STRATEGIC TAXATION OF THE MULTINATIONAL ENTERPRISE: PROFIT-SHIFTING AND GLOBALLY-JOINT INPUTS

by

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ABSTRACT

This paper models strategic taxation policy of home and host governments when a multinational enterprise sets transfer prices on globally-joint inputs such as research and development. Tax credit and deduction allowances, as well as no taxation of foreign-earned profits, result in identical optimal transfer price solutions and national income effects in both countries. An equilibrium home tax solution is to tax foreign-earned profits at a higher rate than domestically earned profits. The multinational responds by shifting profits abroad through transfer pricing mechanisms.

JEL Codes: F2, H2, H3, L1.
Key Words: transfer pricing, strategic taxation, multinational enterprise

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1. Introduction

Under the 1986 U.S. tax reform act income generated by intra-firm trade, such as transactions between a corporate headquarter and its foreign subsidiary, must be determined at arm's length. For those transactions with competitive markets external to the multinational enterprise (MNE), transfer pricing tends to be a problem of monitoring rather than method. Seminal papers by Horst (1971) and Copithorne (1971) show that an MNE will choose a transfer price that may deviate from true marginal cost in order to maximize global profits net of tariffs and taxes. Recently, several authors have explored the effect of asymmetric information on transfer pricing in this context (Donnenfeld and Prusa 1993, and Gresik and Nelson 1994). The consensus of this literature is that optimal commercial policy will provide incentives for the MNE to truthfully reveal the price of intra-firm exports when the cost of a transaction is known to the firm but not to the government.

Various studies have shown that MNEs arise because they possess globally-joint, firm-specific assets that are difficult to trade at arm's length (Caves 1982). Yet to my knowledge, theoretical analysis of taxation and MNE transfer pricing behavior has not been forthcoming for intra-firm trade in globally-joint inputs.[1] Globally-joint inputs include intangibles (such as patents, research and development, franchises or trademarks) and management and administration of the parent.

Optimal taxation in the presence of globally-joint inputs adds several complications relative to intra-firm trade in goods. First, it is difficult to monitor the true flow of intangible intra-firm trade as these transactions are reported by firms rather than recorded by customs officers. Second, even if monitoring trade flows were possible, there is no obvious arm's-length price for use of an intangible in one plant while it is jointly employed in several plants. In the absence of external markets government are unable to determine the appropriate benchmark price against which to compare these intra-firm transactions. Legal efforts have thus been made to provide for intangibles by requiring that transfer prices be commensurate with income earned on the intangible but these techniques are far from comprehensive and are not based on an economic efficiency standard (Ault and Bradford 1990). Encouraging or requiring the MNE to set a transfer price that differs from the true shadow price by tax code will effect the global distribution of income in an arbitrary manner.

Recent technology-based theories of the MNE (see Caves 1982 and Markusen 1984) indicate that the source of multi-plant economies of scale are often found in firm-specific rather than plant-specific activities. One characteristic of these firm-specific assets (FSA) is that they frequently have "public goods" aspects of non-rivalry. Often a FSA may be employed jointly in multiple plants without diminishing the marginal product in any one plant. From the MNE's perspective, after the globally-joint input is developed for domestic use its shadow price in subsidiary production is essentially zero.

The purpose of this paper is to analyze optimal tax policies when an MNE is able to set a transfer price on a globally-joint input, such as R&D, that is intangible. We focus on the behavior of the MNE and the strategic interactions between the MNE source and home governments. We simplify by assuming that governments can accurately monitor the firm activity in employment of globally-joint inputs.

In this model, an MNE invests abroad to capture scale economies arising from a globally-joint input. For tax purposes, the parent may charge the subsidiary for use of this asset although the shadow price per plant is zero. The home (MNE source) country selects a method for alleviating double taxation of foreign-earned profit. Home and host governments then move simultaneously to set tax rates on reported MNE profits. An equilibrium home tax solution is to tax foreign-earned profits at a higher rate than domestic profits. This encourages the MNE to set the maximum legal price for the transfer and indirectly repatriate profits by tax avoidance. The host government reacts by taxing reported profits of the MNE subsidiary at the highest rate possible. We find that tax credit and deduction allowances are identical in their impact on equilibria transfer price and national incomes in both countries.

The policy prescriptions with globally-joint inputs and scale economies differ from those stemming from models in which foreign investment is treated as intra-firm capital exports. Models by Bond and Samuelson (1989) and Slemrod (1988) suggest that to foster efficient allocation of capital governments should alleviate double taxation through deductions of foreign taxes paid. Slemrod further demonstrates that governments should tax home and foreign earned income of domestic residence at the same rate and not tax domestic income of foreigners.

In a general-equilibrium open-economy framework, the nature of the game played by the MNE, home, and host governments are described in section 2. In section 3, we solve for the subgame equilibrium reaction of an MNE to global tax policies. An MNE centralizes administration activities, such as R&D, in the home and manufactures a good in both home and foreign countries for domestic consumption. Output and transfer prices are selected to minimize the global tax bill and thus maximize profits. In section 4, government tax policy is analyzed. In a simultaneous move subgame, home and foreign governments set reported profit tax rates knowing home's rule for double taxation alleviation. The subgame-perfect Nash-equilibrium outcome is also described. We summarize and provide concluding observations in section 5.

2. The Game and Model

In this general equilibrium model there are two countries: home (MNE source) and foreign (MNE host). Aside from the location of the MNE headquarters, the two countries are identical. Each share the same full-employment endowment of labor ($\bar{L}$) and technology. Consumer preferences are identical and homothetic for two goods (X and Y). The world demand for good X is supplied by subsidiary plants owned by an MNE in both countries. A FSA, such as a blueprint or research and development, is developed at the MNE headquarters in the home country. This asset is used in the foreign plant without diminishing the marginal product in the home plant and thus has the public good characteristic of non-rivalry. The FSA is employed in both home and foreign plants in combination with labor used in manufacturing and increasing returns to scale technology. A composite commodity, Y, is produced competitively with constant returns to scale technology. Both industries employ one factor, labor (L).

Tax regimes, profit tax rates, and transfer prices are choice parameters within a common-knowledge game between the MNE, home, and foreign governments. In the first stage of the game, the home government selects among three methods of alleviating double taxation of foreign-earned profits. First, the home government may exempt foreign profits from taxation. Under the second tax rule, the home government credits foreign taxes paid against the MNE's home tax bill. A third tax rule allows the MNE to deduct foreign taxes paid from its home tax base. Avoiding deferral issues, net foreign-earned MNE profits are immediately repatriated home.

After the tax regime is declared, the governments compete by strategically setting economic profit tax rates in a simultaneous announcement. Tax income is redistributed, lump-sum, to domestic citizens. Home and foreign tax reported foreign-earned MNE profits (π^{r*}) at rates t^{h*} and t^{f*}, respectively. The home tax rate on reported domestic profits (π^r) is t^h.

In the final stage of the game, the MNE reports home and foreign profits to the tax authorities. Expenditures on the globally-joint input is accurately monitored by governments. The MNE, however, has discretion over the distribution of these costs across subsidiary plants. Reported profit depends on actual revenues and costs as well as the transfer price (α) for the use of the globally-joint input. The solution is characterized by a subgame-perfect Nash-equilibrium in pure strategies, and is found by backward induction in the usual fashion.

3. Decisions of firms

We begin by solving for a subgame equilibrium in production. For ease of analysis, specific functional forms are defined, following the general approach of Markusen (1984). Y is produced competitively with constant returns to scale. Define units so that Y is produced with one unit of L input, $Y=L$. Y, and thus L, is conveniently selected as numeraire.

X is produced with a dual requirement technology. First, the MNE engages in administration activities, including management and R&D, which are centralized at home but are jointly employed in home and foreign plants. For simplicity we assume administration, $A(\bar{L}_a)$, uses a fixed amount of labor $(\bar{L}_a)$. This is essentially a short-run approach as long-run innovations would require variable labor inputs.

An additional MNE activity, manufacturing $M(L_m)$, employs variable labor with constant returns to scale. The combined administration and manufacturing technology thus exhibits increasing returns to scale. The production function for X, with administration activity at home (h) and manufacturing plants both home and in the foreign (f) countries, is

$$X = A(\bar{L}_a^h)M(L_m^h + L_m^f) \tag{1}$$

We begin by solving the MNE's optimization problem. Home-earned profits are taxed by home at rate t^h. Foreign-earned profits are taxed at an effective rate t^*, which depends on announced tax rates and method for alleviating double taxation. The MNE's choice parameters are the world output price, p, and the transfer price, α, on foreign use of globally-joint inputs.[2] We assume that the governments can accurately monitor the expenditures in administration activity.[3] This limits an MNE's ability to shift profits by bounding the transfer price to the range $0 \leq \alpha \leq 1$. The MNE maximizes global profits

$$\pi = (1-t^h)[pA(\overline{L}_a^h)M(L_m^h) - (1-\alpha)L_a^h - L_m^h] + (1-t^*)[pA(\overline{L}_a^h)M(L_m^f) - \alpha L_a^h - L_m^f] \tag{2}$$

with the first-order condition, where e_x is own world price elasticity of demand[4]

$$p\left(1-\frac{1}{e_x}\right) = [A(\overline{L}_a)M'(L_m)]^{-1} \tag{3}$$

Thus, the profit-maximizing price is a markup over constant marginal cost.

The MNE avoids taxation by manipulating cash flows on intra-firm transactions with transfer price α to minimize the MNE's global tax burden. The MNE compares the effective tax rates on home and foreign profit (t^h and t^*, respectively), and shifts the cost of the firm-specific asset to the high-tax area. The equilibrium transfer price is

$$\tilde{\alpha} = \begin{Bmatrix} 1, & t^* > t^h \\ 0, & t^* \leq t^h \end{Bmatrix} \tag{4}$$

Substituting equation 4 into 2, we derive equilibrium reported home and foreign profits (π^r and π^{r*}, respectively) as a function of home and foreign tax rates as well as the double taxation regime.

$$\pi^r = \begin{Bmatrix} pA(\overline{L}_a^h)M(L_m^h) - L_m^h, & t^* > t^h \\ pA(\overline{L}_a^h)M(L_m^h) - \overline{L}_a^h - L_m^h, & t^* \leq t^h \end{Bmatrix} \tag{5}$$

$$\pi^{r*} = \begin{Bmatrix} pA(\overline{L}_a^h)M(L_m^f) - \overline{L}_a^h - L_m^f, & t^* > t^h \\ pA(\overline{L}_a^h)M(L_m^f) - L_m^f, & t^* \leq t^h \end{Bmatrix}$$

Reported home and foreign profits may differ from the global distribution of incurred MNE profits, as computed when the intra-firm transfer is valued at its shadow price of zero. Denote actual home and foreign profits as followed.[5]

$$\begin{aligned} \pi &= pX^h - \bar{L}_a^h - L_m^h \\ \pi^* &= pX^f - L_m^f \end{aligned} \tag{6}$$

4. Decisions of governments

In this section, we derive home and foreign tax policy under the assumption that governments optimize social welfare. Tax revenues are redistributed in lump-sum to representative domestic consumers. With international trade, the balance of payments constraint requires the value of national consumption to be equivalent to national income. There is no aggregation problem under the assumption of identical and homothetic preferences. Thus, social welfare is maximized when national income is maximized.[6]

In the competitive and numeraire Y sector, zero profits and full employment imply that revenues (Y) equal factor payments ($L_y = \bar{L} - \bar{L}_a - L_m$). X-sector income includes payments to labor ($\bar{L}_a + L_m$), domestically-held net profits, and profit tax revenues. The global income distribution of foreign-earned profits depends on the subsidiary's reported profits, equation 5, and on the equilibrium foreign tax rate ($\tilde{t}^{f*}$). Ignoring issues of deferrals, net foreign-earned profits are immediately repatriated home. In the foreign country, national income (NI^f) equals

$$NI^f = Y^f + pX^f - \pi^* + \tilde{t}^{f*}\pi^{r*} = \bar{L} + \tilde{t}^{f*}(\pi^* - \tilde{\alpha}\bar{L}_a^h) \tag{7}$$

Home national income (NI^h) depends on net repatriated profits, factor payments, and home-earned profits.

$$NI^h = Y^h + pX^h + \pi^* - \tilde{t}^{f*}\pi^{r*} = \bar{L} + \pi + (1-\tilde{t}^{f*})(\pi^* - \tilde{\alpha}\bar{L}_a^h) \tag{8}$$

Consider optimal tax policy in the non-cooperative subgame between governments. The home government announces a tax policy for foreign-earned profits: no taxation; tax credit; or tax deduction. Next, home and foreign governments set tax rates simultaneously before the MNE sets its transfer price. We begin by solving for the subgame Nash-equilibrium tax rates under each taxation regime subgame. Government tax strategies and subgame-perfect Nash equilibrium tax rates are summarized in Table 1.

<<INSERT TABLE ONE>>

First, we examine a regime with no home taxation of foreign-earned profit ($t^{h*}=0$). The effective tax rate on reported home profits is t^h. Reported foreign profits are taxed at rate $t^* = t^{f*}$. As shown in the previous section, reported profits (equation 5) for a location may differ from actual profits (equation 6) because of MNE profit-shifting through transfer pricing mechanisms. If t^{f*} exceeds t^h then the MNE will shift the entire administration cost from the parent to the subsidiary by setting $\tilde{\alpha}=1$. A portion (valued at $\bar{L}_a^h$) of MNE profit is indirectly shifted as the subsidiary reports a profit of ($\pi^{r*}=\pi^*-\bar{L}_a^h$) to the host government to avoid foreign taxation.[7]

We assume Nash competition whereby each country's government treats rival tax rates as given. Consider the foreign government's strategy for maximizing MNE tax revenue. Both home tax rate (t^h) and the transfer price response of the MNE will impact the tax base. If $t^{f*}=t^h<1$ then the MNE will set a transfer price of $\tilde{\alpha}=0$ and report taxable profits of $\pi^{r*}=\pi^*$. If $t^{f*}=1>t^h$ then the foreign government taxes profits at a increased rate but the tax base is eroded as the MNE reports profits $\pi^{r*}=\pi^*-\bar{L}_a^h$.

Figure 1.A demonstrates foreign national income as a function of t^{f*} when foreign conjectures

that the home tax rate t^h is set at a critical rate t_c. In this case, the foreign government is indifferent between the two tax rates $t^{f*}=t^h=t_c$ (thus $\tilde{\alpha}=0$) and $t^{f*}=1$ (where $\tilde{\alpha}=1$) because either tax rate results in the same tax revenue. Note the subsequent equilibrium tax base (reported profits) is π^* if $t^{f*}<t_c$ and π^*-$\bar{L}_a^h$ otherwise. Thus the critical tax rate is determined by solving $NI^f = \bar{L} + t_c\pi^* = \bar{L} + \pi^* - \bar{L}_a^h$, or

$$t_c \equiv 1 - \frac{\bar{L}_a^h}{\pi^*} \tag{9}$$

<<INSERT FIGURE ONE>>

Figure 1.B demonstrates foreign national income when the home tax rate is below t_c. In this case, the income from foreign taxation of the reported profit when $\tilde{\alpha}=0$ (or $t^{f*}\leq t^h<t_c$) is lower than foreign income with full taxation ($t^{f*}=1$) of profits net of the home administration cost, where $\tilde{\alpha}=1$. Given a conjectured t^h, the foreign government's strategy is to set t^{f*} equal to the conjectured home rate if t^h exceeds t_c, and set $t^{f*}=1$ otherwise.

The home government is indifferent between income in the form of repatriated profit and tax revenue. Thus, for a conjectured t^{f*} the home government will react by setting $t^h<t^{f*}$ as the MNE's subsequent response would be to shift the cost of administration abroad ($\tilde{\alpha}=1$) thus increasing domestic profit by $\bar{L}_a^h$. This subgame results in a set of Nash equilibria whereby $\tilde{t}^{f*}=1$ and $\tilde{t}^h\in[0,t_c)$. Equilibrium national income in home and foreign respectively are

$$\begin{aligned} \tilde{NI}^f &= Y^f + pX^f - \bar{L}_a^h = \bar{L} - \bar{L}_a^h + \pi^* \\ \tilde{NI}^h &= Y^h + pX^h + \bar{L}_a^h = \bar{L} + \bar{L}_a^h + \pi \end{aligned} \tag{10}$$

In the next case, assume the home government credits foreign profit taxes paid against the home tax bill. The effective tax rate on MNE subsidiary profit equals the maximum of home and foreign tax rates, $t^*=max(t^{h*},t^{f*})$. The foreign country's tax strategy depends on its conjecture of home behavior and the profit-shifting response of the MNE. As in the prior case, the foreign government will set a foreign tax rate on an MNE tax base $\pi^{f*}=\pi^*$ at $t^{f*}=t^h$ if t^h is believed to exceed t^{h*} and $t^h>t_c$. If $t^h<t^{h*}$ then the MNE will set a transfer price $\tilde{\alpha}=1$ regardless of foreign tax policy as $t^h<t^*$. Thus if either $t^h<t^{h*}$ or $t^h>t^{h*}$ and $t_h<t_c$ then foreign's tax strategy is $t^{f*}=1$ resulting in an MNE transfer price of $\tilde{\alpha}=1$ and $\pi^{f*}=\pi^*-\bar{L}_a^h$.

With jurisdiction over both home and foreign-earned profits, home simultaneously selects global tax rates, t^h and t^{h*}. Home has complete control over the MNE's equilibrium transfer price. If $t^{f*}>t^{h*}$ then home will set $t^h<t^{f*}$, otherwise home will set $t^h<t^{h*}$. For any conjectured t^{f*}, the home country may set any range of rates (t^h,t^{h*}) whereby $t^h<t^{h*}$ and thus promote a transfer price $\tilde{\alpha}=1$. In a subgame-perfect Nash equilibria $\tilde{t}^{f*}=1$, $\tilde{t}^h<max(\tilde{t}^{f*},\tilde{t}^{h*})=1$, and $\tilde{t}^{h*}\in(0,1)$. National income for home and foreign are equivalent to that under a $t^{h*}=0$ regime, in equation 10 and results are summarized in Table 1.

In the last case, home allows the MNE to deduct taxes paid abroad from its domestic tax base. The effective reported subsidiary profits tax rate is $t^*=t^{h*}(1-t^{f*})+t^{f*}$. Again to minimize tax burden, the MNE will set a transfer price $\tilde{\alpha}=0$ if $t^*<t^h$ and $\tilde{\alpha}=1$ otherwise. Foreign's strategy is to set its tax rate t^{f*} such that $t^*=t^h$. This is equivalent to setting t^{f*} equal to the composite tax rate $\tau^h\equiv(t^h-t^{h*})/(1-t^{h*})$ if $\tau^h>t_c$ (whereby $\tilde{\alpha}=0$), and to set $t^f=1$ otherwise. With a conjecture about t^{f*}, the home government sets its composite tax rate $\tau^h<t^{f*}$ to assure a transfer price $\tilde{\alpha}=1$. In equilibrium, $\tilde{t}^{f*}=1$ and $\tilde{\tau}<1$. National incomes are again represented by equation 10 and results are summarized in Table 1.

Given the subgame-perfect Nash equilibria under each method of relieving double taxation, we return to the initial tax regime choice of the home country. In each taxation regime, the ability of the MNE to set transfer prices that differ from true shadow prices diminishes the foreign government's facility to tax subsidiary profits by the cost of the globally-joint input. Home achieves identical welfare levels under the credit, deduction, and no foreign-earned profit taxation regimes. Thus, home is indifferent between the three methods for double taxation alleviation -- each represents a subgame-perfect equilibrium solution in pure strategies.

5. Concluding Remarks

This paper analyzes the global tax treatment of an MNE in a noncooperative setting when transfer prices on globally-joint inputs are endogenous. We model an MNE investing abroad to capture scale economies resulting from globally-joint inputs that possess the public good characteristic of non-rivalry across plants. We assume that governments can fully monitor the cost of a globally-joint input but that no a priori pricing rule exists for the distribution of this cost across plants. As the input is nonrival its true shadow price in any one manufacturing plant is zero. Yet to encourage development of firm-specific assets the parent may optimally charge its subsidiary for use of such inputs. In the presence of different home and foreign profit tax rates, the parent uses transfer prices to reduce its tax liability.

With conjectures about subsequent MNE behavior, both governments engage in a tax rate and policy setting subgame. In the first stage, the source country announces a tax regime governing the treatment of foreign taxes paid (no foreign tax, tax credit, or tax deduction. In a second stage, governments engage in Nash competition when setting tax rates on MNE home and foreign-earned profits.

A key result is that tax credit and deduction allowances, as well as no taxation of foreign-earned profits, imply identical optimal transfer price solutions and national income effects in both countries. Home has jurisdiction over both domestic and foreign-earned profits of its MNE. Thus, an equilibrium home tax solution, common each method of double taxation alleviation, is to tax foreign-earned profits at a higher rate than domestically earned profits. Unable to influence transfer prices, the host government's equilibrium strategy to fully tax reported subsidiary profits. The MNE reacts by shifting the cost of globally-joint inputs abroad through transfer pricing mechanisms.

This result is counter to the conventional wisdom obtained from models where direct foreign investment is treated as intra-firm capital exports. The traditional approach to the MNE taxation suggests that governments should deduct taxes paid abroad from domestic taxable profits, apply the same tax rates to resident profits from any source, and not tax locally-earned income of foreign citizens.

This exercise also poses an agenda for future analysis. One possible extension would be to examine the imperfect nature of cost information. The transfer pricing problem is compounded if governments are unable to monitor the cost of globally-joint inputs. In practice, these shared inputs tend to be intangible and are thus difficult for governments to quantify. A profit maximizing MNE will set transfer prices to minimize its global tax bill. With asymmetric cost information, an MNE will tend to overbill the subsidiary for services of a globally-joint asset. As high transfer prices allow the MNE to repatriate profits indirectly through tax avoidance, the home has an incentive to encourage overpricing.

Endnotes

1. One notable exception is the model by Huizinga (1992) which addresses issues of intangible inputs but not transfer pricing. This paper shows that in a noncooperative environment, the international tax system discourages R&D by MNEs.

2. The transfer price is an intra-firm transfer from the foreign subsidiary to the parent as the subsidiary's share of the cost of the globally-joint input.

3. Relaxing this assumption gives greater profit-shifting leverage to the MNE.

4. If t^* exceeds one then the MNE will close foreign operations by setting L_m^f to zero. We exclude such cases from consideration.

5. It is possible for global profits to be non-negative $(\pi+\pi^*\geq 0)$ and for reported profits in one (ith) plant to be negative if $L_m^i < L_a \leq L_m^h + L_m^f$.

6. Under the assumption of identical and homothetic preferences, there is no aggregation problem.

7. Reported profits may be negative while global profits are positive. In this case there is an incentive for the government to restrict firm entry. We do not consider this case but rather assume that administration costs do not exceed manufacturing profits in any one country.

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TABLE 1

		No Taxation	Tax Credit	Tax Deduction
	Effective Foreign Tax Rate (t^*)	t^{f*}	$max(t^{h*}, t^{f*})$	$t^{h*}(1\text{-}t^{f*})+t^{f*}$
Tax Rate Strategies	**Foreign** (t^{f*})	$t^{f*}=t^h$ if $t^h>t_c$ and $t^{f*}=1$ otherwise	$t^{f*}=t^h$ if $t^h>t^{h*}$ and $t^h>t_c$ and $t^{f*}=1$ otherwise	$t^{f*}=\tau^h\equiv(t^h\text{-}t^{h*})/(1\text{-}t^{h*})$ if $\tau^h>t_c$ and $t^{f*}=1$ otherwise
	Home (t^h, t^{h*})	$t^h<t^{f*}$ $t^{h*}=0$ (by definition)	$t^h<max(t^{h*}, t^{f*})$ $t^{h*}>max(t^h, t^{f*})$	$\tau^h\equiv(t^h\text{-}t^{h*})/(1\text{-}t^{h*})<t^{f*}$
Subgame-Perfect Equilibrium	**Foreign** ($\tilde{t}^{f*}$)	$\tilde{t}^{f*}=1$	$\tilde{t}^{f*}=1$	$\tilde{t}^{f*}=1$
	Home ($\tilde{t}^h, \tilde{t}^{h*}$)	$\tilde{t}^h\in[0,t_c)$	$\tilde{t}^h<1$ and $\tilde{t}^{h*}\in(0,1)$	$\tilde{\tau}^h\equiv(\tilde{t}^h\text{-}\tilde{t}^{h*})/(1\text{-}\tilde{t}^{h*})<1$
	MNE ($\tilde{\alpha}$)	$\tilde{\alpha}=1$	$\tilde{\alpha}=1$	$\tilde{\alpha}=1$

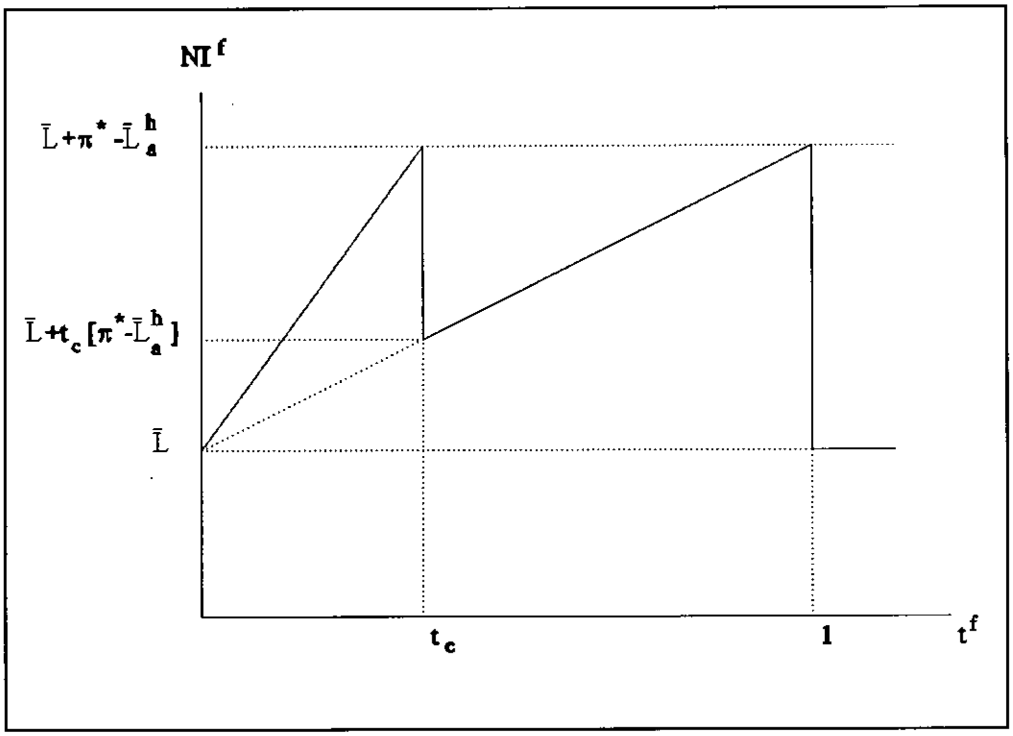

Figure 1.A.

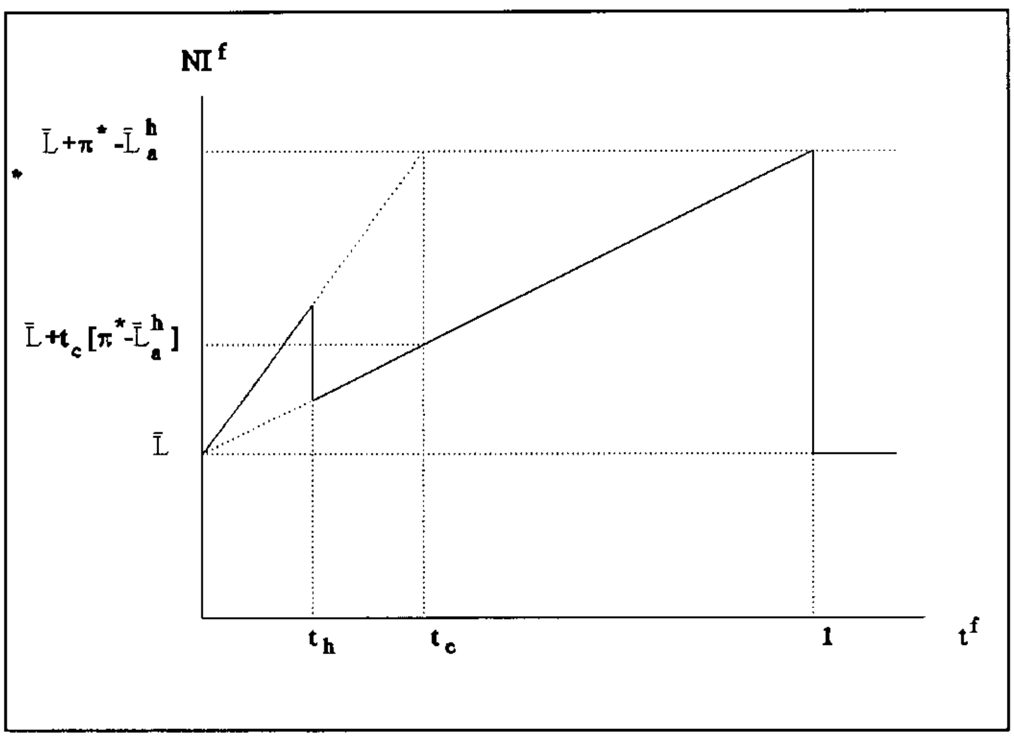

Figure 1.B.