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MONOPOLY WEALTH AND INTERNATIONAL DEBT

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ABSTRACT

When rents generated by government policies are perceived as permanent, the rights to earn them may be capitalized as assets that form a component of nonhuman wealth. The existence of such assets raises international indebtedness, while shifts in policy that increase or reduce the importance of such rents can generate movements in the current account that are correlated with the real exchange rate. Because the elimination of policies that generate rents imposes a capital loss that is born entirely by generations currently alive, while the benefit of the removal of a distortion is shared between those alive and unborn generations, a possibility is that such a reform can reduce the expected lifetime welfare of everyone alive. If monopoly exists in the provision of nontraded goods then there may be several steady states that can be Pareto ranked.

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The effects of rents created by government policies have been a major concern of the theory of political economy in the last decade. This work follows from Tullock's (1967) and Krueger's (1974) seminal concept of rent seeking as a resource-using activity that provides access to rents in the economy. Because this activity in itself absorbs productive resources, the consequences of rent-creating policies can go far beyond their direct allocative and redistributional effects.[1]

The analysis of this paper takes as its point of departure the observation that entitlements to rents created by government policy can be capitalized in asset values. The presence of these assets as a form of nonhuman wealth can therefore have significant implications for the dynamic behavior of the economy. In particular, by displacing other forms of wealth in national portfolios, the existence of monopoly can increase international indebtedness.

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[1]Bhagwati and Srinivasan (1980) and Bhagwati (1982) have introduced the related notions of revenue seeking and directly-unproductive-profit (DUP) seeking and examine their implictions for a number of issues in the theory of commercial policy. Other important contributions to the literature are by Brock and Magee (1978,1980), Buchanan, Tullock and Tollison (1980), Findlay and Wellisz (1982), and Hillman and Riley (1987). Tollison (1982) and Bhagwati, Brecher, and Srinivasan (1984) provide overviews of work in the area. This literature, to my knowledge, has not considered the implications of rents for capital accumulation.

The portfolio implications of monopoly rents have received little attention. An important exception is Laitner's (1982) analysis of the effect of monopoly on the capital stock in an overlapping generations economy. Laitner shows, in a closed economy, that the presence of capitalized monopoly rents reduces welfare in steady state by displacing capital in individuals' portfolios, and that this effect may quantitatively overwhelm the cost arising from static resource misallocation.[2]

The analysis here concerns the implications of domestic monopoly for the current account and for foreign indebtedness. A particular reason for this focus is to illustrate the effect on foreign debt of policies that affect the size of rents generated in the economy. Governments in a number of the large debtor countries have pursued policies that appear to create significant rents domestically.

Indonesia provides an example. A common practice has been to grant monopolies to importers as well as to domestic producers of a number of industrial commodities. In 1985, for example, of 5229 coomodity classification numbered items, importation of 1484 were restricted to holders of government licenses. (Only 296

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[2]Mitchell (1987) has recently analyzed the implications of the capitalization of rents created by an import quota for trade and production patterns.

were subject to quotas.)[3] Most of these items were manufactures. The dollar value of imports subject to these restrictions equaled US$ 2.7 billion, which corresponded to 30 per cent of total imports. Applying a mark-up factor of 20 per cent yields an estimate of monopoly profits from licensing of 1.2 per cent of GDP. If all of these rents are capitalized at a discount factor of ten per cent, then their asset value is 12 per cent of GDP, or about 27 per cent of outstanding foreign debt. Licensing arrangements have also been widely used in domestic manufacturing, generating additional sources of rent. Determining their quantitative importance is more difficult, but numerous descriptions of the economy suggest that they are significant.[4]

To focus on the rent-creating rather than on the terms-of-trade effects of monopoly, I consider a country that does not affect world prices, and in which monopoly is present in the domestic retailing of certain products. Furthermore, to focus on the role of monopoly in generating rents rather than in

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[3] See the discussion in Pangestu (1987). Recent articles in the Economist and Far Eastern Economic Review also describe aspects of recent policy in Indonesia.

[4] Estimates of rents in some developing countries are much larger. Krueger (1982) reports estimates of 7.3 per cent of GDP for India and 15 per cent for Turkey. If the second estimate were fully capitalized at a discount factor of ten per cent then their asset value would equal 150 per cent of GDP, which is likely to be a large fraction of total wealth. What share of rents is actually capitalized would be difficult to determine.

changing factor rewards, the first part of the analysis is of a country that trades enough commodities and factors at given world prices to determine domestic factor rewards, at world prices, independent of the extent of monopoly in domestic retailing.

Wealth accumulation is governed by individual maximization of expected lifetime utility with uncertain individual lifetimes, as in the framework developed by Yaari (1965) and Blanchard (1985).[5] I restict myself to consider a country that has unrestricted access to foreign capital and briefly discuss the implications of relaxing this assumption later.

Three main conclusions follow from this analysis. First, in comparing two otherwise identical economies, the one in which domestic retailing is monopolized has a steady-state level of net foreign indebtness exceeding that in the competitive economy. The difference is exactly equal to the capitalized value of monopoly rents.

An implication of this result is that, in comparing a country's foreign indebtedness with the value of its nonhuman domestic wealth, it is important to take into account the effect of capitalized monopoly rents on asset values. To the extent that wealth represents capitalized rents, it does not reflect productive resources available to finance repayment.

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[5]This framework has been applied extensively to study issues in international finance. See, for example, Frenkel and Razin (1986), Engel and Kletzer (1987), and Buiter (1986).

A second and closely related conclusion is that liberalization of monopoly will cause a current account surplus. The extent to which the surplus precedes rather than follows the liberalization depends upon how long it is anticipated

This result provides an explanation for the negative correlation between the real exchange rate and the current account that has been observed, for example, by Sachs (1981). An increase in monopolization of domestic supply raises the domestic price level relative to that elsewhere. This is reflected in an appreciation of the real exchange rate. At the same time, monopoly wealth increases, which attracts capital from abroad. A liberalization, in contrast, causes real depreciation and capital outflow.

A third conclusion is that the capitalization of monopoly rents can create a constituency in favor of monopoly that, in the extreme, consists of all of those alive. Hence majoritarian decision-making can introduce or sustain monopoly despite the distortion it creates. The reason is that the capital loss associated with liberalization is born solely by the living while the benefit of removing the distortion is shared between the living and the unborn. Monopoly acts in part as an unfunded social security system. This result illustrates the extent to which the capitalization of monopoly rents can augment opposition to reform.

As mentioned, the results stated so far apply to an economy

in which world prices of traded goods and factors uniquely determine factor rewards, and hence the cost of nontraded goods, regardless of the extent of monopolization. If world prices of traded goods and factors do not uniquely determine factor rewards, however, then the presence of nontraded goods can break the independence between monopoly practices and factor rewards.[6] The resulting interdependence between the size of monopoly rents and the level of factor rewards introduces the possibility of multiple equilibria for reasons that have been discussed, in a closed economy, by Kiyotaki (1985) and Cooper and John (1986), among others: A high level of production of nontraded goods raises the real wage, and consequently the level of expenditure on nontraded goods in steady state. Because of this positive relationship between the wage and output there may be several different steady-state allocations, some of which Pareto dominate others. A higher level of economic activity and total investment characterize the preferred equilibrium. Whether net indebtedness is larger or smaller in this steady state is ambigous, since both domestic and national wealth are greater.

The outline of the paper is as follows. Section I below describes the economy I consider. In section II I discuss the

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[6]Commodities may be nontraded because of natural impediments to international trade or because of government restrictions. In fact, an import prohibition may naturally generate a domestic monopoly, or accompany the licensing of a single domestic producer.

relationship between monopoly rents and international debt. The current account dynamics accompanying liberalization are characterized in Section III. Section IV considers the implications of liberalization for the welfare of current generations. Section V treats nontraded goods and multiple equilibria. Finally, in Section VI I discuss some limitations of the analysis and areas for further research.

I. The Structure of Economy

The economy can be characterized in terms of preferences over commodities within any period, the production technology, and preferences over expenditure in different periods.

A. Intratemporal Preferences and Market Structure

In each period individual preferences toward commodities correspond to that posited by Dixit and Stiglitz (1977), which has been which has been used extensively in modelling international trade under conditions of imperfect competition.[7]

There are n+1 commodities produced and consumed in any

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[7]See Helpman and Krugman (1985) for a discussion of the specification of preferences in models of international trade under conditions of imperfect competition.

period. The utility derived by the representative consumer from consumption of these commodities in that period is given by the utility function:

$$u(c_1,\ldots,c_{n+1}) = \frac{1}{1-\sigma}\{[\sum_{i=1}^{n} c_i^{\theta}]^{\alpha/\theta} c_{n+1}^{1-\alpha}\}^{1-\sigma}$$

where $\sigma \in (0,\infty)$, $\alpha \in [0,1]$ and $\theta \in (0,1]$. These preferences ensure that expenditure each period on commodity n+1, which I call the agricultural good and which is always retailed competitively, is a constant share $1-\alpha$ of total consumption expenditure, denoted C. Expenditure on the first n goods, which I call industrial goods and which may be retailed monopolistically, is consequently $(1-\alpha)C$ independent of what each supplier charges.

Consider the case in which the number of commodities traded freely in world markets suffices to ensure that world commodity prices fully determine factor rewards. It is convenient to choose units so that all commodity prices in world markets are unity. Since the cost of producing any nontraded commodity is also determined, this cost can be set at one as well. The first m commodities, where $m \leq n$, are retailed monopolistically, while the remaining n+1-m are competitively supplied, and hence are available to consumers at a price one.

Each domestic monopolist is assumed to set an output price,

taking all other prices as given, to maximize its profit in terms of the numeraire. The Appendix derives the first-order condition for this maximization. In two special cases this expression yields a closed-form solution for p^M and for profit.

(i) Fully-Monopolized Industrial Supply

If all industrial goods are retailed monopolistically (m=n) then

$$p^M = \frac{n-\theta}{\theta(n-1)}$$

and

$$\pi = \frac{\alpha C(1-\theta)}{n-\theta}.$$

Economy-wide monopoly profits are:

$$\Pi = \frac{\alpha C(1-\theta)}{1-\theta/n}.$$

Note that this expression increases in αC, total expenditure on industrial goods, and decreases in n, the number of industrial commodities, and in θ, which is inversely related to the elasticity of demand for a typical industrial good. As $n \to \infty$, $p^M \to 1/\theta$ and $\Pi \to \alpha C(1-\theta)$.

(ii) A Large Number of Industrial Commodities

Consider the case in which the number of industrial commodities n becomes very large, holding the ratio of commodities retailed by a monopolist to the total (m/n) constant. The price charged by a monopoly retailer is then $1/\theta$. Total monopoly profits are:

$$\Pi = \frac{(m/n)\alpha C(1-\theta)}{(1-m/n)\theta^{\theta/(\theta-1)} + m/n}.$$

Given the price p^M charged by monopolistic retailers, the utility derived by a representative consumer s spending an amount c^s in any period is:

$$v(c^s, p^M) = \frac{1}{1-\sigma}\{\alpha^{\alpha}(1-\alpha)^{1-\alpha}c^s[m(p^M)^{-\theta/(1-\theta)} + (n-m)]^{\alpha(1-\theta)/\theta}\}^{1-\sigma},$$

which is condensed below as:

$$v(c^s, p) = \frac{1}{1-\sigma}[c^s g(p^M)]^{1-\sigma}.$$

B. The Production Technology

Each industrial good is produced by the same constant-returns-to-scale technology using land, labor and capital as

factors of production. Denote the total output Q^I of all industrial goods as a function of inputs employed in that sector as:

$$Q^I = F^I(K^I, L^I, T^I).$$

The agricultural good is produced by a different technology employing these same factors. Its output Q^A as a function of inputs employed is:

$$Q^A = F^A(K^A, L^A, T^A).$$

Here K^i, L^i, and T^i are the amounts of capital, labor and land in sector i where i= I,A. The economy is endowed with a fixed amount of labor, normalized at one, and an amount of land T. Capital is perfectly mobile internationally and is available at a given world interest rate r*. The supply price of each commodity equals its world market price. Competition in domestic factor markets consequently determines the wage w, the return on land ρ, the supply of domestic capital K^D, and the allocation of factors between sectors according to the marginal productivity conditions:

$$r^* = F^I_K(K^I, L^I, T^I) = F^A_K(K^D - K^I, 1 - L^I, T - T^I)$$

$$w = F_L^I(K^I, L^I, T^I) = F_L^A(K^D - K^I, 1 - L^I, T - T^I)$$

$$\rho = F_T^I(K^I, L^I, T^I) = F_T^A(K^D - K^I, 1 - L^I, T - T^I).$$

As long as both industrial and agricultural products are produced domestically then these conditions determine factor rewards independently of the endowments of labor and land.

C. Intertemporal Preferences

Aggregate consumption expenditure C is determined by the outcome of the representative individual's maximization of expected lifetime utility. The age a at which any individual dies is a random variable with a Poisson distribution:

$$f(a) = \lambda e^{-\lambda a}.$$

where λ is a positive parameter. Lifetime utility is the sum of utility from expenditure each period as defined in Section A above. Maximizing lifetime utility thus corresponds to the problem posited and solved by Yaari (1965) which Blanchard (1985) imbeds into an aggregate economy.[8] Following Blanchard I assume that λ is also the birth rate. Hence the population is constant

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[8] An overlapping generations specification would imply equivalent results to those reported here. See Mitchell (1987).

at size one.

While alive, individuals earn a constant wage w. Individual nonhuman wealth takes the form of claims on firms, or direct claims on capital or land. The value of a firm is in turn determined by the value of land and capital that it owns and the present discounted value of the current and anticipated future rents to which it has claim. Since there is no uncertainty, with perfect foresight portfolio arbitrage will ensure that each asset pays a return r*. As in Yaari's and Blanchard's analysis, a perfectly competitive annuities market is assumed to exist. An individual can consequently earn a return $r^*+\lambda$ by promising to transfer his nonhuman assets to an insurer at his death.

The problem is formulated in continuous time. I first focus on the stationary case in which world commodity prices, the world interest rate, the endowments of land and labor, and monopoly prices and profits are constant. In period t, an individual s with nonhuman wealth W_t^s chooses an expenditure level c_t^s to maximize:

$$\int_t^\infty v(c_\tau^s, p) e^{-(\delta+\lambda)\tau} d\tau$$

subject to the intertemporal budget constraint:

$$W_t^s + \frac{w}{r+\lambda} \geq \int_t^\infty c_\tau^s e^{-(r^*+\lambda)\tau} d\tau$$

and the equation of motion for nonhuman wealth:

$$dW_\tau^S = (r^*+\lambda)W_\tau^S + w - c_\tau^S.$$

Here $\delta\in[0,1)$ is the subjective rate of time preference. The condition $(\sigma-1)r^*+\delta+\sigma\lambda$ is imposed to ensure that the transverality condition:

$$\lim_{\tau\to\infty} e^{-(r^*+\lambda)\tau}(W_\tau^S+H) = 0.$$

is satisfied. To focus on efficient steady states I assume also that $r^*\geq 0$.

The solution to this problem takes the form:

$$c_t^S = \Delta(W_t^S + H)$$

where:

$$\Delta \equiv \frac{\delta+\sigma\lambda+(\sigma-1)r^*}{\sigma}.$$

and:

$$H \equiv \frac{w}{r^*+\lambda},$$

which is an individual's valuation of human wealth.

Since any individual's consumption is proportional to his total (nonhuman plus human) wealth, aggregate consumption C_t is proportional to total national wealth. Since nonhuman wealth earns a social return r*, the equation of motion for national nonhuman wealth W_t^N is given by:

$$dW_t^N = r^*W_t^N + w - C_t = (r^*-\Delta)W_t^N + (1-\frac{\Delta}{r^*+\lambda})w.$$

In steady state aggregate wealth is constant so that $dW_t = 0$. Nonhuman wealth $\bar{W}^N$ in steady state is consequently:

$$\bar{W}^N = \frac{r^*-\delta}{(r^*+\lambda)(\delta-r^*+\sigma\lambda)}\, w$$

while aggregate expenditure $\bar{C}$ is:

$$\bar{C} = \frac{\sigma\lambda\Delta}{(\delta+r^*+\sigma\lambda)(r^*+\lambda)} = \frac{[\delta+\sigma\lambda+(\sigma-1)r^*]\lambda}{(\delta-r^*+\sigma\lambda)(r^*+\lambda)}\, w.$$

Note that, since factor prices are independent of the presence of monopoly, both $\bar{C}$ and $\bar{W}^N$ are independent of p or Π: The presence of monopoly in domestic supply does not affect the steady-state level of expenditure or of national wealth <u>as measured in world prices</u>.

Domestic monopoly causes the domestic price level to exceed the world price level, however. Consequently, in terms of consumers prices, the steady-state levels of consumption and

national wealth are lower with monopoly.

II. Foreign Indebtedness

Domestic nonhuman wealth W^D consists of the discounted present value of land rents, capital and the present discounted value of monopoly rents. Hence, in steady state:

$$W^D = \frac{\bar{\rho}T}{r^*} + \bar{K}^D + \frac{\bar{\Pi}}{r^*}$$

where $\bar{x}$ denotes the steady-state value of variable x. The conditions determining $\bar{\rho}$, $\bar{K}^D$, and r* are independent of p and $\bar{\Pi}$. Hence the value, at world prices, of domestic land and capital, like the steady-state value of national wealth, are unaffected by the presence of monopoly in domestic supply.

Net foreign indebtedness F is the excess of domestic over national wealth; i.e.,

$$F = W^D - W^N = \frac{\bar{\rho}T}{r^*} + \bar{K}^D + \frac{\bar{\Pi}}{r^*} - \frac{r^*-\delta}{(r^*+\lambda)(\delta-r^*+\sigma\lambda)}\,\bar{w}.$$

Since $\bar{\rho}$, $\bar{K}^D$, and $\bar{w}$ are independent of $\bar{\Pi}$, Proposition 1 follows:

Proposition 1: Consider two economies identical in terms of

their production technologies, their endowments of land and labor, their world trading opportunities and the preferences of their consumers. The economy with more capitalized monopoly rents will, in steady state, be more highly indebted. The difference in foreign debt equals the difference between the present discounted value of capitalized monopoly rents in the two countries.[9]

III. Liberalization and the Current Account

Consider now the consequences of a permanent liberalization, in the form of the removal of domestic monopoly, at some period 0. For concreteness, assume that, prior to some period $T \leq 0$, a zero probability is attached to liberalization, but at this time it becomes a certainty.

Liberalization does not affect factor prices or the level of domestic capital K^D during any part of the transition. Furthermore, as shown above, in steady state liberalization has

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[9] It is interesting to compare this result with Engel and Kletzer's (1987) analysis of the effect of a tariff on total indebtedness in a life-cycle economy. They find that it depends crucially on how the tariff revenue is distributed, and contrast the implications of lump-sum distribution (or, what is equivalent in this framework, a wage subsidy) with a capital subsidy. Neither is equivalent to its distribution as a perpetual claim on revenue, which is what I consider here. If rents are not available as perpetuities but supplement wage income then they increase steady-state <u>national</u> wealth as well as domestic wealth. They consequently have a less positive effect on foreign debt. The can even reduce it.

no implications for expenditure or for national wealth, as measured in world prices, either.

Liberalization affects the current account in two ways. First, it changes the relative price of commodities domestically, which creates an incentive for intertemporal substitution of consumption across periods. The implications of this effect for the current account are ambiguous. Second, to the extent that monopolies are domestically-owned, liberalization has a wealth effect. This reduces steady-state debt. The current account is consequently positive during the transition from monopoly to laissez-faire.

Because the analysis of the transitional dynamics is complicated, I consider each effect in isolation.

A. The Relative-Price Effect

To focus attention on the relative-price effect of reform, consider the case in which monopolies are entirely foreign-owned, so that their elimination has no implications for national balance sheets.

Once liberalization is effected, in period 0, all commodity prices faced by consumers are unity from then on. The value of nonhuman wealth to consumers alive in period 0, denoted, $J(W_0,0)$ is the solution to the dynamic programming problem:

$$J(W_0,0) = \max_{c_t} \left[\int_0^{\infty} \frac{1}{1-\sigma} c_t^{1-\sigma} e^{-(r^*+\lambda)t} dt\right]$$

subject to:

$$dW_t = (r^*+\lambda)W_t + w_t - c_t$$

and the initial endowment of nonhuman wealth W_0. This problem has as its solution:

$$J(W_0,0) = \Delta^{-\sigma}(W_0+H)^{1-\sigma}/(1-\sigma)$$

where Δ is defined as above. Optimal behavior in period t is to consume a proportion Δ of (W_t+H).

Since the reform has no implications for steady-state national wealth, if the reform is completely unanticipated (T=0) and the economy is initially in steady state, then reform does not change national wealth transitionally, either. When it occurs it simply eliminates that part of foreign indebtedness corresponding to foreign ownership of domestic monopolies.

If reform is expected, however, then the anticipated change in relative prices will affect domestic saving. The value of wealth in period t, denoted $J'(W_t,t)$, $t\in[T,0)$, is the solution to the problem:

$$J'(W_t,t) = \max_{c_\tau} \left[\int_t^0 \frac{1}{1-\sigma}[c_\tau, g(p)]^{1-\sigma} e^{(r^*+\lambda)(t-\tau)} d\tau\right] + e^{(r^*+\lambda)t} J(W_0,0)$$

which is solved by:

$$c_t = \Delta[g(p)^{(\sigma-1)/\sigma} e^{\Delta t} + (1-e^{\Delta t})]^{-1}(W_t+H).$$

Note, first of all, that for the special case in which $\sigma=1$ (Bernoulli preferences), reform has no implications for consumption; the optimal consumption rule is the same as in the case in which the relative price change is unanticipated, which is to consume a fraction $\delta+\lambda$ of total wealth. If the economy is initially in steady state, announcement of a reform does not change the level of expenditure, in world prices, at any period between the announcement and the period of the change. There is consequently no impact on national wealth or on the current account in any period between T and 0.

If $\sigma>1$ then the anticipation of reform causes consumption to rise in the period between the announcement of reform and reform itself. Anticipated reform thus causes a current-account deficit that increases international indebtedness. Once the reform occurs the current account becomes positive until national wealth, in world prices, is restored to its initial steady-state level.

If $\sigma<1$ this trajectory is just reversed. The country runs a

current-account surplus in anticipation of the reform. Once the reform is implemented a deficit reduces wealth back to its steady-state level.

The ambiguity in the response derives from the conflicting income and substitution effects of the relative price change. The reform raises the real value of expected lifetime income for the typical individual. This income effect favors increased consumption during the period prior to the reform. The reform also raises the real value of a given level of expenditure at world prices in the post-reform period relative to the pre-reform period. This substitution effect favors postponing consumption until after the reform. The relative strengths of the two effects depend on whether $\sigma \gtrless 1$.

B. The Wealth Effect

Consider now the implications of reform for national wealth when monopolies are wholly nationally-owned. To treat this effect in isolation from the relative-price effect just discussed, it is convenient to set $\sigma=1$. For concreteness consider the case in which, before the reform, all industrial commodities are monopolistically supplied and $n \to \infty$.

From an initial steady state with monopoly, the announcement of a reform reduces the value of shares in monopolies from

$$\bar{q} = \frac{\alpha(1-\theta)(\delta+\lambda)\lambda w}{(r^*+\lambda)(\delta+\lambda-r^*)}$$

to:

$$\alpha(1-\theta)\int_T^0 C_t e^{(r^*+\lambda)(T-t)}dt,$$

where C_t is aggregate expenditure in period t.

The optimal consumption rule, that $C_t = (\delta+\lambda)(W_t+H)$ implies an equation of motion for nonhuman wealth, once reform is announced, given by:

$$dW_t = [r^*-(\delta+\lambda)]W_t + (\frac{r^*-\delta}{r^*+\lambda})w.$$

The value of nonhuman wealth immediately after announcement of the reform, W_T, provides an initial condition for this differential equation. The solution is:

$$W_t = (W_T - \bar{W})e^{(\delta+\lambda-r^*)(T-t)} + \bar{W},$$

where

$$\bar{W} \equiv \frac{(\delta-r^*)w}{(r^*+\lambda)(\delta+\lambda-r^*)},$$

which is the steady-state velue of nonhuman wealth.

The value of nonhuman wealth immediately following announcement of the reform, W_T, is given by:

$$W_T = \bar{W} - \bar{q} + \alpha(1-\theta)(\delta+\lambda)\int_T^0 (W_t+H)e^{(r^*+\lambda)(T-t)}dt,$$

the value of nonhuman wealth in steady state, less the initial steady-state value of monopoly profits, plus the value of monopoly profits until the reform.

Substituting the solution for W_t into this expression implies that:

$$W_T = \bar{W} - \frac{qe^{(r^*+\lambda)T}}{1 - \frac{\bar{q}(r^*+\lambda)}{(\bar{W}+H)(\delta+2\lambda)}(1-e^{(\delta+2\lambda)T})}.$$

If reform is totally unanticipated (T=0) then the drop in wealth upon announcement is simply $\bar{q}$. As the length of the period of anticipation approaches infinity ($T\to\infty$) the effect on wealth goes to zero.

The announcement of reform causes an immediate decline in nonhuman wealth that is followed by a current account surplus that gradually restores wealth to its initial steady-state level. At the time that reform actually takes place, the deviation of wealth from its steady state level is a fraction $e^{(\delta+\lambda-r^*)T}$ of the initial wealth loss. Hence the longer the reform is anticipated, the less effect it has on national wealth or on the current account in any period.

The effect of increasing monopoly restrictions is, of

course, just the reverse of those of liberalization. The economy runs a current account deficit to restore national wealth to its steady-state level, eliminating the effect on wealth of the initial allocation of monopoly rights. The extent to which the deficit occurs before the actual imposition of monopoly restrictions depends on how long they have been anticipated.

IV. Liberalization and Contemporary Welfare

The capitalization of anticipated future monopoly rents affects the intergenerational allocation of the welfare benefits of a permanent liberalization. The possibility arises that removal of monopoly restrictions reduces the expected welfare of every individual alive at the time of the reform. The reason is that, while liberalization reduces consumer prices, it also reduces the value of nonhuman wealth by the amount of the discounted present value of future monopoly rents.

Since monopoly distorts the economy, as long as the welfare of unborn generations is taken into account, the benefit from price reduction must exceed the capital loss. But while the benefit is shared between the unborn and the currently alive, the cost falls entirely on those currently alive. Hence, the welfare of many, or even all, of those alive may fall.

Consider an initial steady state in which there are a large

number of industrial commodities, each of which is monopolistically supplied. As shown above, the domestic price of these goods will be $1/\theta$. In the absence of reform, the expected discounted utility of an individual aged a with a level of nonhuman wealth, W^a, is:

$$J(W^a,t) = e^{-(\delta+\lambda)t}\frac{1}{1-\sigma}\Delta^{-\sigma}[(1/\theta)^{-\alpha}(W^a+H)]^{1-\sigma}.$$

Assuming that domestic monopolies are entirely nationally-owned, a liberalization imposes a capital loss equal to the present discounted value of monopoly profits in the initial steady state, which equals $\alpha(1-\theta)\Delta(\bar{W}+H)/(r^*+\lambda)$. Immediately following a permanent liberalization the expected discounted value of the utility of individual aged a becomes:

$$J(\bar{W},t) = e^{-(\delta+\lambda)t}\frac{1}{1-\sigma}\Delta^{-\sigma}[(W^a+H)(1-\frac{\alpha(1-\theta)\Delta(\bar{W}+H)s^a}{(r^*+\lambda)(W^a+H)}]^{1-\sigma}.$$

Here s^a is the share of monopoly assets owned by individual aged a.

The implications of a liberalization for the welfare of this individual depend upon whether the first or second of these two expressions is greater. This depends, among other things, on s^a. The most straightforward case to consider is the one in which these claims are distributed in proportion to individuals' total

wealth, W^a+H. In this case the comparison is the same for every individual, since the ratio $s^a/(W^a+H)$ is unity independent of a. Liberalization then raises or lowers welfare depending upon whether:

$$\sigma(r^*+\lambda)(1-\theta^{\alpha}) \gtrless \alpha(1-\theta)[\delta+\sigma\lambda+(\sigma-1)r^*].$$

Consider the case in which $\alpha=1/2$. Maintaining monopoly rather than liberalizing implies a higher level of welfare for those alive if:

$$\theta \in ((\frac{2(r^*+\lambda)}{\Delta}-1)^2, 1)$$

which is non-empty if $\delta>r^*$. Satisfying this condition requires that the extent of monopoly power not be too great (i.e., that θ not be too close to zero) and that the country have negative net nonhuman wealth in steady state (i.e., that $\delta>r^*$).

A similar result, of course, obtains on the implications of introducing monopoly from an initial laissez-faire steady state. Such a move can benefit all living individuals.[10]

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[10]It is important to note that the option to liberalize for the current period only, rather than permanently, would always be favored over permanent monopoly by at least some living individuals. Similarly, at least some individuals would always oppose the imposition of monopoly for only the current period.

V. Nontraded Goods and Multiple Equilibria

The discussion up to this point has posited that the number of commodities freely traded internationally is sufficient for international commodity prices to determine factor rewards independently of domestic market conditions. Introducing nontraded goods can break this independence, thereby introducing the possibility of multiple equilibria, some of which strictly dominate others in terms of Pareto efficiency.

To illustrate this possibility, consider now a situation in which legal prohibitions or natural barriers prevent trade in industrial commodities, but the agricultural commodity is freely traded. For concreteness, continue to assume that all industrial commodities are monopolistically supplied and that the number of such commodities is large.

In the absence of international arbitrage opportunities for industrial commodities, the cost of production will typically differ from the world price of unity. Denote the unit cost of production as a function of factor rewards as $a(w,r^*,\rho)$. Monopolistic suppliers who take their rivals' output prices and factor costs as given will establish a price:

$$p = a(w,r^*,\rho)/\theta .$$

Since, by assumption, industrial commodities are nontraded, total production of industrial commodities equals domestic demand C^I, which equals total expenditure divided by price, i.e.,:

$$C^I = \alpha C\theta / a(w,r^*,\rho)$$

where C continues to denote total expenditure.

Total factor demands by the industrial sector as a function of total expenditure are:

$$L^I = \frac{\alpha C\theta a_w(w,r^*,\rho)}{a(w,r^*,\rho)}$$

$$K^I = \frac{\alpha C\theta a_r(w,r^*,\rho)}{a(w,r^*,\rho)}$$

$$T^I = \frac{\alpha C\theta a_\rho(w,r^*,\rho)}{a(w,r^*,\rho)}.$$

Here $a_i(w,r^*,\rho)$ denotes the derivative of the unit cost function with respect to factor reward i, which equals the demand for factor i per unit produced. Marginal productivity conditions in agriculture continue to govern factor rewards; that is:

$$w = F^A_L(1-L^I, K^D-K^I, T-T^I)$$

$$r^* = F^A_K(1-L^I, K^D-K^I, T-T^I)$$

$$\rho = F_T^A(1-L^I, K^D-K^I, T-T^I).$$

Together, these six conditions determine factor rewards w and ρ, the domestic capital stock K^D, and the division of the three factors between the two industries as functions of the world interest rate r* and of domestic expenditure C. In steady state, C continues to be given by the condition:

$$C = \Delta(\bar{W}+H) = \Delta' w.$$

where $\Delta' \equiv \Delta[\sigma\lambda/(r^*+\lambda)(\delta+\sigma\lambda-r^*)]$. This condition and the six conditions above fully characterize the steady state of the economy. There may be more than one set of values for w, ρ, K, L^I, K^I, and T^I that satisfy these equations. Each set may correspond to different equilibria that can be Pareto-ranked, as the following example illustrates.

Consider a case in which the production technology in industry is Leontief, and does not use land. Thus $a(w,r^*,\rho) = w+r^*$. The production technology in agriculture is of the form:

$$Q = \begin{cases} \gamma^H L^A & L^A \leq T \\ \gamma^L L^A & L^A > T \end{cases}$$

where $\gamma^H > \gamma^L \geq 0$. Thus labor has a high average productivity in

agriculture if it is less plentiful than land, but a low average productivity if it is more plentiful. Assume that $T\in(0,1)$.

The demand for labor in the industrial sector as a function of factor prices is given by:

$$L^I = \frac{\alpha\theta\Delta'}{1+r^*/w},$$

which is an increasing function of the wage w. If:

$$1-T \geq \frac{\alpha\theta\Delta'}{1+r^*/\gamma^L}$$

then in one steady state $w=\gamma^L$. If, in addition:

$$1-T \leq \frac{\alpha\theta\Delta'}{1+r^*/\gamma^H} \leq 1,$$

then in another steady state $w=\gamma^H$. Employment in industry is greater in the high-wage steady state, as is the level of domestic investment. Even though the increase in the wage raises the cost of producing the industrial good, which is passed on to consumers with a mark-up factor of $1/\theta$, the real wage, and the value of real wealth, is greater in the high-wage steady state. Consequently the expected utility of the average individual is higher in this steady state as well.

A movement from the low to the high-wage equilibrium reduces

the value of land to zero. It also increases the value of monopoly rents. It may do so by more than an offsetting amount. In this case land-owners can be compensated for their capital loss on land by receiving the capitalized value of the additional monopoly rents. With such a transfer scheme in effect a movement from the low to the high-wage equilibrium constitutes a Pareto-improvement.

It is ambiguous as to whether net international indebtedness is greater or less in the high-wage steady state relative to the low-wage one. At the higher wage national wealth is greater, but so, typically, is the value of domestic wealth. (The amount of capital and the value of monopoly rents are higher, but land is worth less.)

VI. Extensions

To focus attention on several basic points I have made a number of specific assumptions about the nature of the environment under consideration.

First, I have ignored potential credit rationing and default on international debt. For one thing, introducing these considerations would break the independence between domestic monopoly and the level of domestic investment even in the absence of nontraded goods. Capitalized monopoly rents would displace

domestic savings as a source of investment. Consequently, the presence of domestic monopoly would reduce the capital stock and raise the interest rate, as in Laitner's (1982) discussion. If land and capital are complementary factors then monopoly will result in a lower wage even at world prices. From the point of view of comparing steady states, welfare will be even lower in the steady state with monopoly. For this reason capital mobility mitigates the cost of monopoly.

Second, there has been no discussion here of the implications of uncertainty, in particular uncertainty about potential reform or about switches among alternative equilibria. These considerations complicate the problem of pricing monopoly assets and of characterizing optimal consumption.[11]

Third, I have ignored the rent-seeking activities of the sort discussed by Krueger (1974) and by Bhagwati and Srinivasan (1982). Introducing these activities would reduce the capitalized value of monopoly rents to the extent that they absorb resources contemporaneously with the accrual of rents. As argued by McCormick, Shughart, and Tollison (1984), however, in many realistic situations rent-seeking activity may absorb resources at the time monopolies are first established. Once monopolies exist then the analysis here applies. In other words, the analysis here applies to situations in which rent seeking

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[11]Romer (1986) and Trefil (1987) discuss the solution to dynamic optimization problems with stochastic regime shifts.

occurred to obtain a license initially, but is not needed to maintain ownership of the license.

Finally, and perhaps of greatest potential interest, I have not explored the determinants of the distribution of claims on monopoly across the population. The discussion of the political popularity of liberalization pointed to this distribution as affecting whether voters would favor or oppose liberalization. The distribution of assets in the economy is consequently not neutral even though, when a given policy is in place, all assets earn the same rate of return.

APPENDIX

Consider the problem of the retailer of good i in setting its price p_i. This firm observes a price of unity for the competitively-retailed commodities m+1 to n+1, and, in a symmetric equilibrium, a price p^M for the monopolistically-retailed commodities 1 to m other than i. Its profit π_i is:

$$\pi_i = (p_i - 1)c_i(p_i, p^M)$$

where c_i denotes demand for good i as a function of the price charged by retailer i and by all other monopolistic retailers.

Denote by c^M the quantity consumed of each of the goods monopolistically retailed, other than i, and by c^F the quantity consumed of each of the industrial goods competitively retailed. First-order conditions for utility maximization by the representative consumer ensure that:

$$c_i/c^F = (p_i)^{1/(\theta-1)}$$

and that:

$$c^M/c^F = (p^M)^{1/(\theta-1)}.$$

Combining these conditions with the budget constraint

$$p_i c_i + (m-1)c^M + (n-m)c^F = \alpha C$$

provides an expression for c_i given by:

$$c_i = \frac{\alpha C/p_i}{(m-1)(p_i/p^M)^{\theta/(1-\theta)} + (n-m)(p_i)^{\theta/(1-\theta)} + 1}.$$

Substituting this expression into the expression for retailer i's profit above gives:

$$\pi_i = \frac{\alpha C(p_i-1)/p_i}{(m-1)(p_i/p^M)^{\theta/(1-\theta)} + (n-m)(p_i)^{\theta/(1-\theta)} + 1}.$$

Combining the first-order condition for a maximum with the condition that, in a symmetric equilibrium, all monopolistic retailers charge the same price (so that $p_i = p^M$) implies that the price charged by a monopolistic retailer is determined by the expression:

$$(n-m)(p^M)^{\theta/(1-\theta)} + m = (p^M-1)[\theta/(1-\theta)][(n-m)(p^M)^{\theta/(1-\theta)} + m-1].$$

The two special cases reported in the text are obtained by setting n=m and by holding n/m constant and letting $n \to \infty$.

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