Macroeconomic Versus Market-Specific Protection: An Intertemporal Optimizing Model of North-South Trade

Walter Enders

GATT Research Paper 91-GATT 8
January 1993

Center for Agricultural and Rural Development
Iowa State University
Ames, Iowa 50011

W. Enders is professor of economics, Iowa State University, Ames, Iowa.

This material is based upon work supported by the Cooperative State Research Service, U.S. Department of Agriculture, under Agreement No. 89-38812-4480.

Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view of the U.S. Department of Agriculture.

CONTENTS

ABSTRACT

If the General Agreement on Tariffs and Trade reduces foreign trade barriers against U.S. farm exports, special interest groups in affected nations will seek other forms of protection. It would not be surprising if some of our trading partners used general macroeconomic policies to promote domestic production.

This paper develops a model to demonstrate how the government of an importing nation might reasonably undertake macroeconomic policies designed to thwart imports. Using a two-country, overlapping generations model, the paper analyzes some of the tensions between developed and developing nations regarding intertemporal trade and capital movements. The model is designed so that optimizing agents in the South have a high rate of time preference. Otherwise, the North and the South are alike in all respects. The differential rate of time preference means that the South is likely to have a relatively low capital-to-labor ratio, wage rate, and level of per capita income but a relatively high interest rate in autarkic equilibrium. The introduction of international capital flows (intertemporal trade) will be welfare reducing for the current generation in the South, even though it may increase the next generation's (and steady-state) utility. The international conflicts that arise from international capital movements and the intergenerational conflicts that arise within each nation are discussed.

MACROECONOMIC VERSUS MARKET-SPECIFIC PROTECTION: AN INTERTEMPORAL OPTIMIZING MODEL OF NORTH-SOUTH TRADE

Easing trade barriers does not eliminate pressures to protect producers from import competition. It is unlikely that the domestic political forces that successfully achieved trade protection will dissolve in the face of trade liberalization. To the extent that the General Agreement on Tariffs and Trade (GATT) reduces foreign trade barriers against U.S. farm exports, special interest groups in affected nations will seek other forms of protection.

Policymakers intent on granting protection to firms in the import sector command a vast array of tools in addition to the traditional means of restricting imports (i.e., tariffs, quotas, and other nontariff barriers). The various forms of subsidizing firms in the import sector all act to increase producers' surplus and restrict imports. Direct production, employment, and price subsidies, for example, enhance profitability and induce resources to remain in (or possibly enter) the subsidized sector. Thus, production in subsidized industries replaces imports in the market baskets of consumers. Moreover, as is widely recognized, macroeconomic policies can have profound impacts on a nation's agricultural sector. Currency depreciation, designed to promote exports and restrict imports, can have a significant short-run influence on a nation's agricultural prices, production, and trade position. Government taxing and spending decisions affect aggregate demand, including demand and cost conditions in the agricultural sector.

The alternative means of protection are not equivalent in their effects on resource allocation, income distribution, and trade patterns. Traditional economic research focuses on a comparison of the microeconomic, or market-specific, methods of providing assistance to the agriculture sector. Quantitative restrictions such as quotas, voluntary export restraints (VERs), voluntary restraining

agreements (VRAs), and other means to directly limit market access are thought to be more restrictive than tariff barriers. Production and employment subsidies are considered the least costly means of providing protection. The *Specificity Principle* states that the least costly method to support a specific activity is to directly subsidize that activity. Given the policy goal of protecting or maintaining living standards in the farm sector, the least costly policy is to enhance farm incomes through lump-sum transfer payments not coupled to production or farm size. In addition, subsidies are deemed to have a smaller trade-distorting effect than tariff and nontariff barriers (NTBs). To explain, note that subsidies do not induce a price gap between domestic and world prices. With a subsidy, domestic consumption—hence import demand—is not diverted toward other sectors as a result of a price increase.

Using Nontariff Barriers

Although economists consider quantitative restrictions to be more restrictive than tariffs, NTBs are far more prevalent than tariffs. Production subsidies, the least costly policy option, are often not in the set of politically feasible policies. Why are the most costly and distortionary methods of protection more prevalent than the least costly? A large part of the explanation centers on the information available to the public. The public may not fully understand the added costs of nontariff restrictions; tariffs are directly measurable increases in the price of imported goods. It is easy to understand that a 25 percent import tariff raises import prices. On the other hand, NTBs have equivalent, albeit indirect, price-enhancing effects. The protection from foreign competition provides domestic producers an umbrella under which they can raise, or refrain from reducing, domestic product prices. These indirect price effects, although less visible, are just as important as the direct price effects of a tariff. Direct subsidies to an industry, the least costly method of protection, are often highly visible. Direct cash payments and "tax breaks" to an industry often raise the political ire of the nonsubsidized groups. In contrast to the Specificity Principle, the public often finds such

indirect forms of support to be more palatable than direct support. Subsidies are more visible than tariffs, which in turn are more visible than NTBs.

In response to reduced trade barriers, special interest groups in the import sector will seek import relief by whatever means are available. Some of their efforts will certainly be channeled into soliciting subsidies from the government. It would not be surprising if the interest groups in many of our trading partners attempted to "drum up" popular support for such schemes as agricultural subsidies and price supports, "buy domestic" programs, and health regulations favoring domestic products. Even if these efforts are successful, it is quite possible that efforts will be devoted to using general macroeconomic policies to promote domestic production.

GATT Negotiations and Nontariff Barriers

This issue is particularly important for the GATT negotiations that are designed to eliminate restrictive trade barriers; for example, policymakers might be inclined to substitute toward exchange rate manipulation as a method of protecting the domestic import sector. Even though the Jamaica agreement obligates nations to "avoid manipulating exchange rates," exchange depreciation is a feasible tool for policymakers. It is interesting to note that the United States once resorted to this same practice; the Roosevelt Administration's 1933 devaluation of the dollar, in part, boosted farm (particularly cotton) and raw materials prices. In today's world, many of our trading partners have the potential to manipulate their currency. Recently, Korea has been accused of maintaining an artificially low price for the won. It is charged that the Korean central bank deliberately depressed the value of the won as the dollar fell from its 1985 zenith. The accusation is that Korea wanted to maintain its competitive position against the United States.

Macroeconomic Policy Adjustments

Macroeconomic policy adjustments, such as currency depreciation, are relatively easy to comprehend, observe, and monitor. The Roosevelt devaluation of the dollar is still unpopular with political conservatives; the movements in the won did not go unnoticed by the Korean private sector or by U.S. producers competing with Korean firms. Moreover, history is replete with instances in which labor unions have violently opposed currency depreciation. In Mexico, for example, it was a long-standing practice of outgoing governments to devalue the peso; only a "lame duck" president could withstand the resulting political consequences from labor groups. Thus, there is an important difference between using market-specific versus macroeconomic policies to promote the well-being of the import sector. As opposed to market-specific policies, macroeconomic policies, by their very nature, affect the whole economy; individuals from all sectors have the incentive to be informed about the macroeconomy.

Using macroeconomic policy to restrict imports is most likely when there is a consensus that imports in general are detrimental to domestic economic well-being. It is no coincidence that the Roosevelt devaluation came during the midst of the Great Depression; a general stimulus to domestic production and employment was a national goal.

This paper develops a model to demonstrate how the government of an importing nation might reasonably undertake macroeconomic policies designed to thwart imports. The model is designed so that all agents are optimizers operating in perfectly competitive markets. Thus, it is possible to abstract from the unemployment goal concerning the use of macroeconomic policy. Two countries are assumed; the North and the South. The model demonstrates that free trade increases welfare in the South in the long run but not in the short run. Policymakers in the South have the incentive to restrict trade—prevent international capital movements—unless the North makes a compensatory

transfer payment. Unless the side payment is forthcoming, both workers and capitalists will oppose free trade; there will be a consensus to restrict trade in general.

The political implications of the results are straightforward. In the North-South dialogue, the South has the incentive to oppose free trade unless it can realize compensation payments from the North. If the North is not willing to make such payments, the South will find that its short-term interests are best served by restricting all forms of imports from the North.

Direct Investments and International Capital Movements

Host nations typically express serious concerns about direct foreign investment. U.S. policymakers are wary of Japanese direct investment in the United States while strongly objecting to Canadian barriers to direct investment. In the same vein, one key issue in the New International Economic Order (NIEO) dialogue centers on the appropriate policies toward multinational firms. The goal is to explain the host's disinclination toward direct foreign investment. In economic development literature, objections to direct investment center around the political influence of the multinational, market failures, myopic agents, and/or government-induced distortions. The nature of this argument is quite different in that we assume all agents are forward-looking optimizers operating in perfectly competitive markets. It is not our aim to dispute the importance of market failures as obstacles to economic development. Instead, the tradition within the economics profession has been to analyze problems of many varieties within the optimizing-competitive framework. Many fruitful insights have been gleaned from this methodology even though noncompetitive elements impinge on the problem at hand. Our objective is to follow in this tradition with regard to international capital flows between the North and the South.

There have been many studies of the determinants of international capital movements within an optimizing framework; we use the general methodology contained in papers by Anderson (1989), Eaton (1988), Galor (1986), Ruffin and Yoon (1990), and Siebert (1985, 1989), among others.

Specifically, some of the implications of the Diamond (1965)-Buiter (1981) two-country, overlapping generations model are used to analyze host-donor issues regarding international capital mobility. The nature of the model is such that agents in one nation (the South) have a relatively high rate of time preference. Otherwise, the North and the South are alike in all regards; both have the same aggregate production function, intraperiod utility function, and rate of population growth. To preview our results, the differential rate of time preference means that the South is likely to have a relatively low capital-to-labor ratio, wage rate, and level of per capita income but a relatively high interest rate in autarkic equilibrium. Introducing international capital flows will be welfare reducing for the current generation in the South even though it increases the next generation's (and steady-state) utility. Residents in the North, on the other hand, will benefit from the capital flow. Since real interest rate equalization places the "world" economy on its production possibilities frontier, the North must gain more than the South loses.

A side payment, or transfer, will be necessary to induce the potential host to accept the direct investment. We show that the transfer will be necessary each and every period—the young generation in the South will always have the incentive to "kick the foreigners out" unless an additional side payment is forthcoming. Thus, there will be a sustained, although indeterminate, flow of side payments into the South. We show that the welfare of the young of any particular generation in the South is always positively related to the size of the side payment. In the long run, however, welfare of the South (and the North) may be negatively related to the size of the side payment. The nonuniqueness of the side payment gives rise to a number of interesting issues concerning the size and distribution of the payment.

The Model

The model is a simple extension of the Diamond (1965)-Buiter (1981) model, which allows us to consider international transfers. There are two countries, the South and the North, that are

identical in all respects except that residents in the South have a higher rate of time preference. An agent born in the South at the beginning of any period (t) lives for two periods. During the first period of life, the individual sells one unit of labor and receives wage income, w_t. Also during this first period, the individual receives a side payment (s_t) from residents of the North.[1] At this point, we do not motivate the need for the transfer. If $s_t = 0$, residents in the South will choose to expel foreign capital, or remain in autarky.

During the first period of life, the agent must decide how much to save and how much to consume. The individual leaves no bequests, and consumption and saving decisions are made under conditions of perfect foresight. Saving in (t) earns the real market interest rate, r_{t+1}; principal plus interest are used to finance second-period consumption. After consumption in the second period of life, the agent leaves the economic system and a new generation is born. Population grows at the constant rate n.

Thus, individuals of the South born during period (t) face the following optimization problem:

$$\max\ v(c_t^1) + \frac{v(c_t^2)}{1+\rho};\ v' > 0;\ v'' < 0;\ \rho > 0, \tag{1}$$

$$\text{s.t. } w_t + s_t - c_t^1 \leq a_t, \tag{2}$$

$$a_t\,(1 + r_{t+1}) \geq c_t^2, \tag{3}$$

$$c_t^1,\ c_t^2 \geq 0, \tag{4}$$

where

c_j^i = consumption of an individual born in period j during the i^{th} period of life;

a_t = real saving in period (t);

r_{t+1} = real interest rate on saving between (t) and $(t+1)$; and

ρ = rate of time preference.

As Buiter (1981) notes, although the utility function in Equation (1) is quite specific, it has the virtue of allowing us to unambiguously define international differences in the pure rate of time preference.

Assuming an interior solution to the optimization problem, the demand function by the young during their first period of life is given by

$$c_t^1 = c(w_t + s_t,\ r_{t+1};\ \rho). \tag{5}$$

It is easily verified that[2]

$$0 < c_w < 1;\ c_r < 0;\ c_\rho > 0, \tag{6}$$

where the notation c_x is used to denote the partial derivative of the function c with respect to the argument x.

To highlight the issue of international capital movements, it is assumed that there is a single homogeneous good. Thus, all trade is intertemporal trade. Production occurs under competitive conditions so that factors are paid their marginal products. Equilibrium in the factor market entails

$$y_t = f(k_t);\ f' > 0;\ f'' < 0;\ f'(0) = \infty;\ f'(\infty) = 0, \tag{7}$$

$$w_t = f(k_t) - k_t f'(k_t), \tag{8}$$

$$r_t = f'(k_t), \tag{9}$$

where

y_t = real per capita output; and

k_t = capital-to-labor ratio.

The nature of the capital formation process is such that it takes one period to transform savings (investment) into capital; thus, the capital stock in (t) is the amount invested during (t - 1). Note that this assumption is formally equivalent to assuming that a unit of capital installed in (t - 1) does not bear output until period (t).

If there is not international capital mobility in (t), the capital stock in (t + 1) is[3]

$$k_{t+1}\,(1 + n) = w_t - c_t^1. \tag{10}$$

If capital is mobile in (t), however, interest rate equalization entails a common capital-to-labor ratio—hence common interest rates and wage rates—for period (t + 1). With capital mobility in (t), Equation (10) is replaced by

$$2(1 + n)\,k_{t+1} = w_t - c_t^1 - \hat{w}_t - \hat{c}_t^1 \tag{11}$$

where ^ denotes the North's counterpart of the South's variable.

Notice that w_t need not equal $\hat{w}_t$; in period (t), wage rates would be equal only if there had been capital mobility in period (t - 1) or if by some coincidence out-of-steady-state capital-to-labor ratios happened to be equal in the two nations.

Buiter (1981) argues that it is likely that the country with the higher rate of time preference will be the nation with the lower capital-to-labor ratio and higher interest rate (and thus, the host). He proves the following propositions by comparing autarkic equilibria in the two nations.[4]

Proposition 1. If the two nations have the same initial capital-to-labor ratio (k_0), the country with the higher rate of time preference will have a lower capital-to-labor ratio than the other nation in all subsequent periods. Moreover, if the higher time preference nation begins with a greater capital-to-labor ratio than the other nation, the time paths of the capital-to-labor ratios will eventually cross so that the higher time preference nation eventually has the lower capital-to-labor ratio.

Proposition 2. Let k_t^s and k_t^n be the autarkic capital-to-labor ratios in the South and North, respectively. If the autarkic capital-to-labor ratios are such that $k_t^s < k_t^n$, then the common capital-to-labor ratio under capital mobility for $(t + 1)$ (i.e., k_{t+1}) is between the capital-to-labor ratios that would prevail if autarky were maintained: $k_{t+1}^s < k_{t+1} < k_{t+1}^n$. Alternatively, $r_{t+1}^n < r_{t+1} < r_{t+1}^s$.

Propositions 1 and 2 provide interesting insights into the nature of the comparative autarkic equilibria. The nation with the relatively high (low) rate of time preference will have many characteristics of the South (the North). Each generation in the nation with the higher rate of time preference will undertake relative saving; it is likely to have the relatively lower capital-to-labor ratio. Assuming this condition holds (i.e., $k_t^s < k_t^n$), the South will have a relatively lower level of per capita income (since $f' > 0$) and a relatively higher real rate of interest (since $f'' < 0$). Moreover, wages in the South will be below those of the North since, from Equation (7), $dw_t/dk_t = -k_t f'' > 0$. If capital movements are allowed in (t), real capital will flow from the North to the South in search of high real interest rates. The equilibrium levels of the capital-to-labor ratio and real interest rate (i.e., k_{t+1} and r_{t+1}) will be between those that would have prevailed had autarky been maintained. In the remainder of the paper, we continue to assume that the South has the relatively higher rate of time preference ($\rho > \hat{\rho}$) and that the autarkic capital-to-labor ratio in the South is less than that in the North.

The Effects of Capital Movements

Proposition 2 demonstrates that introducing capital mobility will increase the capital stock in the host nation and decrease the capital stock in the donor (as compared to remaining in autarky). Thus, as is often argued, direct foreign investment will raise production and wages and decrease interest rates in the host nation. It is inappropriate, however, to conclude that the wage and

production gains are welfare increasing for all members of all generations. As we formally demonstrate in the Appendix, for any given value of k_t, the utility of an agent born at (t) is positively related to r_{t+1}. Intuitively, an increase in r_{t+1} raises the return from any given amount of saving. Since the newly born generation in (t) save to finance (t + 1) consumption, their utility is positively related to the interest rate.[5] The key point (see Proposition 2) is that capital mobility in (t) causes the interest rate to rise in the donor nation and to fall in the host. Thus, introducing capital mobility in period (t) is unambiguously welfare reducing for the young generation in the host nation and unambiguously welfare increasing for the young generation in the donor nation. Notice that utility of the old generation in (t) is unaffected by changes in r_{t+1}; the consumption of this generation in period t (i.e., $c_t^2{}_{-1}$) is financed from saving in period (t - 1).

Identifying the South as the nation with the higher rate of time preference means that introducing capital mobility causes welfare in the South to decline and welfare in the North to rise *for those alive during period t*. Buiter (1981) argues that the South will not allow capital mobility unless there is a side payment or transfer at (t) from the young in the North to the young in the South. That such a transfer is feasible is clear; capital mobility during period (t) equalizes the marginal productivities of capital across nations. Since capital mobility is Pareto-efficient, the gainers—the young in the North—must be able to compensate the losers—the young in the South. As discussed in a later section, there are inefficient means of taxing the capital inflow from the North; per unit taxes and interest rate taxes are but two examples. The efficient tax is a lump sum or "entry" tax that does not induce a gap between interest rates of the two nations. With an efficient tax, the North pays the sum s_t multiplied by the number of workers in the South; in return, the South allows an unrestricted flow of capital during period (t).

What Buiter (1981) does not discuss is that the North must make a sustained flow of side payments to the South. The need for a continual transfer can be demonstrated from the following propositions.

Proposition 3. For any given value of k_t, a return to portfolio autarky will be associated with a lower value of the South's capital stock than if capital mobility were to be maintained. For the North, a return to autarky will be associated with a higher value of the capital stock than if capital mobility were to be maintained. The required demonstration is

$$k^s_{t+1} < k_{t+1} < k^n_{t+1}, \text{ or}$$

$$r^n_{t+1} < r_{t+1} < r^s_{t+1}.$$

Formally, Proposition 3 is equivalent to Proposition 2.

Proposition 4. For any given value of k_t, the welfare of an individual born at (t) is positively related to r_{t+1} and to the size of the side payment he/she receives. (The proof is provided in the Appendix and following Proposition 6.)

These two propositions hold for any arbitrary value of k_t and $\tilde{k}_t$, not for just the autarkic values of the capital stocks. Thus, even from a regime of capital mobility, Propositions 3 and 4 establish the need for a sustained transfer to the South. Each young generation in the South will press for a return to autarky; the rise in the domestic interest rate will be beneficial to members of the young generation in the South and will not affect the welfare of the old. In each period (t), a time-consistent solution for the South is to "kick out foreign capital" unless an additional side payment is forthcoming. At the same time, members of the young generation in the North will experience a welfare decline if there is a suspension of capital mobility. [Recall that members of the old generation in the North during period (t) are unaffected by capital movements in period (t).] Thus, for every period (t), the North is willing to pay a transfer to maintain (or restore) capital mobility. Moreover, the North is always able to make a transfer of sufficient size that induces the South to allow capital movements. Given that capital mobility is Pareto-efficient, the gains to the North from

capital movements must exceed the losses to the South. Thus, a transfer must be made each and every period; the South will always demand a side payment from the North and residents of the North are always willing and able to make such a payment. Of course, generations subsequent to those born in period (t) will be affected by the existence of capital mobility in (t). However, in the absence of forward-looking governments, is not possible for the preferences of these future generations to be expressed during period (t).

General Equilibrium Effects of the Transfer

Having demonstrated the need for a continual stream of side payments, it is interesting to consider the effects on both the North and the South. Let u^a be the reduced form level of utility received by agents born in the South during period (t) if autarky prevails in (t). Let u^c denote reduced form utility (with a transfer) if capital mobility prevails in (t). Residents of the South will allow capital mobility if they receive a transfer of sufficient magnitude such that

$$u^c(w_t + s_t, r_{t+1}) > u^a(w_t, r^s_{t+1}) \; ; \; s_t > 0. \tag{12}$$

Similarly, residents in the North will be willing to make any transfer such that

$$\hat{u}^c(\hat{w}_t - s_t, r_{t+1}) > \hat{u}^a(\hat{w}_t, r^n_{t+1}). \tag{13}$$

Without modeling the bargaining game between the North and the South, the magnitude of the transfer that will result from the bargaining process is indeterminate. There is a range of s_t values for which the inequalities (12) and (13) are simultaneously satisfied. Given that the North makes a transfer of sufficient size to induce the South to allow capital mobility, it is possible to ascertain the consequences of changes in the size of the transfer.

Transfer and Capital Stock

The consequences of a marginal increase in the size of the transfer on the capital stock and interest rates are given by Proposition 5.

Proposition 5. An increase in the magnitude of the transfer in (t) has an ambiguous effect on the capital stock in ($t + 1$). Under the presumption that the marginal propensity to consume in the South exceeds that of the North, the capital stock in ($t + 1$) is inversely related to the size of the transfer.[6] Intuitively, each unit of resources transferred increases consumption in the South by c_w but decreases consumption in the North by $\hat{c}_w$. If the former exceeds the latter, overall consumption increases and capital formation declines.

Proof. With capital mobility, the capital stock in ($t + 1$) is given by Equation (11). Combining (11) and (5),

$$2(1 + n)\, k_{t+1} = w_t - c(w_t + s_t,\ r_{t+1}) + \hat{w}_t - \hat{c}(\hat{w}_t - s_t,\ r_{t+1}).$$

Since w_t and $\hat{w}_t$ are predetermined and independent of the size of the transfer in (t),

$$2(1 + n)\, dk_{t+1} = -c_w\, ds_t - c_r f'' dk_{t+1} + \hat{c}_w\, ds_t - \hat{c}_r f'' dk_{t+1}.$$

Thus, $dk_{t+1}/ds_t = (\hat{c}_w - c_w)/[2(1 + n) + c_r f'' + \hat{c}_r f'']$.

Given that $f'' < 0$, $c_r < 0$, $\hat{c}_r < 0$, and $\hat{c}_w < c_w \rightarrow dk_{t+1}/ds_t < 0$.

The effect of the transfer on the steady-state value of the capital stock also depends on the difference between the marginal propensities to consume. Let the steady-state value of the transfer be denoted by the constant s and let $k_t = k_{t+1} = k_{t+2} = \ldots, = k$. The steady-state version of (11) is

$$2(1 + n)k = w(k) - c[w(k) + s,\ r(k)] + \hat{w}(k) - \hat{c}[w(k) - s,\ r(k)], \tag{14}$$

where a variable without a subscript denotes the steady-state value of that variable.

Taking the total differential of (14),

$$\frac{dk}{ds} = \frac{\hat{c}_w - c_w}{2(1 + n) + (2 - c_w - \hat{c}_w)kf'' + (c_r + \hat{c}_r)f''}. \tag{15}$$

From the stability condition, the denominator of (15) is positive. Thus, the steady-state value of the capital stock changes in the same direction as the capital stock in the short run. Notice that the steady-state change in the capital stock is larger than that obtained from Proposition 5. To explain, consider the effects of a marginal increase in the transfer at (t) that is to be maintained for all future periods. From Proposition 5, the capital stock in period ($t + 1$) will fall (assuming the condition that the marginal propensity to consume in the South exceeds that in the North). The generation born in ($t + 1$)—and all subsequent generations—will receive lower wages than if the transfer had been maintained at its original level. With lower wages, the savings and capital-to-labor ratios of generations ($t + 1$) and beyond will be diminished.[7]

Transfer and Utility Levels

From Proposition 4, an individual born in the South during (t) will prefer that his or her transfer be increased for any given value of r_{t+1}. However, as just shown, if all members of generation (t) receive a transfer, the capital stock and interest rate will change. Proposition 6 generalizes Proposition 4 in order to consider the general equilibrium effects of the transfer.

Proposition 6. For a given value of k_t, welfare of the young generation in the South at time (t) is positively related to the size of the transfer if $\hat{c}_w > c_w$. The welfare of the young generation in the North, however, is ambiguously related to the size of the transfer.

Proof. Using the results in the Appendix,

$$du(t) = \{v_{22}(1 + r_{t+1})^2 (dw_t + s_t) + c_t^2[v_1 v_{22} + v_{11} v_2/(1 + r_{t+1})]dr_{t+1}\}/\Delta.$$

Note that w_t is unaffected by the size of the transfer in (t) and use the result that $dr_{t+1}/ds_t = f'' dk_{t+1}/ds_t$ to obtain

$$du(t)/ds_t = \{v_{22}(1 + r_{t+1})^2 + c_t^2[v_1 v_{22} + v_{11} v_2/(1 + r_{t+1})]f'' dk_{t+1}/ds_t\}/\Delta. \qquad (16)$$

Since v_{11}, v_{22}, f'', and Δ are negative and dk_{t+1}/ds_t is negative if $\hat{c}_w > c_w$, the first portion of Proposition 6 follows directly [i.e., $du(t)/ds_t < 0$]. Since the structure of the North and South are identical except for the rate of time preference, the equivalent of Equation (16) for the North is

$$d\hat{u}(t) = \{-\hat{v}_{22}(1 + r_{t+1})^2 + \hat{c}_t^2[\hat{v}_1\ \hat{v}_{22} + \hat{v}_{11}\ \hat{v}_2/(1 + r_{t+1})]f''dk_{t+1}/ds_t\}/\Delta. \tag{17}$$

Given $dk_{t+1}/ds_t < 0$, $d\hat{u}(t)/ds_t$ is ambiguous in sign.

To explain, the transfer directly increases the disposable income of the young in the South and reduces the disposable income of the young in the North. In addition, the decline in the capital stock (given that $\hat{c}_w > c_w$) means that savings of the young in (t) will earn a higher rate of return than otherwise. Thus, the general equilibrium effect of the transfer on the interest rate acts to increase utility of the young in both the North and the South. These two effects—the disposable income and interest rate effects—are mutually reinforcing for the South but lead to an ambiguity for the level of welfare in the North.

It is important to note that utility levels of generations subsequent to generation (t) are negatively related to the size of the transfer in (t).

Proposition 7. For a given transfer in ($t + 1$) and under the presumption that $c_w > \hat{c}_w$, the welfare level of generation ($t + 1$) in the South *and in the North* is negatively related to the size of the transfer in (t).

Intuitively, the assumption concerning marginal propensities to consume means that the capital stock in ($t + 1$) is inversely related to the size of the transfer in (t). Hence, the larger the transfer in (t), the smaller the wage income of the generations born in the South and in the North during the period ($t + 1$). There is an interesting intergenerational conflict in the South as members of generation (t) attempt to obtain the largest transfer possible. To the extent they are successful, they reduce the welfare levels of subsequent generations in the North and in the South.

Proof. As shown in the Appendix, the utility of generation (t) is positively related to w_t. Since the time index is arbitrary, the utility of generation ($t + 1$) is positively related to w_{t+1}. Given that w_{t+1} is determined by Equation (8) and that k_{t+1} is negatively related to s_t, Proposition 7 follows directly.

Intergenerational Conflicts and Second-Best Schemes

A key insight of the model is the need for a sustained transfer and its continuing source of conflict between the North and the South. Moreover, the need for a transfer has important implications for intergenerational conflicts within the South. These intergenerational conflicts and the existence of second-best transfer schemes are discussed next.

Conflicts between Generation (t) and Subsequent Generations

It was shown that the optimal short-run solution for the South is to block international capital movements unless a side payment is forthcoming from the North. In time period (t), the old in the South are indifferent to the introduction of foreign capital while the young have the incentive to "kick out" the foreigners. Moreover, this solution does not take into account the welfare of future generations. Recall that in the South, the wage in period ($t + 1$) is positively related to the capital inflow during period (t); those individuals born in ($t + 1$) will have benefitted from the inflow of foreign capital in the previous period. Continuing to assume $\hat{c}_w > c_w$, the welfare of generation ($t + 1$) is negatively related to the size of the transfer at (t).

A social planner, with a welfare function consisting of the utility levels of *all* generations' utility levels, might be willing to allow the capital inflow even if no transfer is forthcoming. From a long-run planning perspective, capital inflows to the South in (t) can be socially beneficial even though they are detrimental to the welfare of agents born in (t). Moreover, the long-run effects of increasing the transfer at (t) may be beneficial to generation (t) but detrimental to generations

subsequent to (t). An obvious example is one in which the autarkic capital stock in the South is below its "golden rule" level.[8] In this situation, steady-state welfare rises *even in the absence of transfers*. The transfer, by decreasing the capital-to-labor ratio, pushes the economy further from the golden rule. Certainly, the forward-looking planner might be willing to trade off the welfare loss of those alive in (t) for the long-run gain to future generations. There is strong incentive for residents in the South to adopt institutions that prevent forward-looking behavior on the part of the planner.

Conflicts between the Young and Old Generations at (t)

Transactions costs and free-rider problems necessitate that representatives of the North negotiate with representatives of the South concerning the size and the distribution of the transfer payments; individual-by-individual negotiations concerning the transfer are not feasible. Once the transfer has been collected, its distribution to the young is often complicated by certain institutional practices that make it illegal or impractical to directly discriminate against individuals based on age; that is, on the generation in which they were born. Certainly, certain government services, such as government provision of emergency medical care facilities, or public goods, such as roads and other forms of infrastructure, cannot be withheld from a particular group within society. Also, the structure of tax laws often necessitates that direct tax rebates or subsidies be made independently of an individual's age.

If the proceeds of the transfer are used to provide nonrival public goods, both the old and the young generations benefit from the transfer. Notice that this might be of some concern to members of the young generation. As long as the old in (t) receive any of the public good, members of that generation will benefit from international capital mobility in (t). Intergenerational conflicts can arise since the old have a greater incentive to allow foreign capital than do the young.

The situation is somewhat different if the government must provide members of both generations rival goods (such as medical care) or equal per capita transfers. Again, the old generation

will favor introducing foreign capital. The young, however, may be overall losers as a result of the redirection of a portion of the transfer to the elderly; the magnitude of the transfer received by the young might not be sufficient to compensate them for the reduced interest rate induced by the capital inflow.[9] In either case, there is strong incentive for the old to press for capital movements regardless of the preferences of the young.

Second-Best Transfers

Even though they are Pareto-efficient, lump-sum taxes on the entry of foreign capital are not prevalent. Commonly used alternatives include per unit taxes on the inflow of foreign capital and high average tax rates on foreigners' interest income. Requirements that multinational firms use productive techniques with relatively high labor-to-capital ratios are implicit taxes on foreign capitalists. These latter forms of taxation are certainly more prevalent than the lump-sum taxes just discussed. Although Pareto-inferior to the nondistorting lump-sum transfers discussed in the text, distortionary taxes are preferable to remaining in (or returning to) portfolio autarky. It would seem that the existence of such second-best schemes are the result of breakdowns in the bargaining process. If the government of the South is dissatisfied with the negotiated size of the transfer, it could unilaterally tax foreign capital. The ability of the South to impose such a tax enables the South to threaten the North should the bargaining process prove unsatisfactory. Of course, the North also has the ability to tax the export of capital; for example, the U.S. Interest Rate Equalization Tax was aimed at discouraging U.S. direct investment abroad. In a multiperiod bargaining game in which both sides have credible threats, there would be periods during which such inefficient outcomes could occur.

Alternative Transfers and the GATT

In a multigood setting, there are gains to be had from specialization in accord with comparative advantage. It is possible that this "within period" gain from trade is not sufficient to offset losses from intertemporal trade. This can explain why, in the current Uruguay Round, the nations of the South have expressed reluctance to open their markets to products from the North. Unless the North is willing to offer concessions, the lived generations in the South may have nothing to gain by allowing free trade. At the same time, the North is pressing the South to respect intellectual property rights. The analysis suggests that a successful conclusion to the North-South dialogue in the Uruguay Round necessitates some form of side payment to the South. All else equal, the North might want to make compensation in the form of nonrival goods; members of both the old and young generations will then favor trade. Moreover, it should be understood from the outset of the negotiations that the South will always have the incentive to renegotiate the compensation package.

In light of this discussion, it is useful to compare two of the proposals intended to induce the South to allow freer trade and to respect intellectual property rights. The Generalized System of Preference (GSP)—an exception to the Most Favored Nation Principle—represents an attempt to increase the demand for products from the South by reducing trade barriers on imports from selected developing nations. From the North's perspective, expanding the GSP is a second-best form of transfer. The standard theory of Customs Unions suggests that a nation's selective removal of trade barriers may be welfare reducing if the effects of "trade diversion" outweigh the beneficial effects of "trade creation." Expanding the GSP may induce agents in some Northern countries to switch purchases from low-cost producers in the North to high-cost producers in the South. Although expansion of the GSP is a second-best policy (since it entails a dead-weight loss), the desirable feature

of this proposal is that tariff rates can be readily altered should the South attempt to restrict intertemporal trade.

An alternative type of side payment to the South entails debt relief. The desirable aspect of this proposal is that an appropriately designed aid package would be a first-best policy in terms of resource allocation. Debt relief can be a pure transfer that "forgives" a certain portion of the preexisting debt; hence, there is no dead-weight loss. The problem with simple debt relief is that once loan principal has been reduced, the young generations in the South still have the incentive to prevent intertemporal trade. A properly designed debt relief package would entail reductions in loan payments from the South that are contingent on access to southern markets; attempts to eliminate intertemporal trade could be met with a return to the originally negotiated loan repayment plan. Such a debt relief package would be first-best and would induce the South to maintain intertemporal trade.

Conclusions

A two-country, overlapping generations model was used to analyze some of the tensions between the North and the South regarding international capital movements. The nature of the model was such that optimizing agents in the South have a high rate of time preference. Otherwise, the North and the South are alike in all respects. The differential rate of time preference means that the South is likely to have a relatively low capital-to-labor ratio, wage rate, and level of per capita income but a relatively high interest rate in autarkic equilibrium. Introducing international capital flows (intertemporal trade) will be welfare reducing for the current generation in the South, even though it may increase the next generation's (and steady-state) utility. For the South to allow capital mobility, a sustained transfer from the South to the North must be made. The transfer itself will affect the general equilibrium solution of the two economies and gives rise to some important host-donor and intergenerational tensions.

Of course, the model has several important omissions. Markets in the South are not always perfect, agents may not be forward-looking optimizers, and there are government-induced distortions. On an analytic level, the assumptions of identical production functions, identical and constant rates of population growth, two countries, two overlapping generations, and a single homogeneous good are certainly unrealistic. The model does offer some interesting insights into the development process; it is hoped that these insights justify the extreme assumptions.

APPENDIX

Let u denote utility of an agent born at (t). Considering only interior solutions, for any individual born in period (t), the optimization problem is

$$\max\ u(t) = v(c_t^1) + \frac{v(c_t^2)}{1+\rho}\ ;\ v' > 0;\ v'' < 0;\ \rho > 0, \tag{A.1}$$

$$\text{s.t. } w_t + s_t = c_t^1 + c_t^2/(1 + r_{t+1}). \tag{A.2}$$

Let v_i denote $\partial v/\partial c_t^i$. The first-order condition is

$$\frac{v_1(c_t^1)}{v_2(c_t^2)} = \frac{(1 + r_{t+1})}{1+\rho}, \tag{A.3}$$

where c_t^2 is given by (A.2). The second-order condition is $v_{11} < 0;\ v_{22} < 0$.

Taking the total differential of (A.1), (A.2), and (A.3),

$$\begin{bmatrix} 1 & 1/(1+r_{t+1}) & 0 \\ \dfrac{v_{11}}{1+\rho} & -(1+r_{t+1})v_{22} & 0 \\ v_1 & v_2/(1+\rho) & -1 \end{bmatrix} \begin{bmatrix} dc_t^1 \\ dc_t^2 \\ du(t) \end{bmatrix} = \begin{bmatrix} d(w_t + s_t) + \dfrac{c_t^2 dr_{t+1}}{(1+r_{t+1})^2} \\ v_2 dr_{t+1} - v_1 d\rho \\ \dfrac{-v(c_t^2)d\rho}{(1+\rho)^2} \end{bmatrix}.$$

The properties of Equation (5) are found directly:

$$\partial c_t^1/\partial(w_t + s_t) = (1 + r_{t+1})^2 v_{22}/\Delta \equiv c_w,$$

$$\partial c_t^1/\partial r_{t+1}) = [v_2 - c_t^2(1 + r_{t+1})v_{22}]/\Delta \equiv c_r,$$

$$\partial c_t^1/\partial \rho = -v_1/\Delta \equiv c_\rho,$$

where

$$\Delta = (1 + \rho)v_{11} + (1 + r_{t+1})^2 v_{22} < 0.$$

The proposition that utility is increasing in r_{t+1} is easily demonstrated:

$$du(t)/d(w_t + s_t) = v_{22}(1 + r_{t+1})^2/\Delta > 0,$$

$$du(t)/dr_{t+1} = c_t^2[v_{11}v_2 + (1 + r_{t+1})v_1 v_{22}]/[(1 + r_{t+1})\Delta] > 0,$$

where we have used the result $v_2(1 + r_{t+1}) - v_1(1 + \rho) = 0$.

ENDNOTES

1. To consider the case in which the transfer is received during the second period of life, simply let s_t represent the present discounted value of the transfer. Mathematically, no other alterations of the model are needed. However, the political economy may differ since the North in $(t + 1)$ can threaten to renege on its period (t) promise to pay the transfer.

2. In the Appendix, we demonstrate

$$\partial c_t^1/\partial(w_t + s_t) = (1 + r_{t+1})^2 v_{22}/\Delta \equiv c_w,$$

$$\partial c_t^1/\partial r_{t+1} = [v_2 - c_t (1 + r_{t+1})^2 v_{22}]/\Delta \equiv c_r, \text{ and}$$

$$\partial c_t^1/\partial \rho = -v_1/\Delta \equiv c_\rho,$$

where

$$\Delta = (1 + \rho)v_{11} + (1 + r_{t+1})^2 v_{22} < 0.$$

3. Let L_t represent the number of individuals born at (t) and K_t represent the aggregate capital stock at (t). Aggregate saving in (t) is $(w_t - c_t^1)L_t = K_{t+1}$. The capital-to-labor ratio in $(t + 1)$ is $k_{t+1} = (w_t - c_t^1)L_t/L_{t+1}$. Since the rate of population growth $n = L_{t+1}/L_t - 1$, Equation (10) follows directly.

4. The formal proofs are available in Buiter (1981). Note that the stability condition in the case of portfolio autarky is

$$| (c_w - 1)kf''[1 + n + c_r f'']^{-1} | < 1,$$

and for the case of capital mobility is

$$| (c_w + \hat{c}_w - 2)\, kf''[2(1 + n) + (c_r + \hat{c}_r)f'']^{-1} | < 1.$$

5. Notice that wages in (t), however, are unaffected by the capital flow in period (t). From Equation (8), w_t is determined by k_t. Hence, saving in period $(t - 1)$, but not (t), affects wages in (t).

6. The marginal propensity to consume in the South (c_w) will exceed that in the North ($\hat{c}_w$) if $\partial c_w/\partial \rho > 0$. Note that this will be the case with a wide variety of utility functions. Using a homothetic utility function, for example, v_1/v_2 is independent of the level of consumption. For this class of utility functions, c_t^1 is proportional to w_t so that the marginal propensity to consume is constant. Hence, the marginal propensity to consume depends only on r_{t+1} and ρ. For any given common value of the interest rate, the demonstration that $c_\rho > 0$ directly implies $\partial c_w/\rho > 0$.

7. For a formal explanation, note that Equation 11 is a first-order difference equation. If the stability condition is everywhere satisfied, the time path of the capital stock must be monotonic.

8. As in the Solow (1956) growth model, the golden rule level of the capital stock in autarky is that given by the equality of the rate of population growth and the interest rate, $f' = n$. If K_t and L_t are the autarkic aggregate capital stock and labor supply for period (t), respectively, total consumption by the old and the young at (t) is $L_t c_t^1 + L_{t-1} c_{t-1}^2 = L_t y(k_t) - (K_{t+1} - K_t)$. Divide the right-hand side by L_t to obtain $y(k_t) - K_{t+1}/L_t + k_t$. Since $K_{t+1}/L_t = k_{t+1}(1 + n)$ and on the golden rule path $k_{t+1} = k_t = \ldots = k$, maximizing steady-state aggregate consumption is equivalent to maximizing $y(k) - nk$.

9. In this situation, it might be feasible for the government in the South to promise generation (t) a sufficiently large share of the transfer to be received in ($t + 1$). If the promise is credible, generation (t) would allow capital mobility in (t).

REFERENCES

Anderson, James E. 1989. "The Optimal Borrowing Tax." Unpublished manuscript. Boston, Massachusetts: Boston College.

Eaton, Jonathan. 1988. "Foreign Owned Land." *American Economic Review* 78:76-88.

Buiter, Willem H. 1981. "Time Preference and International Lending and Borrowing in an Overlapping-Generations Model." *Journal of Political Economy* 89:769-97.

Diamond, Peter A. 1965. "National Debt in a Neoclassical Growth Model." *American Economic Review* 55:1126-50.

Galor, Oded. 1986. "Time Preference and International Labor Migration." *Journal of Economic Theory* 38:1-20.

Ruffin, Roy J., and Young Deak Park. 1990. "The Intergenerational and Welfare Effects of International Capital Movements." Unpublished Manuscript. Houston, Texas: University of Houston.

Sibert, Anne. 1985. "Capital Accumulation and Foreign Investment Taxation." *Review of Economic Studies* 52:331-45.

_____. 1989. "Taxing Capital in a Large, Open Economy." Unpublished Manuscript. Manhattan, Kansas: University of Kansas.

Solow, Robert M. 1956. "A Contribution to the Theory of Economic Growth." *Quarterly Journal of Economics* 70:65-94.