized value of current (time 0) net production cash flows, the capitalized value of current (time 0) financing cash flows, and the initial net wealth. Each of the first two terms is capitalized by the real interest rate adjusted by the relevant deviation parameters. For example, the capitalization factor for dollar-equivalent foreign sales revenue, $x_0p_0Q_0^*$, is $\overline{r} - d - d_x$ which is the real interest rate adjusted by deviations from domestic interest neutrality and exchange rate neutrality.

The role of the deviation parameters in equation (13) is better understood by first considering the case in which all neutrality conditions hold simultaneously. In this case equation (13) reduces to:

$$V_{0} = \frac{\{(x_{0}\dot{p_{0}}) - (x_{0}\dot{w_{0}}a_{L}) - (x_{0}\dot{c_{0}}a_{K})\}Q_{0}^{\dagger}}{r} + x_{0}(\dot{q_{0}}K_{0}^{\dagger} - B_{0}^{\dagger})$$
(14)

Observe first, that the affiliate's net production cash flows depend only on the current (time 0) exchange rate, foreign price level, and foreign costs. They do not depend on future changes in the exchange rate, foreign prices, or costs. The reason is that when neutrality conditions hold, the exchange rate and foreign price and cost changes are offsetting. For example, consider the effects of an increase in foreign prices while US prices remain the same. Inflation neutrality abroad implies that, in foreign currency terms, foreign sales revenue, costs, and cash flows will all increase proportionately leaving per unit foreign profits unchanged; exchange rate neutrality implies that the foreign currency will depreciate to leave the dollar value of the affiliate's cash flows unchanged.

Second, observe that the affiliate's value does not depend at all on its finance cash flows because, with the existence of international interest neutrality, there are no borrowing arbitrage opportunities for the affiliate to exploit: any appreciation (depreciation) in foreign currency is offset by a lower (higher) foreign interest differential.

This analysis demonstrates that in a properly specified multiperiod framework if neutrality conditions hold, then the value of a foreign affiliate depends only on accounting and exchange rate information at time 0. This implies that it is unnecessary to be concerned with measuring how cash flows and exchange rates change over time. It also implies that market value accounting with translation at the current rate of present-period (time 0) financial statements of a foreign affiliate provides an undistorted assessment of its true economic value. The present analysis thus clarifies the conditions under which Beaver and Wolfson's conclusions hold. However, as will now be shown, when these neutrality conditions are violated market value accounting with translation at the current rate of present-period financial statements will give an inaccurate picture.

DEVIATIONS FROM NEUTRALITY CONDITIONS

Deviations from neutrality conditions can occur for a variety of reasons discussed below.¹⁴ These deviations are likely to be short-run phenomena because, in the long run, they should be eliminated by arbitrage. However, for simplicity it is assumed that these deviations persist over the long run, and equation (13) is used to illustrate their effect on the cash flows of the foreign affiliate.

a. International interest neutrality

Deviations from international interest neutrality may arise from transaction costs, capital controls, government intervention, or other imperfections in financial markets. Anticipatible deviations will create exploitable borrowing arbitrage opportunities for the affiliate. If, for example $d_r > 0$, and effective borrowing costs are lower abroad than domestically, then

$$\frac{x_0 d_r B_0^{*}}{\bar{r} - d - d_x + g_p^{*}} > 0$$

so the financing cash flows and value of the affiliate will increase for any given level of foreign debt.

b. Exchange rate neutrality

Imperfect arbitrage in international goods markets and government intervention in the foreign exchange market may lead to violations of the exchange rate neutrality condition. For example, it is possible that the host country currency depreciates faster than the inflation differential between the host country and the United States i.e., $d_x < 0$. This means that the denominators of all three parts of the first term on the right-hand side of equation (13) increase, resulting in a decrease in the affiliate's operating cash flows to the parent.

c. Inflation neutrality

Nonneutral inflation may occur if the rate of price adjustment in some sectors of the economy lags because of price controls, contracts fixed in nominal terms, or other adjustment constraints. Under these circumstances it is possible that inflation may lead to disproportionate changes in the prices of the affiliate's output and its inputs. For example, if labor costs increase faster than sales price in the host country i.e. $d_w > 0$, then the term $(x_0w_0a_L)/(r-d-d_x-d_w)$ will increase, implying a decrease in the affiliate's operating cash flows to the parent.

d. Domestic interest neutrality

Deviations from domestic interest neutrality may occur if transaction costs or capital controls limit the adjustment of nominal interest rates to inflation changes. For example, if d > 0 the nominal domestic interest rate does not fully reflect domestic inflation. Consequently, the discounted value of future cash flows will increase.

The analysis suggests that if deviations from neutrality conditions exist then market value accounting with translation at current rate of present-period financial statements will give an inaccurate measure of the value of a foreign affiliate. The reason is that under these conditions future changes in the exchange rate, interest rates, and foreign prices and cost will no longer be offsetting and so cannot be ignored.

Equation (13) suggests a more satisfactory approach for interpreting presentperiod financial statements in the presence of neutrality deviations. Specifically, it suggests that the elements of production and financing cash flows should be adjusted individually to reflect the impact of the relevant deviations.

To illustrate this approach, both sides of (13) are multiplied by r, the real domestic interest rate:

$$r\overline{V}_0 = \left(\frac{\overline{r}}{\overline{r}-d-d_x}\right)(x_0p_0Q_0) - \left(\frac{\overline{r}}{\overline{r}-d-d_x-d_w}\right)(x_0w_0a_LQ_0)$$
(15)

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$$-\left(\frac{\overline{r}}{\overline{r-d-d_x-d_c}}\right)(x_0c_0a_KQ_0^{\bullet}) + \left(\frac{\overline{r}}{\overline{r-d-d_x+g_p^{\bullet}}}\right)(x_0d_rB_0^{\bullet}) + \overline{rx}_0(q_0^{\bullet}K_0^{\bullet} - B_0^{\bullet})$$

 rV_0 represents the permanent income value of the affiliate; i.e. the uniform real income flow over time whose discounted sum equals the value of the firm. Equation (15) expresses the permanent income of the affiliate as the net sum of the permanent income values of its underlying cash flow components: sales revenue, labor costs, user capital costs, financing costs, and the initial asset position. Each of these permanent income flow components is obtained by multiplying the foreign currency value of the component translated at the current exchange rate by a corresponding adjustment coefficient. When expressed in this manner in permanent income terms, the individual cash flow components incorporate the effects of neutrality deviations on the affiliate's value.

Observe first that if there are no neutrality deviations (i.e. $d = d_x = d_w = d_c = 0$) the adjustment coefficients all degenerate to the value of 1. The actual current value of all cash flow items are then equal to their permanent income equivalents. No adjustments are necessary since, as was pointed out above, the absence of any anticipated neutrality deviations implies that all future exchange rate, inflation, and interest rate developments have offsetting effects on future cash flows.

When neutrality deviations are anticipated, however, one or more of these coefficients will differ from 1. For example, if foreign wages are expected to grow at a rate faster than foreign sales price inflation, implying $d_w > 0$, the adjustment coefficient for labor costs is greater than 1. This implies that the current translated value of labor costs should be adjusted upwards in order to obtain the permanent income value of these costs. This upward adjustment reflects the anticipation of relative foreign wage costs increasing over time and the resulting adverse effect on the value of the affiliate. The adjustment of all cash flow components in a similar manner provides a more satisfactory means of reporting financial statement information in the presence of market neutrality deviations.¹⁵

CONCLUSIONS

A multiperiod cash flow model has been formulated which has shown how the cash flows and value of a foreign affiliate depend on deviations from neutrality conditions. When neutrality conditions hold, market value accounting with translation at the current exchange rate of present-period financial statements provides an accurate assessment of the affiliate's value. This conclusion supports the findings of Beaver and Wolfson (1982). When neutrality conditions do not hold, market value accounting with translation at the current exchange

rate of present-period financial statements will give a distorted picture of the value of the affiliate. The framework shows how the value of the affiliate explicitly depends on individual deviations from neutrality.

The analysis has some policy implications. When neutrality conditions hold, financial statements prepared using SFAS 70, but not SFAS 52, meet the model's criteria of acceptability. When any of the neutrality conditions do not hold SFAS 70 statements are unacceptable as well. One way to resolve this problem is to require market-value financial statements in the currency of the foreign affiliate with information about exchange rates and deviations from neutrality conditions appended. The analysis suggests how the individual cash flow elements of the foreign affiliate should then be adjusted by the appropriate deviations in order to obtain more meaningful financial interpretations.

NOTES

- 1 See R.A. Alleman (1982), T. Selling and G. Sorter (1983), and S.R. Wojciechowski (1982).
- 2 SFAS No. 52 also introduces the notion of a 'functional currency' defined as the primary currency in which a foreign affiliate generates and expends cash. Financial statements of foreign affiliates first are expressed in this functional currency. Then they are translated into US dollars.
- 3 SFAS 70, page 32, suggests that the information it requires to be disclosed in financial statements is for the purpose of assessing future cash flows.
- 4 Alternative financing methods could be used but they would complicate the analysis without affecting the results.
- 5 An asterisk (*) is used to denote denomination in a foreign currency, and a dot (.) over a variable denotes its instantaneous rate of exchange.
- 6 Given the assumption of perfect markets, the time paths of prices and interest rates are exogenous to the firm.
- 7 With perfect capital markets expressions for the value of the foreign affiliate in terms of cash flows to the parent or net asset accumulation by the affiliate are equivalent.
- 8 Equation (5) is derived under the assumption that the present value of the terminal stock of foreign borrowing is zero, i.e., $\lim_{t \to \infty} x_t B_t k_t = 0$.
- 9 Equation (6) is derived assuming that $\lim_{t \to \infty} x_t q_t^* K_t^* k_t = 0$.
- 10 Note that net production cash flows and economic profits differ at any time by the difference between the current value of fixed capital services and of gross fixed investment.
- 11 A more general assumption is that the input-output coefficients are functions of relative factor prices. However, the equilibrium conditions of neutral inflation posited below imply that the prices of all factors rise proportionately. Hence nothing of analytical significance is lost by assuming that the input-output coefficients are constant.
- 12 With certainty the expected future spot, the actual future spot, and forward exchange rates are always equal. Hence there is no difference between covered interest parity, which involves the forward rate, and uncovered interest parity (or Fisher Open), which involves the expected future spot rate.
- 13 Note that the effect of any domestic inflation will be offset by a corresponding increase in the domestic market interest rate as a result of domestic interest neutrality, and the real interest rate, r, will remain unchanged.
- 14 Empirical evidence on the magnitude of neutrality deviations may be found in Aliber and Stickney (1975) and Levi (1983).
- 15 The formulae for calculating these deviations can be obtained from many international finance texts, for instance, M. Levi (1983).

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