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THE EFFECTS OF TAXES ON FOREIGN DIRECT INVESTMENT IN THE UNITED STATES

By

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ABSTRACT

THE EFFECTS OF TAXES ON

FOREIGN DIRECT INVESTMENT IN THE UNITED STATES

By

Taejoo Kim

The main objective of this dissertation is to analyze the effects of U.S. taxation on foreign direct investment in the U.S. Specifically, this dissertation tries to provide empirical answers to some questions regarding the relationship between FDI in the U.S. and the U.S. effective corporate tax rate: (a) what is the qualitative response of FDI in response to a change in the effective tax rate?, (b) how does the foreign investor country's double-taxation-relief system affect the response of FDI in the U.S. to the U.S. effective tax rate?, (c) is the average effective tax rate or the marginal effective tax rate the better explanatory variable for FDI behavior?, and (d) what are the responses of acquisition-type FDI and establishment-type FDI to both the average and the marginal effective tax rate?

The estimation results indicate that overall foreign investment decreases in response to an increase in the U.S. average effective tax rate, and that multinationals from countries with worldwide system do not appear to adjust their investment, but multinationals from countries with territorial system reduce their investment in the U.S. in response to an increase in the U.S. average effective tax rate. These results are consistent with the Traditional View, but do not conform to the New View.

The industrial organization theory suggests that FDI is closely related to market imperfections, and FDI is a result of highly strategic decision-making of a multinational corporation. Also, most FDI is accounted for by acquisition of existing U.S. firms. Therefore, FDI is not expected to respond to the marginal effective tax rate, which is based on the perfect-competition assumption and measures the tax burden of a new investment project. My estimation results appear to support this hypothesis.

Another estimation result of mine indicates that establishment-type FDI does not respond to a change in either the average effective tax rate or the marginal effective tax rate. I explain this result with the composite feature of establishment-type FDI: it is a new investment and it is a mode of FDI.

On balance, this dissertation does not support the New View. I think the problems of the New View arise from its assumptions: perfect capital mobility among countries and among assets. Perfect capital mobility means that every adjustment process takes place immediately. So, in the world of the New View, the economy is always in the equilibrium state. However, in the case of direct investment, capital seems to move slowly in response to a change in the relative tax rates between countries and between assets. These capital movements, in turn, lead to changes in asset prices and in the pretax returns of the assets. That is, the change in the pre-tax rate of return in response to a change in tax rate is the result of the process of capital movements. But, the New View thinks that every adjustment process occurs immediately, and the price and the pretax return change immediately in response to a tax change. And then capital (direct investment) moves again in response to these changes in asset price. The problems of the New View seem to arise from this misunderstanding.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

1. Foreign Direct Investment in the United States

Direct investment implies that a person has a lasting interest in and a degree of influence over the management of a business enterprise in another country. For the United States, ownership or control of 10 percent[1] or more of an enterprise's voting securities is considered evidence of such a lasting interest or degree of influence over management. Thus, foreign direct investment (FDI) in the United States is defined as "the ownership or control, directly or indirectly, by one foreign person of 10 percent or more of the voting securities of an incorporated U.S. business enterprise or the equivalent interest in an unincorporated U.S. business enterprise"[2]. Any investment that is not direct investment by this definition is considered *portfolio investment*. In 1997, outlays of foreign direct investors to acquire or establish businesses in the U.S. were $69.7 billion, about 8.1% of domestic nonresidential fixed investment.

Foreign investors can undertake FDI in the U.S. by acquiring shares of existing U.S. firms, or by establishing new subsidiaries or branches. Quantitatively, acquisition is

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[1] The 10-percent criterion is somewhat arbitrary, and may understate or overstate foreign control. However, Graham and Krugman (1995) suggest that, in the aggregate, the danger of overstatement and understatement is not that large. They point out that, on average, foreign parents controlled 77.5 percent of their U.S. affiliates in 1991.

[2] Quijano (1990), p. 29.

the more important route of FDI. Figure 2 in Chapter 2 shows that the acquisition type of FDI accounts for over 80 percent of total FDI. The choice between acquisition and new establishment depends on many strategic considerations. The strategic considerations and the reason why foreign investors prefer the acquisition route will be discussed in Chapter 6.

2. Economic Effects of FDI

According to the neoclassical theory of the effects of FDI (MacDougall model[3]), FDI leads to an increase in the output of the world as a whole. The gain from FDI is shared by both the home country (investor country) and the host country (investee country). In a world of perfect competition and no externalities, foreign direct investment equalizes the marginal productivities of capital of both the investor and investee countries. The efficiency in the use of capital improves, and the total output of the world increases. The argument of the neoclassical model is easily explained by Figure 1[4].

In Figure 1, the vertical axes measure the marginal product of capital in the investor country (MPK_1) and the investee country (MPK_2) and the horizontal axis measures the total capital endowment of the world. The lines *ee'* and *dd'* represent the marginal productivity schedule of the investor country and the investee country, respectively. Before FDI takes place, the investor country produces O_1ebc of output with

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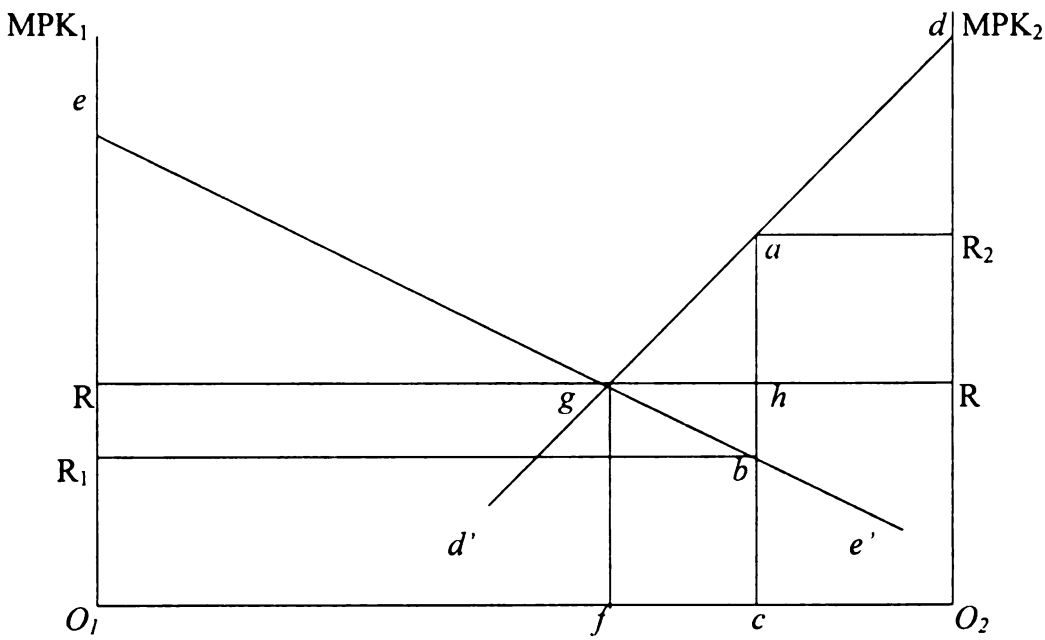
[3] MacDougall (1960).

[4] Caves (1996), p. 194.

O_1c capital in combination with the given amount of labor, and the investee country (host country) produces O_2dac with O_2c capital. The price of capital is O_1R_1 in the investor country, which is lower than that in the investee country O_2R_2. Now fc amount of FDI flows from the investor country to the investee country, and the marginal productivity of capital is equalized between the two countries at $O_1R = O_2R$. As a result of FDI, the output is O_1egf in the investor country and O_2dgf in the investee country. Compared with the total output before FDI, total world output is increased by the triangle *abg*. The output of the investor country is decreased by $fgbc$, but as a return to FDI the investor country receives $fghc$. The investor country enjoys greater national income than before FDI. Similarly, the investee country enjoys a net increase of national income *agh*.

Figure 1. MacDougall Model



Of course, the MacDougall model cannot capture all the economic effects of FDI, because it is based on several strong assumptions: perfect competition, perfect capital

mobility, no externalities, and no consideration of time (it is a static model). As a matter of fact, FDI has an effect on the quantity and quality of employment, technology diffusion, balance of payments, and other variables such as national security. In reality, most debates on the effects of FDI concentrate on these external effects. Advocates of FDI argue that FDI creates huge job opportunities in the U.S., or that FDI brings good technology into the U.S. and stimulates domestic R&D efforts, or that capital inflow through FDI improves the balance of payments. In contrast, critics of FDI argue that foreign firms tend to obtain more of their production inputs from abroad than U.S. firms, and that the resulting reduced demand for the products of domestic suppliers costs the U.S. jobs and worsens the U.S. trade balance. They also argue that R&D by foreign-controlled firms is skewed toward less challenging application-oriented technologies, rather than more basic and scientific technologies. Due to the nature of the externalities, there is not much evidence on these arguments[5]. Graham and Krugman (1995) review these issues and conclude that FDI in the U.S. is not a bad thing on balance.

3. FDI and Taxes

There are a variety of reasons why multinational corporations (MNCs) invest abroad: acquiring particular resources (labor, natural resources, technological capability, or management skill) at a lower cost, supplying goods and services to markets in the host

[5] For more detailed discussion about the debates and empirical evidence, see Graham and Krugman (1995, chapter 3-6).

country or in adjacent markets, seeking benefits from economies of scale and scope, or promoting long-term strategic objectives (such as, advancing international competitiveness by acquiring the assets of foreign corporations)[6]. In addition to these factors, the host-country tax system also potentially affects the attractiveness of investment by foreigners.

There are two different views on how foreign direct investment responds to tax variables: the traditional "choice between alternative investment locations" view and the new "asset competition" view. While the traditional view argues that FDI in the U.S. should respond negatively to an increase in the U.S. tax rate, the new view argues that FDI in the U.S. should respond positively to an increase in the U.S. tax rate.

According to the "choice between alternative investment locations" view, foreign investors compare the after-tax rate of return in the U.S. ($R_{US}[1-T_{US}]$) and that in the home country ($R_H[1-T_H]$), where R_i is the pre-tax return in a country, and T_i denotes the effective tax rate in a country. Foreign investors decide to undertake investment in the location with the higher after-tax rate of return. In this view, an increase in the U.S. tax rate reduces the after-tax rate of return, and leads to a decrease in FDI in the U.S. (that is, $T_{US}\uparrow \rightarrow$ FDI $\downarrow$). Hartman (1984) and Boskin and Gale (1987) support this view.

The "asset competition" view criticizes the "choice between alternative investment locations" view in that it ignores the possibility that the pre-tax rate of return may be affected by the change in tax rate. In the asset competition view, competition for tax-favored assets causes the relative price of the tax-advantaged assets to rise, and this means that the pre-tax rate of return of the tax-favored assets decreases. Therefore, an

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[6] Dunning (1992), pp. 56-61.

increase in the U.S. tax rate decreases the price of U.S. assets, and increases the pre-tax rate of return on the U.S. assets. Since foreign investors from countries with a *territorial tax system*[7] do not pay taxes on foreign income to their home country, they receive the full U.S. after-tax return ($R_{US}[1-T_{US}]$). Firms from countries with a *worldwide tax system* pay taxes to their home country and get a foreign tax credit ($R_{US}[1-T_H]$), so in general, their total taxes are not affected by the U.S. tax change[8]. However, according to the asset competition view, firms from countries with a *territorial tax system* are not greatly affected by an increase in the U.S. tax rate, but *worldwide* firms increase their investment in response to an increase in the U.S. tax rate. Swenson argues that an increase in the U.S. tax rate leads to an increase in the U.S. pretax rate of return. These changes do not affect much the investment incentive of territorial firms, but they make worldwide firms increase their investment in the U.S. Accordingly, total FDI in the U.S., which is the sum of FDI from the territorial countries and FDI from the worldwide countries, should respond positively to the U.S. tax rate. The asset competition view is addressed in depth in Chapter 3.

The main purpose of this paper is to analyze the effects of U.S. taxation on FDI in the U.S. More specifically, this paper tries to provide empirical answers to some

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[7] Multinationals are subject to taxation by their home countries, and by their host countries. To relieve the double-taxation problem, each country adopts either a "worldwide" system or a "territorial" system. Under the worldwide system, multinationals get credits for taxes paid to foreign countries, but under the territorial system, multinationals do not have to pay taxes on foreign earnings. The U.S., the U.K., and Japan adopt the worldwide system. France, Germany, Canada, and the Netherlands adopt the territorial system.

[8] This statement is based on the assumption that the rate of taxation of the worldwide country is greater than that of the U.S.

questions regarding the relationship between FDI in the U.S. and the U.S. effective corporate tax rate:

(a) Does FDI in the U.S. respond positively or negatively to an increase in the U.S. effective corporate tax rate measure?

(b) How does the foreign investor country's double-taxation-relief system affect the response of FDI in the U.S. to the U.S. effective corporate tax rate?

(c) Is the average effective tax rate or the marginal effective tax rate the better explanatory variable for FDI behavior?

(d) What is the response of establishment-type FDI to both the average effective tax rate and the marginal effective tax rate?

This dissertation is organized as follows. In Chapter 2, I review the relevant literature and discuss the data issues. The argument of the New View and the empirical analysis of Swenson (1994) are reconsidered in Chapter 3. In Chapters 4 and 5, I investigate the effects of U.S. effective corporate tax rate on FDI in the U.S., as well as the effects of the foreign investor country's international tax system on FDI in the U.S. This paper is different from Hartman (1984), Boskin and Gale (1987), and Slemrod (1990), in that I use *acquisition and establishment* data, while they use *capital flow* data. Even though I use a different FDI data set, I get results that are similar to those of Hartman, Boskin and Gale, and Slemrod. Also, this paper is different from Swenson (1994) in that my calculation of the average effective tax rates is different from hers. I get opposite results from those of Swenson (1994), even though I use the same FDI data. I explain the data on FDI and the effective tax rates in Chapter 2. In Chapter 6, this paper compares the average effective tax rate and the marginal effective tax rate in explaining FDI behavior. Also in Chapter 6, I investigate the response of establishment-type FDI to

the average and the marginal effective tax rate. Finally, Chapter 7 provides a conclusion.

CHAPTER II

LITERATURE REVIEW AND DATA ISSUES

1. Literature Review

Early studies on the effects of taxation on FDI in the U.S. concentrate on analyzing the relationship between capital inflow and measures of the after-tax rate of return. Hartman (1981, 1984), the first contribution, analyzes the effect of taxes on FDI, using annual *capital flow data*[9] for the years 1965 - 1979. He distinguishes FDI financed by retained earnings from FDI financed by funds transfers from parent firms, and estimates separate equations for these two types of FDI. He uses the after-tax rate of return realized by foreign investors, the after-tax rate of return on overall U.S. capital, and the tax rate on U.S. capital owned by foreigners relative to the tax rate on U.S. capital owned by U.S. investors as explanatory variables. He excludes explicitly the home-country tax rate as an explanatory variable, based on the arguments of Hartman (1985)[10]. He finds a positive

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[9] There are two different kinds of FDI data available: one is the *acquisition and establishment data*, and the other is the *direct investment capital flows data* (balance-of-payments data). The *capital flow* data consist of the equity capital, the intercompany debt between U.S. affiliates and their parents, and the reinvested earnings. If a foreign affiliate borrows in the U.S. in order to buy a machine, this transaction will not appear in these data. For more detailed explanation for the capital flow data, see section 2.2.

[10] Hartman (1985) argues that the home country's rate of tax on foreign source income and the presence or absence of a foreign tax credit should be irrelevant to a mature foreign subsidiary's investment and dividend decision. He compares after-tax rates of return from two alternative investment decisions (reinvestment or immediate repatriation) of a mature foreign subsidiary. The parent firm's after-tax rate of return from reinvestment is $[(1-t)/(1-t^*)][1+r^*(1-t^*)]$, and that from repatriation is $[(1-t)/(1-t^*)][1+r(1-t)]$, where t is tax rate, r is rate of return, and * stands for a host-country variable. Therefore, the home-country system of deferring taxes and providing a credit for host-country tax payment (worldwide system) induces

effect of the after-tax rate of return on both types of FDI, and the effect is much stronger for FDI financed by retained earnings. He also finds a negative effect of the relative tax term on FDI. These results suggest that FDI (especially FDI by retained earnings) responds negatively to the U.S. average tax rate.

Boskin and Gale (1987) reestimate Hartman's (1984) equations, using updated series for the tax rate and the rate of return. Their qualitative results are consistent with those of Hartman (1984), even though the estimated elasticities of FDI to the rate of return are somewhat lower. They also try some different model specifications and different sample periods. They conclude that although the results are somewhat sensitive to sample periods and model specification, the qualitative conclusions of Hartman (1984) are fairly robust.

Young (1988) uses revised data on foreign direct investment and rate of return for the sample period 1953-1984 to estimate equations similar to those of Hartman. He modifies the Hartman model by including the lagged dependent variable and U.S. GNP as explanatory variables. His results indicate that foreign direct investment in the U.S. through retained earnings appears to be more sensitive to tax rates than foreign direct investment through transfer of new funds. This is consistent with the findings of Hartman.

Slemrod (1990) points out that previous studies ignored the possibility that FDI could be affected by home-country taxation[11], and did not consider nontax determinants

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multinational firms to invest abroad up to the point at which the after-foreign-tax return available abroad equals the available domestic after-tax return. He explains that this conclusion arises from the unavoidable nature of the tax for a firm with subsidiary earnings.

[11] Slemrod (1990) points out that Hartman's (1985) argument does not apply to an immature subsidiary's investment (FDI financed by funds transfers from the parent company), but only applies to a mature

of FDI. Therefore, he investigates the effect of both U.S. and home-country taxation on FDI in the U.S. Firstly, he changes the model specification by introducing a marginal effective tax rate as a tax variable, rather than an average effective tax rate, and by including other explanatory variables, such as the real exchange rate. The results are that the U.S. effective tax rate has a negative effect on total FDI and FDI financed by transfer of funds, but not on investment from retained earnings. Secondly, Slemrod disaggregates FDI data by the major investing countries. It is expected that investors from *territorial-system* countries would respond sensitively to the U.S. marginal effective tax rate, but that for investors from *worldwide-system* countries, the U.S. tax rate would be a less crucial factor. However, Slemrod's estimation results generally do not support this prediction. About the effect of the home-country taxation on FDI in the U.S., it is expected that FDI from territorial countries should be positively related to the home-country tax rate. But transfers of funds from *worldwide* countries should have a less positive relation to the home-country tax rate, and retained earnings from those countries should be unaffected. The regression results do not support these predictions. Slemrod concludes that these results suggest that home-country taxation does not have much effect on FDI in the U.S.

Auerbach and Hassett (1993) distinguish acquisition-type FDI from establishment-type FDI. They argue that *establishment* FDI could be affected by the marginal effective tax rate, and that *acquisition* FDI should be affected primarily by the laws regarding mergers and acquisitions (M&A). They construct an investment model of FDI using

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subsidiary's investment (FDI financed by retained earnings). So, he argues that it is worthwhile to investigate empirically the effect of both the home country's rate of taxation and its system of taxing foreign-source income.

particular M&A tax-code provisions. The model is neoclassical in character, and is based on the assumptions of the neoclassical model. Their simulation results, which are based on their investment model of FDI, suggest that the Tax Reform Act of 1986 (TRA86) decreased the incentives for *worldwide firms* to invest in all assets other than equipment, and that TRA86 decreased the overall investment incentives of *territorial firms*. However, in reality, this prediction was not supported by the actual FDI trend. They conclude that the FDI boom in the late 1980s might not have been significantly affected by TRA86.

Swenson (1994) analyzes FDI in 18 industries, for the years 1979 through 1991. She uses average tax rates calculated by *Tax Analysts*. She finds that the response of worldwide investors to the U.S. average tax rate was positive and statistically significant. For territorial investors, the effect of the average tax rate on FDI is much smaller and statistically insignificant. These results are consistent with the argument of Scholes and Wolfson (1992) that FDI by worldwide firms responds positively to the tax rate, and this makes total FDI respond positively to the tax rate. I replicate her estimation, and the results will be discussed in chapter 3.

Table 1 shows the differences in FDI data, the tax rate measures used, and the main results, among the empirical studies above.

Table 1. Summary of Empirical Studies

	Hartman (1984)	Boskin & Gale (1987)	Young (1988)	Slemrod (1990)	Swenson (1994)
FDI data	*capital flow* (1965-1979)	*capital flow* (1956-1984)	*capital flow* (1953-1984)	*capital flow* (1960-1987)	*acquisition and establishment* (1979-1991)
Main Explanarory Variable	*After-tax Rate of return*	*After-tax Rate of return*	*After-tax Rate of return*	*METR*	*AETR*
Conclusion (U.S. tax Effect on FDI)	negative	negative	negative	negative	positive

* AETR stands for the average effective corporate tax rate, and METR for the marginal effective corporate tax rate

2. Data Issues

2.1. FDI Data

There are two different kinds of FDI data available: one is the *acquisition and establishment data*, and the other is the *direct investment capital flows data* (balance-of-payments data). Both data sets are available in the *Survey of Current Business* published by the Bureau of Economic Analysis.

The *acquisition and establishment* data set consists of the actual outlays of foreign investors to establish or acquire new U.S. affiliates. Roughly speaking, *establishment* involves creation of a new legal entity by a foreigner, and *acquisition* involves obtaining a voting interest in an existing U.S. business by a foreigner. These data are available since 1979. Swenson (1994) uses this data set.

The *capital flow* data consist of equity capital, intercompany debt between U.S. affiliates and its parents, and reinvested earnings. If a foreign affiliate borrows in the U.S. in order to buy a machine, this transaction will not appear in this data. Hartman (1984), Boskin & Gale (1987), Young (1988), and Slemrod (1990) use this data set.

The acquisition and establishment data and the capital flow data provide different measures of the annual growth in FDI in the U.S. The acquisition and establishment data cover the actual outlays to establish or acquire new U.S. affiliates, regardless of how or by whom the investment was financed. Thus the outlays may be made by either the foreign parent or an existing U.S. affiliate, and the source of financing may be other than the foreign parent group, such as local borrowing by existing U.S. affiliates. In contrast, the balance-of-payments data cover only transactions between foreign parent groups and U.S. affiliates. If, for example, a U.S. affiliate of a German chemical manufacturer

acquired a U.S. chemical company by borrowing funds in the U.S., the borrowed funds would be included in the acquisition and establishment data but not in the capital flow data, because the acquisition did not involve funds from the foreign parent[12].

As mentioned above, the *capital flow data* cannot capture the foreign direct investment financed by borrowing in the U.S. Young (1988) admits the limitation of the capital flow data by saying "FDI in this study is most accurately thought of as a financial transaction. It does not necessarily mean purchase of real assets, such as plants and equipment, and does not include funds borrowed in the U.S." Auerbach and Hassett (1993) point out that the capital flow data are not directly related to physical investment, which is of interest to the researcher, and on which are based the theoretical models to form effective tax rates. Swenson (1994) also agrees that the acquisition and establishment data provide a more accurate assessment of the tax effect on FDI. So, I think the *acquisition and establishment data* set is more appropriate than the *capital flow data* for explaining investment behavior. The *acquisition* FDI, the *establishment* FDI, and the total FDI (sum of *acquisition* FDI and *establishment* FDI) can be broken down by industries. And the *total* FDI can be disaggregated by some major foreign investor countries. In chapter 4, I disaggregate total FDI (the sum of the *acquisition* FDI and the *establishment* FDI) by four industries[13]. And in chapter 5, I use the *total* FDI by seven

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[12] Quijano (1990).

[13] I calculate the average effective tax rates on the basis of corporate income tax return data in *Statistics of Income* (SOI) *Bulletin* published by the Internal Revenue Service. So, my industry classification is restricted by the industry classification of the SOI Bulletin (eight industries: Agriculture-Forestry-Fishing, Mining, Construction, Manufacturing, Transportation and Public Utilities, Wholesale and Retail Trade, Finance-Insurance-Real Estate, and Services). And FDI data in *Survey of Current Business* have some data suppressions to avoid disclosure of data of individual companies. Therefore, to avoid losing too much information, I consolidate some industries into one industry. The four industries are (1) manufacturing, (2)

major investor countries. In chapter 6, I disaggregate the acquisition FDI and the establishment FDI by four industries. According to these data sets, most FDI are accounted for by the *acquisition* FDI (see *Figure 2*).

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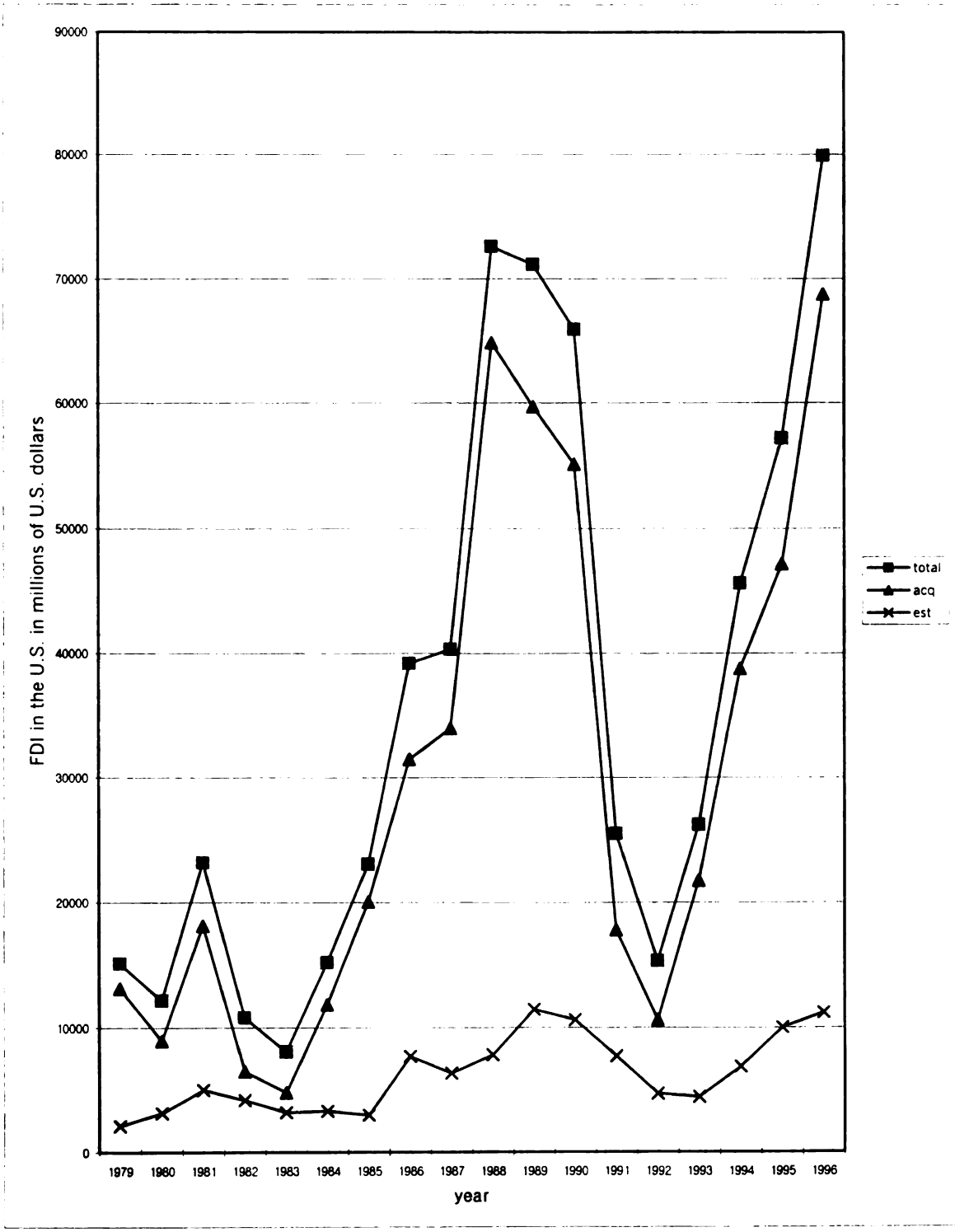
trade, (3) services and FIRE (finance, insurance, and real estate), and (4) other industries.

Figure 2. Foreign Direct Investment in the U.S., 1979 – 1996



2.2. Data on Effective Tax Rates

Since the tax burden of a corporation is dependent on many factors, such as corporate financial policy, inflation expectations, uncertainty, and the tax code, it is difficult to measure the exact burden of corporate income taxation. Especially, the tax code has lots of complexities, such as various deductions, credits, and exemptions, which make the statutory tax rate different from actual tax burden. The average effective tax rate and the marginal effective tax rate are contrived to estimate the actual tax burden or to measure the incentive effects of taxation.

The average effective tax rate is said to be a good measure of the tax burden of existing firms, but it is not necessarily a good measure of the impact of taxes on the incentives to make new investment. In contrast, the marginal effective tax rate measures the estimate of the net tax burden on the expected income from a marginal investment. So it is said to be a good measure of the incentive effect of taxes on new investment, but it cannot be a good measure of the tax burden of existing businesses[14].

Swenson (1994) uses the *average* effective corporate tax rates as the main explanatory variable for FDI in the U.S. However, Slemrod (1990) argues that the *marginal* effective corporate tax rate is a better measure of expected tax burden on a prospective new investment, and uses the marginal effective corporate tax rate as the tax-rate measure. All studies dealing with the effects of taxes on FDI use *corporate* level effective tax rates rather than the *total* of corporate and personal level effective tax rates.

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[14] Fullerton (1984), p. 23.

This is because foreign investors pay taxes at the corporate level, but not at the personal level.

In order to see which tax rate measure is the more appropriate explanatory variable for FDI behavior, I use both average effective corporate tax rates and marginal effective corporate tax rates.

The average effective corporate tax rate is generally defined by actual corporate taxes paid as a proportion of corporate income.[15] The average effective tax rate is used to measure the overall tax burden of existing firms. *Tax Foundation*'s calculation of U.S. average effective corporate tax rates is one of the most recent calculations of the AETR[16]. Tax Foundation calculates the annual U.S. AETR for the years 1945 – 1998. I follow the method of Tax Foundation in calculating the average effective tax rates. I calculate the average effective corporate tax rate, based on *Statistics of Income Bulletin* (SOI Bulletin) data published by the Internal Revenue Service (IRS). The average effective tax rate is calculated by taking federal corporate income tax paid divided by net income. Figure 3 shows my calculation of the AETR for the U.S. as a whole. Table 7 in chapter 4 presents my calculation of the average effective tax rates by industry. The calculation of the AETR of Tax Analysts and that of Tax Foundation are compared in Figure 5 in Chapter 3.

The marginal effective tax rate measures the fraction of the real pretax rate of return to a new investment that will be collected as taxes. It is used to measure the incentive effect of taxes on new investment. One of the most recent calculations of the marginal effective tax rates is the one by Gravelle (1994). She calculates the U.S. overall METR for the years 1953 - 1989. Figure 4 compares my calculation of the METR and

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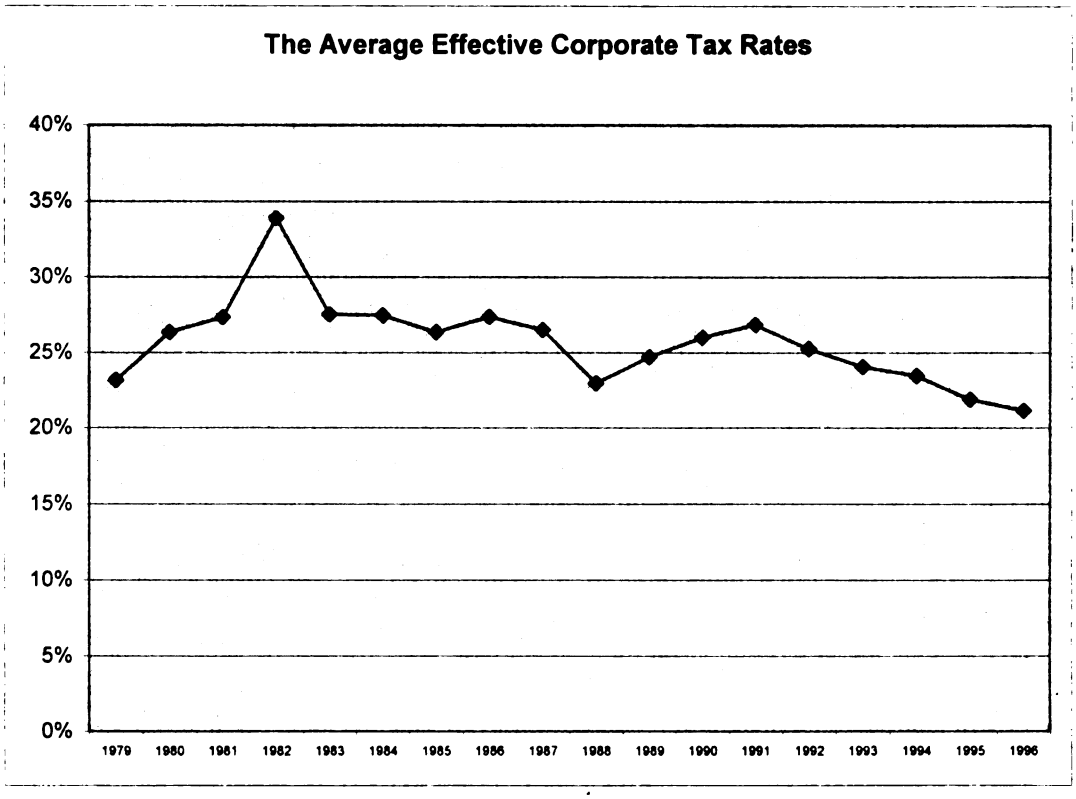
[15] Fullerton (1984), p. 24.

[16] Moody (1998).

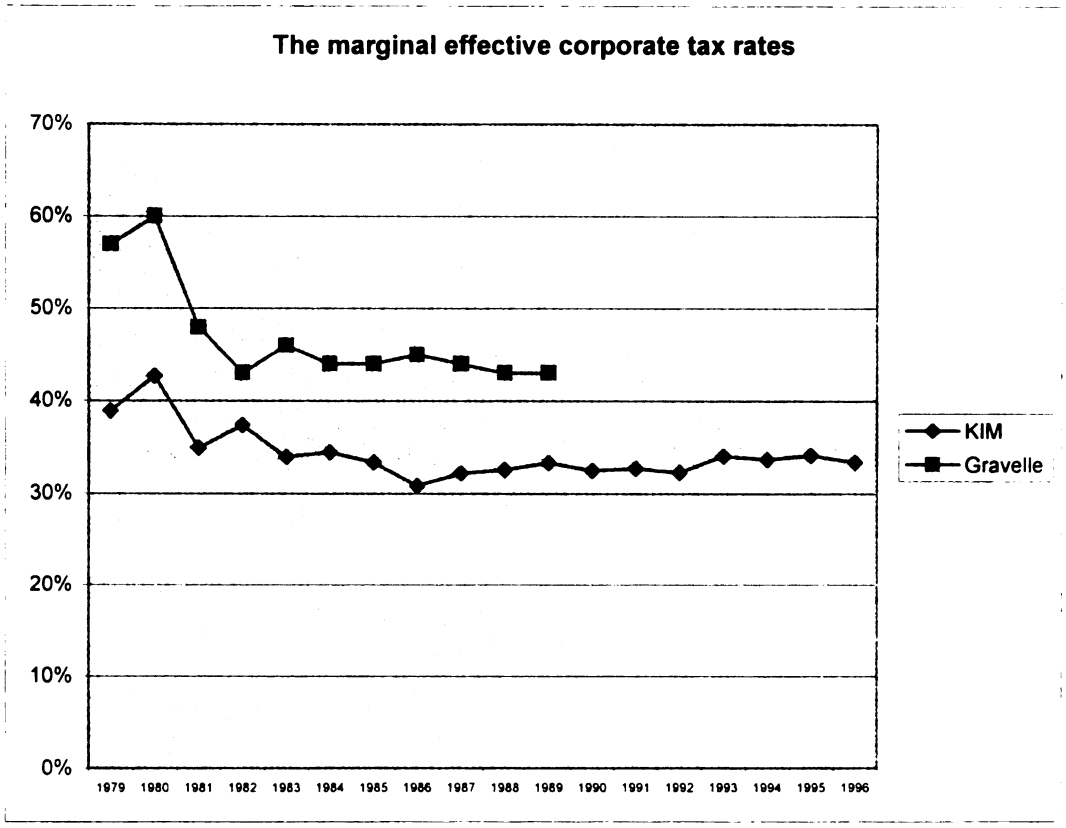
that of Gravelle (1994). The major difference between my own calculation and Gravelle's calculation of the METR is the expected inflation data. While Gravelle (1994) uses the expected inflation rates of the Drexel-Burnham-Lambert Decision Makers Poll, I use the expected inflation rates of the Livingston Survey data maintained by the Federal Reserve Bank of Philadelphia. The methodology and data used in calculating the METR are presented in an appendix.

Figure 3. The Average Effective Corporate Tax Rates in the U.S.



Source: My own calculation, based on corporate tax return data in *Statistics of Income Bulletin* published by the Internal Revenue Service.

Figure 4. Comparison of the Marginal Effective Corporate Tax Rates



Sources: Gravelle (1994) and text.

One of the most important differences between this paper and the paper of Swenson (1994) is the calculation of the average effective tax rates. She uses the average effective tax rates calculated by *Tax Analysts*, but I calculate the AETR using the corporate tax return data from the Internal Revenue Service (IRS).

Tax Analysts use data for the 500 largest companies in calculating the AETR for the years 1980 – 1984, and for the 1,000 largest companies for the years 1985 – 1989. The data are derived from the Form 10-Ks that publicly held corporations are required to file with the Securities and Exchange Commission (SEC). More detailed discussion of the Tax Analysts' calculation of the AETR will be found in chapter 3.

My calculation of the AETR depends on the data on corporation income tax returns in *SOI Bulletin*. The data are broken down by eight broad industries. The data contain the income tax returns filed by all U.S. corporations, so the number of firms included in the IRS data is several million. In 1980, the number of returns filed was 3.7 million, and in 1996 it was 4.6 million.

CHAPTER III

THE NEW VIEW OF

TAXES AND FOREIGN DIRECT INVESTMENT

1. The New View

According to Scholes and Wolfson (1992), if two assets give rise to the same pre-tax cash flows, but the cash flows to one asset are taxed more favorably than those to the other asset, taxpayers will bid for the tax-favored asset. This competition for the tax-favored assets causes the relative price of the tax-advantaged assets to rise. This competition continues until the equality of the post-tax rate of return between the tax-advantaged and tax-disadvantaged assets is restored. As a result, the price of the tax-favored asset will increase, and the before-tax rate of return on the tax-favored asset will decrease. Scholes and Wolfson refer to this reduction in the before-tax rate of return of the lightly taxed asset as an '*implicit tax*'. They use an example of municipal bonds, which are issued by state and local governments. The interest earned on municipal bonds is exempted from federal income taxation. Investors bid up the price of these municipal bonds, such that their before-tax rate of return is lower than the return on fully taxed bonds.

Scholes and Wolfson extend the 'implicit tax' hypothesis to the discussion of the effects of taxes on FDI. They suggest that investors whose home country use a worldwide tax system can respond positively to a change in the host country's tax rate. They state this as follows:

"One might be tempted to suppose that if tax rates are lower in a foreign country than they are domestically, it follows that after-tax rates of return on marginal investments should be higher in the foreign country. But this ignores the very real possibility that pretax rates of return in the foreign country may be lower than that available domestically. In countries where the tax rate on income is relatively low, one would expect competition to force down pretax profitability. In other words, the foreign investments will bear implicit taxes. ····· Implicit taxes can arise because the foreign country encourages investment by offering generous tax benefits, and competition for the right to garner these benefits results in lower before-tax rates of return. ····· (for worldwide investors) it is only necessary to compare before-tax rates of return for one-year horizon investment."[17]

Swenson (1994) makes Scholes and Wolfson's argument in a more general form, which predicts the response of investors from territorial countries as well as that of investors from worldwide countries to a change in the U.S. tax rate. She also provides empirical evidence supporting Scholes and Wolfson's 'implicit tax' hypothesis in the context of FDI and taxes. According to the argument of Swenson (1994), firms invest until their after-tax rate of return on the investment is equal to the return on the passive asset. In her own notation, $R_{US}(1-T_{US}) = RF$, where RF is the after-tax rate of return on an alternative passive asset (or requisite return). In this view, an increase in the U.S. tax rate (T_{US}) increases the before-tax return on U.S. assets (R_{US}). Since foreign investors from countries with a territorial tax system do not pay taxes to their home country, they receive the full U.S. after-tax return ($R_T = R_{US}[1-T_{US}] = RF$). Firms from countries with a worldwide tax system pay taxes to their home country and get a foreign tax credit, so they ultimately earn $R_W = R_{US}(1-T_{US}) + R_{US}T_{US} - R_{US}T_H = R_{US}(1-T_H)$. According to

[17] Scholes and Wolfson (1992), pp. 253-254.

Swenson (1994), firms from countries with a territorial tax system are not greatly affected by an increase in T_{US}, because their after-tax return on direct investment in the U.S. ($R_T = R_{US}[1-T_{US}]$) is fixed at RF regardless of the U.S. corporate tax rate. But, firms from worldwide tax countries increase their investment in response to an increase in T_{US}, because an increase in the U.S. tax rate (T_{US}) leads to an increase in the U.S. pretax rate of return (R_{US}). These changes do not affect the investment incentive of territorial firms, but they do make worldwide firms increase their investment in the U.S. Accordingly, FDI in the U.S. should respond positively to the U.S. tax rate.

2. Problems of the New View

The conclusion of the new view is derived from two assumptions: perfect capital mobility among countries, and perfect mobility between physical and financial assets. Under the assumption of perfect international capital mobility, an immediate adjustment in the pretax rate of return is possible. If the assumption of perfect capital mobility does not hold, the conclusion that worldwide investors should respond positively to an increase in the U.S. tax rate cannot be derived. However, what is generally observed and accepted in the related literature is far remote from these assumptions. Under the assumption of perfect capital mobility between physical and financial assets, the conclusion that territorial investors should not respond to a change in the U.S. tax rate is possible. And this assumption is also far from reality. Therefore, the "asset competition" view can be said to have limitations in explaining the real behavior of direct investment, because of its unrealistic assumptions. This section discusses the assumption of the new

view in more detail.

Capital mobility between countries

The asset competition view (the New View) can hold only under the situation of perfect competition and perfect capital mobility between countries. Scholes and Wolfson (1992, p. 84) state, "...we assume that markets are perfect. In this setting, no transaction costs are incurred to undertake investments or to manage them. All investors are assumed to possess identical information regarding the future cash flows from investment alternatives. Moreover, investors act as though their behavior has no influence on the prices at which assets can be bought and sold." Swenson (1994, p. 249) states, "...we begin with the premise that asset competition, and perfect capital mobility drive the after-tax rate of return on U.S. assets into line with the world rate of return."

However, the consensus in the academic literature is that capital is not perfectly mobile among countries. Feldstein and Horioka (1980) and Mishkin (1984) report empirical evidence suggesting that capital is internationally quite immobile. Feldstein and Horioka analyze the relation between savings rates and investment rates of the 21 OECD countries for the period 1960 – 1974. Their basic finding is that the correlation between savings rates and investment rates is close to one (0.89). They conclude that this result is not consistent with perfect capital mobility. Mishkin analyzes real interest-rate differentials among seven developed counties for the period 1967 – 1979. He finds that there exist real interest-rate differentials across countries. Persistent differentials in real interest rates are also inconsistent with perfect capital mobility.

More recently, Feldstein and Bacchetta (1990) find that, while there is still a

positive correlation between savings rates and investment rates, the size of the correlation has decreased during the 1980s. This appears to be have been due to (1) the relaxation of explicit capital controls in some countries, (2) the ongoing integration of the world capital market, and (3) the vast increase in the borrowing needs of the United States. Nevertheless, the results of Feldstein and Bacchetta are still consistent with a substantial degree of international capital immobility. They find that, even in the 1980s, each additional dollar of domestic saving is associated with more than 50 cents of additional investment in the domestic economy. Frankel (1990) and Obstfeld (1993) provide reviews of the capital-immobility literature. Obstfeld concludes that "Capital mobility appears noticeably lower between industrial economies than it is within them, although intereconomy capital mobility certainly has increased over time..... It is doubtful that capital will ever be as mobile between nations as it can be within them. The mere existence of national governments sovereign within their borders means that no investor can think about domestic and foreign assets in quite the same way."[18]

Gordon and Bovenberg (1996) provide six possible explanations for the observed capital immobility: Existence of capital controls, high transaction costs, exchange-rate risk, fear of expropriation, asymmetric information across countries, and market power of large countries. And they argue that the most plausible explanation is asymmetric information between foreigners and domestic residents. They state this as follows:

> "Investors, by living and working in a particular country, know much more about the economic prospects of that country than they do about those in other countries. When foreigners try to acquire a firm in the country, they can easily end up being overcharged by domestic owners, who have access to better information not only

[18] Obstfeld (1993), pp. 66-67.

about that specific firm, but also about future government policies affecting the firm. When foreigners buy domestic inputs or services or pay domestic income taxes, their lack of information can again lead to overpayment. Foreigners' lack of knowledge can result also in a less efficient use of resources, due for example to their poorer ability to forecast market demand in a new setting or to deal with idiosyncratic aspects of the domestic contract law, the local distribution system and supply network, and local customs governing labor relations."[19]

Substitutability between direct investment and portfolio investment

The perfect-capital-mobility assumption of the asset competition view is a result of not distinguishing direct investment and portfolio investment. That is, the asset competition view regards direct investment as a perfect substitute for portfolio investment. However, the immediate or quick bid up for the tax-favored asset is possible only in the case of portfolio investment. It is generally accepted that portfolio investment is not a perfect substitute for FDI. Caves (1996) and Graham and Krugman (1995) list several reasons why direct investment is different from portfolio investment. First of all, the motivation of direct investment is different from that of portfolio investment. The primary motivation of FDI is to extend control over foreign businesses, because this extension of control can improve corporate strategic value in a variety of ways. The primary motivation of portfolio investment is simply to earn higher returns. In other words, portfolio investment pursues higher short-term returns, while direct investment is carried out pursuing long-term returns, including intangible benefits. Secondly, as Auerbach and Hassett (1993) point out, a significant portion of FDI is financed locally. If the motivation of FDI were simply the higher interest rate, FDI should not be financed

[19] Gordon and Bovenberg (1996), p. 1059.

locally. Thirdly, FDI among advanced countries typically moves in both directions across national boundaries. If FDI were merely designed to find a higher rate of return, then FDI should move unilaterally from a country with a lower rate of return to other countries with higher rates of return. Finally, shifting capital between direct investment and portfolio investment entails adjustment costs and time. Therefore, portfolio investment cannot be a perfect substitute for direct investment.

Capital mobility between physical assets and financial assets

Swenson (1994) assumes that the after-tax rate of return on physical assets and financial assets is always equal. In her own expression, the equality of $R_{US}(1-T_{US}) = RF$ always holds. But, this equation can only be satisfied under the equilibrium state after every adjustment process finishes, or under perfect mobility between physical assets and financial assets. In reality, the economy is not in an equilibrium state, even though it is always moving toward an equilibrium state. And as physical investment is not a perfect substitute for portfolio investment, capital is not so mobile between physical assets and financial assets.

3. Problems in the New View's Empirical Analysis

Even though the conclusion of the New View depends heavily on unrealistic assumptions, Swenson (1994) provides some estimation results supporting the argument of the New View. She gets a positive and significant FDI elasticity with respect to the

AETR. So, I try to replicate her estimation. By using a data set that is very similar to hers[20], I find a positive FDI elasticity with respect to the average effective corporate tax rate. However, the elasticity is much smaller than hers, and it is statistically insignificant. In addition, I find that there are some serious mistakes in her analysis that may make her results unreliable. One problem is that the average effective tax rate calculated by Tax Analysts is not an accurate estimate of the U.S. average effective corporate tax rate. That is, Tax Analysts' calculation of the average effective tax rate has some bias, and so it does not seem that Tax Analysts' average effective tax rate is a representative U.S. average tax rate. The other problem is that Swenson uses Tax Analysts' data very arbitrarily in her analysis. These points will be explained in depth below.

3.1. Problems of the Average Effective Tax Rates by Tax Analysts

Tax Analysts' main goal of their calculation of the AETR seems to be to calculate large U.S. firms' overall average effective tax rates. According to the methodology part of the book *Effective Corporate Tax Rates*, Tax Analysts selected 500 or 1,000 of the largest U.S. firms, ranked in terms of gross sales and assets, as their sample firms, and calculated overall U.S. average effective corporate tax rates for the years 1980 - 1989. In turn, Tax Analysts grouped these firms into from 54 to 91 industries[21], and calculated the average effective corporate tax rates for each industry.

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[20] Swenson's sample period is 1979-1991, and she says her data source is *Effective Corporate Tax Rates* by Tax Analysts (Swenson, 1994, pp. 254-255). But, I cannot get Tax Analysts' average effective tax rate data for the years of 1979, 1990, and 1991. According to Tax Analysts, they published six volumes of the book *Effective Corporate Tax Rates* and the books have the AETR data only for the years 1980-1989.

[21] 54 industries for the years 1980 – 1984, 91 industries in 1985, 84 industries in 1986, 83 industries in

The first problem of using Tax Analysts' AETR in FDI analysis lies in the fact that Tax Analysts' data are based on information in the financial statements of only the largest U.S. firms. Firms have a tendency to make their financial statements look good for a variety of reasons. And there is some evidence[22] that large firms engage in more deception. Therefore, it is difficult to say that the average effective tax rates calculated by using Tax Analysts' data are the representative average effective tax rates of the United States. Accordingly, the result from the estimation with biased data cannot be a reliable one. Figure 5 compares Tax Analysts' average effective corporate tax rates with Tax Foundation's average effective corporate tax rates[23]. It turns out that TA's average effective tax rates are substantially different from the average effective corporate tax rates calculated using more information.

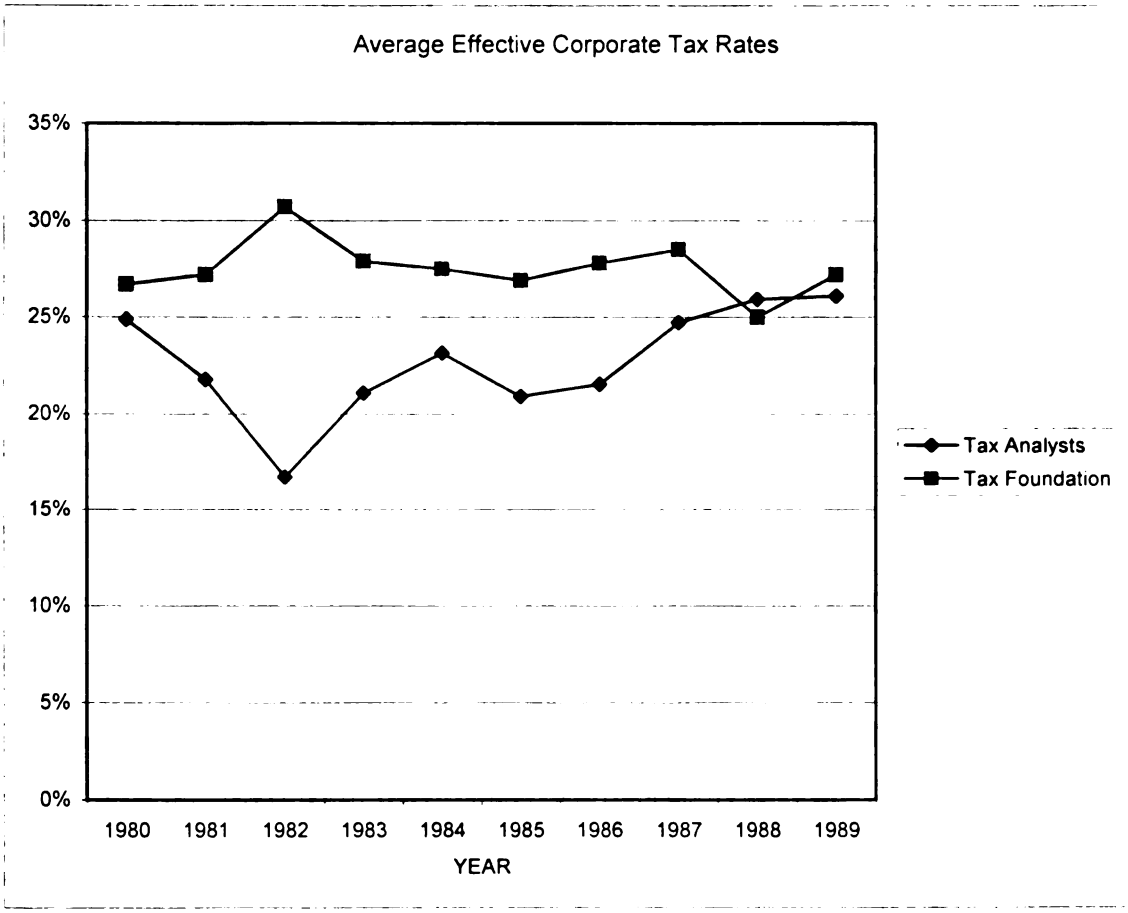
The second problem of Tax Analysts' estimates for the average effective tax rates is associated with the calculation of the average effective tax rates by industry. Tax Analysts' selected 500 or 1,000 largest U.S. firms and categorized them into 54 - 91 industries, according to the Standard Industrial Classification. This method may result in more biased estimates for the industry-level average effective tax rates, because some industries may include very few firms. If Tax Analysts' purpose of calculating AETR were a calculation of large firms' AETR for the selected industry, a more appropriate sampling method would be to select firms ranked in the top 20 or 30 percent in each industry.

1987 and 1988, and 74 industries in 1989.

[22] U.S. Department of Treasury (1999) and Manzon and Plesko (2001).

[23] Tax Foundation (1998) calculated the U.S. average effective tax rates by using Statistics of Income data (by IRS) for the years 1950-1994.

Figure 5. Comparison of the AETR of Tax Analysts and that of Tax Foundation



3.2. Problems of the Way the New View uses Tax Analysts' Data

Since the industry classification of Swenson (1994) is different from that of Tax Analysts, Swenson recalculates the average effective tax rates in the U.S. by using Tax Analysts' data. The only information about how Swenson estimates the average effective tax rates by using Tax Analysts' data is Table 3 in Swenson (1994), which compares the two-year average of the effective tax rate before the Tax Reform Act 1986 (TRA 1986, hereafter) and after TRA 1986. In order to find out how she uses Tax Analysts' data and check out whether my replication of her estimates for the AETR is correct, I try to reproduce her Table 3. Table 2 compares the numbers in Swenson's Table 3 and the replication results of my own. I can reproduce her Table 3 except for the 'petroleum industry', 'finance industry', and 'insurance industry'. That is, the results of reproduction are close for all industries except these three industries. She might have made errors in calculating the average effective corporate tax rates of these three industries. Table 2 simply indicates that I understand how Swenson estimates the average effective tax rates by using Tax Analysts' data.

By reproducing Swenson's Table 3, I find that she uses the AETR of a large-digit industry to represent that of a small-digit industry. That is, she uses the AETR of a subset of an industry to represent the AETR of the entire industry. In the case of the year 1988, the number of industries used in Swenson's analysis is 18, but that of Tax Analysts is 83. To calculate the AETR for each of the 18 industries, Swenson should have regrouped Tax Analysts' 83 industries into 18 industries, and then should have calculated the AETR for the small-digit industries using all of the information from the large-digit industries that are included in that small-digit industry. To make this point clearly, and to show how this

method distorts the AETR for each of the 18 industries, Table 3 is presented. Taking a look at the 'food industry' of Swenson's classification in Table 3, the 'food & kindred products' industry, 'miscellaneous food production' industry, 'dairy products' industry, 'meat products' industry, and 'beverages' industry of Tax Analysts' classification are included in the 'food industry'. The average tax rate of the entire food industry is 30.32%, but that of food & kindred products is 33.46%. That is, Swenson uses the AETR of the 'food & kindred' industry to represent that of the entire 'food' industry. The situation of other industries is the same as that of the 'food industry.'

Table 2. Replication Result of Swenson (1994)'s Table 3

	Table 3 in Swenson (1994)		Replication Results	
INDUSTRY	(84+85)/2	(87+88)/2	(84+85)/2	(87+88)/2
Mining	29.2	17.3	29.2	17.3
Petroleum	**45.9**	**35.9**	**16.3**	**26.0**
Food	27.3	32.8	27.3	32.8
Chemicals	21.2	28.2	21.2	28.2
Metals	30.9	32.5	28.0	32.5
Machinery (Non-electrical)	24.6	26.0	24.0	26.0
Machinery (Electrical)	28.0	30.0	27.4	30.0
Printing & Publishing	34.3	38.2	34.3	38.2
Rubber & Plastics	18.7	22.3	18.7	22.3
Stone, Clay, and Glass	27.3	30.6	27.3	30.6
Instruments	22.7	24.9	22.7	24.9
Wholesale trade	26.0	33.2	26.1	33.2
Retail trade	33.5	37.1	33.5	37.1
Banking	9.9	18.1	9.9	18.0
Finance	**16.0**	**19.4**	**17.7**	**16.2**
Insurance	**15.9**	19.4	**4.3**	19.4
Real estate	21.2	24.1	21.2	24.1
Services	30.4	31.4	30.4	31.4

Table 3. Illustration of Swenson's Calculation of the AETR for Each Industry

Swenson's 18 industries	Tax Analysts' 83 industries (in 1988)	AETR
Mining	**Mining(13)**	**0.1078**
	Oil and gas extraction (8)	0.469
	Total (21)	0.1299
Petroleum	Petroleum refining (26)	0.2702
Food	**Food & kindred products (7)**	**0.3346**
	Food production Miscellaneous (19)	0.2833
	Dairy products (4)	0.3806
	Meat products (10)	0.2877
	Beverages (7)	0.2801
	Total (47)	0.3032
Chemicals	**Chemicals (20)**	**0.29**
	Chemicals: Miscellaneous (21)	0.2499
	Drugs (17)	0.2634
	Soap and other detergents (12)	0.2555
	Total (70)	0.2715
Metals	**Metals: Fabricated (24)**	**0.3183**
	Metals: Primary (25)	0.2226
	Total (49)	0.2394
Non-electric	**Machinery and equipment: General industrial (12)**	**0.234**
Machinery	Machinery: Construction, mining, and materials handling (10)	0.2774
	Machinery: Special industrial (3)	0.3656
	Machinery and equipment: Metal working (3)	0.2464
	Engines and turbines (7)	0.2569
	Total (35)	0.2669
Electric	Electrical computing and office machines (22)	0.1047
Machinery	Electrical: Household appliances (2)	0.2716
	Electrical components and accessories (15)	0.3828
	Electrical and electronic machinery equipment, and supplies (8)	**0.2579**
	Electrical machinery, equipment, and supplies: Miscellaneous. (9)	0.1349
	Equipment-communication (19)	0.4235
	Total (75)	0.2366
Printing &	Printing: Commercial (9)	0.3486
Publishing	Publishing and printing-newspapers (13)	0.326
	Publishing and printing-periodicals and books (8)	**0.4023**
	Total (30)	0.3437
Rubber &	**Rubber (5)**	**0.2259**
Plastics	Plastics (6)	0.256
	Total (11)	0.2445

Table 3 (Cont'd).

Swenson's 18 industries	Tax Analysts' 83 industries (in 1988)	AETR
Stone, clay, and glass	Stone, clay, glass, and concrete products (13)	0.3416
Instruments	Measuring and controlling instruments (26)	0.201
Wholesale trade	**Durable goods (23)**	0.3076
	Nondurable goods: Drugs (4)	0.3754
	Nondurable goods: Miscellaneous (20)	0.3201
	Total (47)	0.3202
Retail trade	Apparel and accessory stores (11)	0.3171
	Building materials and hardware stores (5)	0.2808
	Department stores (9)	0.3138
	Drug stores (6)	0.4243
	Eating and drinking places (12)	0.3362
	Grocery stores (19)	0.2671
	Miscellaneous (14)	**0.3734**
	Variety stores (13)	0.3148
	Total (89)	0.3024
Banking	**Banking: National banks (50)**	**0.1608**
	Banking: State banks (40)	0.1889
	Total (90)	0.1704
Finance	Federal savings and loan (4)	0.4379
	Credit agencies: Other than banks (11)	0.2791
	Savings and loan holding companies (17)	0.2731
	Financial services (6)	0.2227
	Total (38)	0.2607
Insurance	Insurance (36)	0.2471
Real Estate	Real estate (7)	0.2316
Services	Services: Advertising agencies (3)	0.4133
	Services: Enginering and architectural (5)	0.3196
	Services: Personal (4)	0.3198
	Services: Computer and data processing (5)	0.1057
	Services: Health services (10)	0.305
	Services: Hotels and motels (2)	0.2589
	Services: Miscellaneous (12)	**0.3226**
	Services: Motion pictures (3)	0.3112
	Total (44)	0.2671

Foot notes) 1. Numbers in parentheses: number of sample firms.

2. Tax Analysts' industry in bold font: Swenson has this industry represent the entire industry.

3.3. Replication Results of Swenson's Estimation

Industry-level analysis

Table 4 compares my replication results of Swenson's industry-level estimation and Swenson's original estimation results. The first two columns present a part of the original estimation results of Swenson (1994, Table 4). These columns show that the magnitudes of the elasticities of the AETR are positive (around one: 0.75 – 1.13), and the elasticities are statistically significant. Because column two is Swenson's baseline specification, I reestimate a second column with data for the period of 1980 –1989[24].

Column three and column four report the replication result. The coefficients in column three are GLS estimates, and those in column four are OLS estimates with heteroskedasticity-robust t-value. In both columns, the estimated elasticities of FDI with respect to the AETR are positive, but they are very small and statistically insignificant. Since FDI in the U.S. might be affected by the U.S. business situation, U.S. real GDP might be thought to be a relevant control variable. And if U.S. real GDP is correlated

[24] The number of observations in Table 4 of Swenson (1994) is 229. Considering Swenson's industry classification (18 industries) and the period of analysis (13 years: 1979-1991), there must be 5 missing observations in her data set. However, I find that there are more than 5 missing observations. In early volumes of the *Survey of Current Business* (SCB for 1979, 1980, 1981, and 1982), there are only 13 industries that match with Swenson's 18 industries. And there are also some missing observations arising from data suppressions in the Survey of Current Business for the purpose of avoiding disclosure of data of individual companies. In addition to missing observations in the FDI data, there are also some missing observations in the AETR data. The AETRs calculated using Tax Analysts' data indicate that the Banking industry and the Insurance industry have negative tax rates for several years (early 1980s). Taking logarithm of the negative AETRs results in missing observations.

with one of the explanatory variables, omitting real U.S. GDP will cause biased estimates. Therefore, as Hartman (1984), Boskin and Gale (1987), and Young (1988) do, I try to add U.S. real GDP as a control variable. The fifth column shows the results of the estimation with U.S. real GDP. U.S. real GDP appears to have a strong explanatory power, and the FDI-elasticity with respect to the AETR becomes close to zero, and the statistical significance of the estimates is reduced greatly.

As mentioned in the previous section, Swenson uses the AETR of a large-digit industry to represent that of a small-digit industry. Common sense tells us to calculate the AETRs for each industry by using all data of the sample firms in each industry. Therefore, I correct the industry-level AETRs by dividing the U.S. taxes paid by firms in each industry by the net income of the firms in each industry. To see if the use of the corrected AETRs for each industry leads to the same result, I redo the estimation with the corrected AETRs. Column six and column seven show the reestimation results with these corrected AETRs. The FDI-elasticities with respect to the AETR are much smaller (almost zero) than those in columns three and four. The estimation results using the AETRs for each industry calculated more appropriately no longer support Swenson's conclusion. Column eight shows the results of the estimation with U.S. real GDP. Real U.S. GDP appears to have a strong explanatory power, and the AETR variable turns out to have no explanatory power.

In conclusion, Swenson's estimation suffers from the mismatching problem that the AETRs of the large-digit industry represent the small-digit industry. And her estimation results also might have the 'omitted variable bias.' I conclude that I cannot replicate Swenson's industry-level estimation with data the set available, and that it is hard to think of Swenson's estimation result as reliable.

Table 4. Replication result of Swenson's industry-level estimation

	Swenson (1994, Table 4)		Replicated			Corrected		
	GLS	GLS	GLS	OLS	OLS	GLS	OLS	OLS
log(AETR)	1.13 (3.26)	0.75 (2.30)	0.23 (0.93)	0.24 [0.93]	0.14 [0.56]	-0.02 (-0.13)	0.06 [0.23]	-0.03 [-0.13]
log(EX)	-1.38 (-2.38)	-1.42 (-3.01)	-1.82 (-5.13)	-1.79 [-4.22]	-1.28 [-2.83]	-1.96 (-5.50)	-1.95 [-5.15]	-1.38 [-3.19]
Time trend	0.08 (3.94)	0.08 (4.69)	0.16 (8.06)	0.15 [4.75]	-0.35 [-2.96]	0.17 (8.33)	0.16 [5.08]	-0.38 [-3.17]
Industry dummies	no	yes	yes	yes	yes	yes	yes	yes
log(GDP)	-	-	-	-	15.64 [4.36]	-	-	16.38 [4.73]
N	229	229	151	151	151	153	153	153
R-squared	0.16	0.45	-	0.55	0.59	-	0.55	0.60

* AETR and EX stand for the average effective tax rate and exchange rate, respectively.

** Number in ( ) is ordinary t-value and number in [ ] is heteroskedasticity-robust t-value.

Country-level analysis

Table 5 shows the replication result of Swenson's country-level analysis. The first column is a part of Swenson's (1994) Table 6, which is her baseline specification. The first column of Table 5 shows that, while the estimated FDI-elasticity with respect to the AETR for investors from worldwide countries is positive (2.99) and statistically significant, the elasticity for investors from territorial countries is close to zero (0.09) and statistically insignificant. The second column shows my replicated estimation results, which seem to support Swenson's results that worldwide investors respond positively to the U.S. effective corporate tax rate, but territorial investors do not respond to U.S. effective corporate tax rate.

However, it is hard to say that Swenson's estimation is reliable, even though Swenson's country-level estimation is qualitatively replicated. Since FDI in the U.S. might be affected by the U.S. business situation, U.S. real GDP might be thought to be a relevant control variable. And if U.S. real GDP is correlated with one of the explanatory variables, omitting U.S. real GDP will cause biased estimates. Therefore, I try to add U.S. real GDP as a control variable. The third column shows the results of the estimation with U.S. real GDP. Adding log(GDP) reduces the magnitudes of the FDI elasticities with respect to the AETR for both worldwide and territorial investors. The estimated FDI elasticity with respect to the AETR for worldwide investors is much smaller than before, and is now statistically insignificant. And the estimated FDI elasticity for territorial investors becomes negative, and is still statistically insignificant. On the other hand, U.S. real GDP itself appears to have a strong explanatory power.

In addition, as mentioned earlier, Swenson uses Tax Analysts' data in calculating the average effective tax rate. Tax Analysts' data are based on information in the financial statements of only the largest U.S. firms. Since there is some evidence that large firms engage in more deception, it is difficult to say that the average effective tax rates calculated by using Tax Analysts' data are the representative average effective tax rate of the United States. Accordingly, the results from the estimation with biased data cannot be considered to be reliable.

4. Summary

Theoretically, the prediction of the new view is based on two highly unrealistic assumptions: perfect capital mobility among countries, and perfect mobility between physical and financial assets. If these assumptions do not hold, it is not possible to derive the predictions that worldwide investors should respond positively to an increase in the U.S. tax rate, and that territorial investors should not respond to a change in the U.S. tax rate. Instead, what is generally observed and accepted in the related literature is far remote from these assumptions.

And empirically, there are some serious problems in the estimation process of the new view. The estimates for the average effective tax rates are not so reliable. An important control variable is missing. And the estimation results of the new view cannot be replicated.

In the following chapters, I analyze some issues regarding the relationship between FDI in the U.S. and the U.S. effective corporate tax rate, with more appropriate estimates for the average effective tax rate and more appropriate econometric models.

Table 5. Replication result of Swenson's country-level analysis

	Swenson (1994, Table 6)	Replicated	
log(WWTAX)	2.99 (2.66)	3.83 (2.57)	1.56 (0.87)
log(TTAX)	0.09 (0.09)	1.16 (1.05)	-1.11 (-0.73)
log(EX)	-0.39 (-1.42)	-1.75 (-2.70)	-1.71 (-2.73)
Time trend	yes	yes	yes
Country dummies	yes	yes	yes
log(GDP)	-	-	19.41 (2.12)
N	69	57	57
R-squared	0.36	0.66	0.69

* WWTAX, TTAX, and EX stand for the average effective tax rate for worldwide worldwide investors, that for territorial investors, and exchange rate, respectively.

** Number in ( ) is t-statistics.

CHAPTER IV

OVERALL U.S. TAX EFFECT ON FDI

1. Tax Consequences of the U.S. Source Income of Foreign Investors

According to the definition of foreign direct investment in Chapter 1, a foreign person's establishment of an unincorporated branch (same legal entity as the parent firm) and investment in a U.S. corporation (separate legal entity) are both considered FDI in the United States. The U.S. tax treatment of dividends and branch income is determined by the *U.S. source of income rule* (Internal Revenue Code, section 861 - section 865) and the bilateral income-tax treaty between the U.S. and the foreign investor's home country.

According to the *U.S. source of income rule*, the source of dividend income is determined by the residence of the corporation paying the dividends. And the residence is determined by the corporation's country of incorporation. Therefore, a U.S. corporation owned by foreign persons is subject to U.S. corporate income tax on its net income, and in addition, the dividend income of the U.S. corporation is subject to flat 30% withholding tax when dividends are repatriated. Usually, the withholding tax rate is reduced to 0% - 15% by income tax treaties. For example, without treaty provisions, the U.S. dividend income of a Canadian firm is subject to 30% withholding tax, but the U.S.-Canada Income Tax Treaty reduces this rate to 5%[25].

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[25] Protocol Amending the Convention Between the United States of America and Canada With Respect to Taxes on Income and on Capital, Article 5.

Business profits of a U.S. branch are considered *effectively connected income*[26]. Therefore, they are subject to U.S. corporate income tax, but not subject to withholding tax. To equalize the tax treatment of foreign corporations operating through a U.S. branch and those operating through a U.S. subsidiary, TRA 1986 introduced a new branch profits tax, which imposes a 30% tax on the repatriated profits of a U.S. branch of a foreign corporation[27].

Therefore, the tax burden on the U.S. income of a foreign investor depends on the rates of U.S. corporate income tax and withholding tax (or branch profits tax). However, for simplicity, I ignore withholding taxes, as the previous studies do[28].

2. Empirical Model Specification

In this section, I introduce an econometric model that is designed to explain *overall* FDI in the United States. Thus, at this stage, all FDI are considered together, regardless of whether the FDI is in the form of an acquisition or an establishment, and regardless of whether the investment originates in a worldwide country or a territorial country. In later chapters, we will consider separate estimation for different categories of FDI.

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[26] A foreign person's U.S. income that is "effectively connected" with the conduct of a trade or business in the United States is subject to U.S. net-basis taxation. For more details, see U.S. Joint Committee on Taxation (1999).

[27] Slemrod (1990b), p.178.

[28] For example, Hartman (1984) argues that he ignores withholding taxes because they are relatively constant over time.

For the estimation of the overall tax effect on FDI in the U.S., I use the following specification.

(1) $log(FDI_{it}) = a_0 + a_1\, log(ETR_{it}) + a_2\, log(BCA_t) + a_3\, log(GDP_t) + \sum a_i\, d_i + u_{it}$,

where

FDI_{it} = total foreign direct investment of industry i in year t,

ETR_{it} = effective tax rate of industry i in year t,

BCA_t = balance on current account in year t,

GDP_t = U.S. real GDP in year t,

d_i = industry dummy,

u_{it} = error term.

The dependent variable is the log of foreign direct investment, and the main independent variable is the log of the effective tax rates. In general, when a variable is a positive dollar amount, the log is often taken. And when a variable is a proportion or a percent, there is a tendency to use them in level form[29]. But I make the independent variable (ETR: the effective tax rate) appear in logarithmic form, because the double-log specification has a nice property (the coefficient of the independent variable in the double-log model is an elasticity). I test whether the independent variable should take the logarithmic form or the level form using the *Davidson-MacKinnon test*[30]. The result of the *Davidson-MacKinnon test* suggests that the ETR can take either the logarithmic form or the level form. The coefficient a_1 in the above model is the elasticity of foreign direct

[29] Wooldridge (2000), p. 185.

[30] Wooldridge (2000), pp. 283-284.

investment with respect to the effective tax rate. I use both the average effective tax rate and the marginal effective tax rate as the independent variable, to see which effective tax rate measure has a better explanatory power in explaining foreign direct investment behavior. The rationales for the control variables are as follows:

(a) Real U.S. GDP: Foreign direct investment in the U.S. may be influenced by U.S. economic conditions, and the economic conditions are measured by U.S. GDP. Therefore, I enter real U.S. GDP as a control variable. Econometrically, if U.S. GDP has some correlation with one of the explanatory variables, and if it has an effect on dependent variable (FDI), omitting the GDP variable will cause biased estimates. Hartman (1984), Boskin and Gale (1987), and Young (1988) also include a measure of aggregate economic activity in the U.S. as a control variable in their models,[31] although they use *nominal* GNP. While they use nominal GNP, I use real GDP as the output variable. In the double-log specification, entering nominal variables instead of real variables in both the right-hand side and the left-hand side is the same as assuming that the price level is uncorrelated with the nominal variable on the right-hand side. I test for the correlation by including the log of the GDP-deflator in the double-log specification with the variable defined in nominal terms. It turns out that the price level is correlated with nominal GDP. Therefore, using the double-log specification with nominal FDI as the left-hand side variable and nominal GDP as the right-hand side variable causes the "omitted variable bias."

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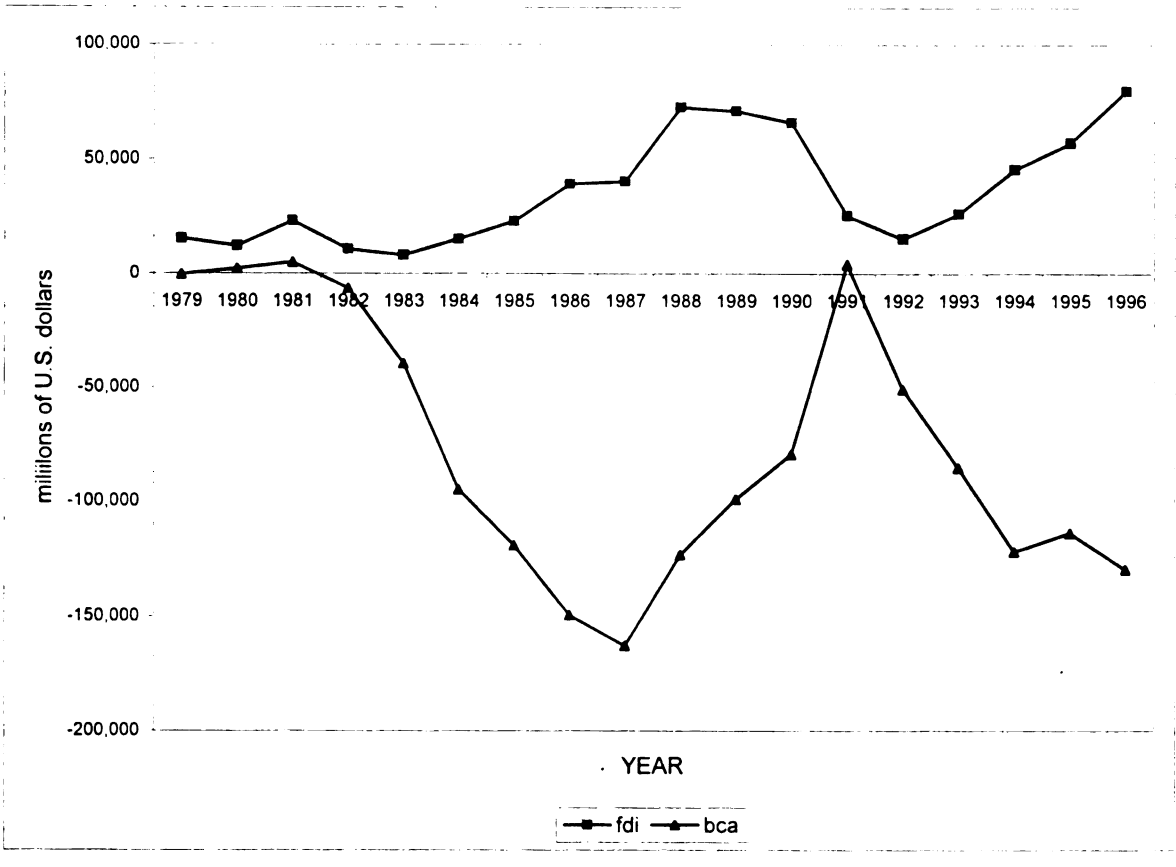
[31] Hartman (1984) and Boskin and Gale (1987) use log(FDI/GNP) as dependent variable in their models. This is equivalent to including log(GNP) as an independent variable, with a fixed coefficient of 1.

(b) U.S. balance on current account: Figure 6 compares the trend of FDI in the U.S. and that of the U.S. balance on current account, during the 1979 – 1996 period. These trends suggest that a surge in FDI in the U.S. approximately coincides with a surge in the U.S. current-account deficit. This implies that foreign multinational companies invest a part of the surplus from trade with the U.S. in purchasing U.S. firms and establishing U.S. subsidiaries. In other words, FDI in the U.S. may have a negative relationship with the U.S. current account balance. Therefore, I include the U.S. balance on current account as a control variable.

(c) Industry dummies: There are many industry-specific factors, such as the capital-labor ratio, entry barriers, the market growth rate, and economies of scale, that determine the characteristics of an industry. These factors differ among industries, and they may influence the FDI. To control for these industry-specific factors that affect foreign direct investment, I include industry dummies.

Figure 6. FDI in the U.S. and the U.S. balance on Current Account: 1979 – 1996.



Sources: *Economic Report of the President* and *Survey of Current Business*.

* 'fdi' and 'bca' stand for FDI in the U.S. and the U.S. balance on current account, respectively.

3. Data.

For the estimation of the overall tax effect on FDI, annual data on foreign direct investment are needed. Earlier studies that use the *capital flow data* analyze the overall tax effect on FDI with annual FDI data. However, the *acquisition and establishment data* by the BEA that I use are only available since 1979, so I cannot get a sufficiently large number of observations. To avoid the problem from small number of observations, I disaggregate the annual FDI data by four industries: manufacturing, trade, finance and services, and other industries[32]. Table 6 shows FDI (the acquisition and establishment) data for the four industries.

Table 7 and Table 8 show my calculation of the average effective tax rates and the marginal effective tax rates for the four industries[33]. The methodology and the data sources for my calculation of the average effective tax rates are provided in Chapter 2, and those for my calculation of the marginal effective tax rate are provided in Chapter 2 and an appendix.

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[32] I calculate the average effective tax rates on the basis of corporate income tax return data in *Statistics of Income* (SOI) *Bulletin* published by the Internal Revenue Service. So, my industry classification is restricted by the industry classification of the SOI Bulletin (eight industries: Agriculture-Forestry-Fishing, Mining, Construction, Manufacturing, Transportation and Public Utilities, Wholesale and Retail Trade, Finance-Insurance-Real Estate, and Services). In addition, the FDI data in the *Survey of Current Business* have some data suppressions to avoid disclosure of data of individual companies. Therefore, to avoid losing too much information, I consolidate some industries into one industry. The four industries are (1) manufacturing, (2) trade, (3) services and FIRE (finance, insurance, and real estate), and (4) other industries.

[33] Table 8 shows that the marginal effective corporate tax rates do not vary much among industries after 1987. This is because the marginal effective tax rate for equipment and that for structures are almost same after 1987.

Table 6. FDI in the U.S. by Industry: 1979-1996 (millions of U.S. dollars)

Year	Manufacturing	Wholesale & Retail Trade	FIRE & Services	Others	All Industries
1979	4,170	890	NA	NA	15,317
1980	3,629	1,221	NA	NA	12,172
1981	8,074	859	NA	NA	23,219
1982	2,379	1,146	4,974	2,318	10,817
1983	3,113	293	3,995	690	8,091
1984	3,106	1,994	5,099	4,998	15,197
1985	12,140	2,021	4,925	4,020	23,106
1986	16,772	6,889	13,184	2,333	39,177
1987	19,751	2,483	15,088	2,988	40,310
1988	36,136	10,476	17,742	8,337	72,692
1989	35,958	4,495	22,932	7,776	71,163
1990	23,898	2,926	32,251	6,857	65,932
1991	11,461	2,228	10,862	986	25,538
1992	6,014	954	5,801	2,564	15,333
1993	11,090	2,332	9,707	3,100	26,229
1994	21,218	3,698	14,481	6,229	45,626
1995	26,643	4,006	19,669	6,879	57,195
1996	27,835	7,734	34,775	9,587	79,929

Source: *Survey of Current Business.*

Table 7. Average Effective Tax Rates by Industry: 1979-1996

Year	Industry			
	Manufacturing	Trade	FIRE & Services	Others
1979	0.2681	0.2677	0.2656	0.1195
1980	0.2602	0.2754	0.2496	0.2783
1981	0.2579	0.3086	0.2600	0.3117
1982	0.3514	0.3313	0.2797	0.3865
1983	0.2573	0.3031	0.2219	0.4128
1984	0.2510	0.2955	0.2524	0.3676
1985	0.2231	0.4044	0.2034	0.4097
1986	0.2530	0.4343	0.1727	0.5606
1987	0.2340	0.3679	0.2127	0.3822
1988	0.2043	0.2927	0.2172	0.2815
1989	0.2159	0.3505	0.2091	0.3697
1990	0.2274	0.4192	0.2083	0.4044
1991	0.2427	0.4012	0.2190	0.3926
1992	0.2287	0.3182	0.2178	0.3773
1993	0.2198	0.3048	0.2137	0.3356
1994	0.2248	0.2633	0.2075	0.3031
1995	0.2081	0.2907	0.1583	0.3058
1996	0.2058	0.2826	0.1759	0.2945

Source: Text.

Table 8. Marginal Effective Tax Rates by Industry: 1979-1996

Year	Industry			
	Manufacturing	Trade	FIRE & Services	Others
1979	0.3668	0.4114	0.3996	0.3898
1980	0.4109	0.4437	0.4351	0.4279
1981	0.3293	0.3709	0.3600	0.3508
1982	0.3579	0.3910	0.3823	0.3750
1983	0.3195	0.3610	0.3501	0.3409
1984	0.3247	0.3657	0.3549	0.3459
1985	0.3120	0.3569	0.3451	0.3352
1986	0.2825	0.3358	0.3217	0.3100
1987	0.3223	0.3217	0.3219	0.3220
1988	0.3263	0.3252	0.3255	0.3258
1989	0.3350	0.3325	0.3332	0.3337
1990	0.3256	0.3245	0.3248	0.3251
1991	0.3279	0.3267	0.3270	0.3273
1992	0.3237	0.3229	0.3231	0.3233
1993	0.3407	0.3413	0.3411	0.3410
1994	0.3364	0.3376	0.3372	0.3370
1995	0.3412	0.3417	0.3416	0.3415
1996	0.3332	0.3348	0.3344	0.3341

Source: Text.

4. Estimation Results

Because my data set has a cross-sectional component (4 industries) and a time-series component (18 years), I test for heteroskedasticity and serial correlation. I use the *Breusch-Pagan test* to test for heteroskedasticity[34], and the *AR(1) serial correlation test*[35] to test for autocorrelation.

In the case of the regression of FDI on the average effective tax rate and other variables (equation (1) in section 2 in this chapter), I cannot reject either the homoskedasticity assumption or the assumption of no serial correlation at the 10% significance level. In the case of the regression of FDI on the marginal effective tax rate and other variables, I cannot reject either the homoskedasticity assumption or the assumption of no serial correlation at the 10% significance level. Table 9 summarizes the test results.

Table 9. Test Results (total FDI on measures of the effective tax rate)

Dependent Variable	Tax-rate Measure	Heteroskedasticity		Autocorrelation		
			p-value*		AR(1)**	*p*-value***
log(FDI)	AETR	No	0.73	No	0.19	0.13
	METR	No	0.11	No	0.18	0.16

* p-value of LM statistic

** estimate for the coefficient of AR(1) model

***p-value of *t* statistic

[34] For the methods for testing for heteroskedasticity, see Wooldridge (2000), pp. 255-261.

[35] For the methods for testing for serial correlation, see Wooldridge (2000), pp. 380-387.

Table 10 reports the results of the regressions of FDI on the average effective tax rate and other variables. Adding log(GDP) to the regression (column 2) reduces the tax elasticity to -0.74 and its significance level significantly to –1.26. And log(GDP) turns out to have a significant effect on log(FDI). This suggests that log(GDP) is a relevant control variable. Foreign investors appear to increase their direct investment in the U.S. when the U.S. economic situation is good and the GDP elasticity is about 2.5. Adding log(BCA)[36] to the regression (column 3) increases the tax elasticity slightly to –0.85 and its significance level to –1.45. And log(BCA) itself has a negative and statistically significant effect on log(FDI). This suggests that log(BCA) is also a relevant control variable. Foreign investors appear to decrease their direct investment in the U.S. as the U.S. current account balance improves. The specification in column four includes log(EX)[37] as a control variable. The log(EX) does not make any difference. When log(EX) is introduced, the coefficients and t-values of the other variables remain almost the same.

Column five and column six show the estimation results when the exchange rate, instead of the balance on current account, is controlled for. The exchange rate seems to have a negative effect on FDI (column 5). However, after including log(GDP) as an explanatory variable, the negative effect of the exchange rate on FDI is significantly

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[36] 'BCA' stands for balance on current account. The balance on current account is actually positive in some years, and negative in others. To take the logarithm of the balance on current account, it is needed to make the smallest value of each year's balance on current account have a value of one. I add a constant of $195,818 (millions of U.S. dollars) to each year's balance on current account. Therefore, the estimated coefficients need to be interpreted with care. Hartman (1984), Boskin and Gale (1987), Young (1988), and Slemrod (1990) also use this transformation method.

[37] 'EX' stands for the trade-weighted exchange rate.

diluted. The sign of the coefficient is changed and its t-value is reduced quite significantly. And comparing the R-squareds in column two and column six, it is difficult to say that the log(EX) is a relevant control variable.

According to my baseline specification (column 3), the elasticity of total FDI with respect to the average effective tax rate is –0.85. This estimate is not statistically significant at the 5% or the 10% significance level, but it is marginally significant at the 15% level (p-value: 0.15). And the estimation result tells that the sign of the FDI elasticity with respect to the AETR is not positive at the 10% significance level. The 10% critical value for a one-tailed test with 60 degrees of freedom is -1.296. The t-value of the FDI elasticity with respect to the AETR is –1.45. Therefore, the hypothesis that the FDI elasticity with respect to the AETR has a positive sign can be rejected at the 10% significance level.

These results are consistent with the traditional view that foreign investors tend to undertake investment in the location with the higher after-tax rate of return. And these results are exactly opposite to those of Swenson (1994). She finds a positive and statistically significant effect of the average tax rate on foreign direct investment.

Table 10. FDI by Industry and the Average Effective Tax Rate*

Independent Variables	Dependent Variable: log of total FDI (in 1992 dollars)					
	(1)	(2)	(3)	(4)	(5)	(6)
log(AETR)	-1.74 (-2.94)	-0.74 (-1.26)	-0.85 (-1.45)	-0.87 (-1.46)	-1.33 (-2.13)	-0.76 (-1.26)
log(GDP)	_	2.62 (3.89)	2.56 (3.88)	2.67 (3.37)	_	2.71 (3.35)
log(BCA)**	_	_	-0.05 (-1.90)	-0.05 (-1.89)	_	_
log(EX)	_	_	_	0.18 (0.28)	-1.09 (-1.80)	0.14 (0.21)
industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.5516	0.6421	0.6627	0.6632	0.5745	0.6424
# of Obs.	66	66	66	66	66	66

* The number in ( ) is the OLS *t* value.

AETR, BCA, and EX stand for the average effective tax rate, the balance on current account, and the trade-weighted exchange rate, respectively.

** log(BCA)=log(195,818+balance on current account).

To see which effective tax rate is a better explanatory variable for FDI behavior, I replace the AETR with the METR. Table 11 presents the results of the regressions of FDI on the marginal effective tax rate and other variables. As with the results from the regressions with the average effective tax rate, adding log(GDP) and log(BCA) to the regression (column 2 and 3) reduces the absolute values of the FDI elasticities with respect to the METR and their significance levels quite substantially. In fact, when both log(GDP) and log(BCA) are added, the METR variable has wrong sign. Whenever log(GDP) is included in the regression, the METR has a very small t-statistics. Therefore, it is impossible to say that the marginal effective tax rate has an important role in explaining the FDI behavior. These results suggest that the average effective tax rate is a better measure of tax burden than the marginal effective tax rate in explaining the variation of total foreign direct investment. The reason why the marginal effective tax rate is not a good explanatory variable for foreign direct investment will be addressed in Chapter 6.

The specification in column four includes log(EX) as a control variable. The log(EX) does not make any difference. The coefficients and t-values of the other variables remain almost the same as they were when log(EX) was not included. This is the same as the result from the regressions of FDI on the AETR and other variables. Column five and column six show the estimation results when the exchange rate, instead of balance on current account, is controlled. The exchange rate seems to have a negative effect on FDI (column 5). However, after including log(GDP) as an explanatory variable, the negative effect of the exchange rate on FDI is greatly diluted. And comparing the R-squareds in column two and column six, it is difficult to say that the log(EX) is a relevant control variable. These results are the same as the regression results with the AETR.

Table 11. FDI by Industry and the Marginal Effective Tax Rate*

Independent Variables	Dependent Variable: log of total FDI (in 1992 dollars)					
	(1)	(2)	(3)	(4)	(5)	(6)
log(METR)	-3.50 (-2.65)	-0.63 (-0.45)	0.27 (0.18)	0.36 (0.22)	-3.18 (-2.51)	-0.69 (-0.47)
log(GDP)	_	2.81 (3.90)	3.05 (4.22)	3.14 (3.16)	_	2.73 (2.79)
log(BCA)**	_	_	-0.05 (-1.70)	-0.05 (-1.68)	_	_
log(EX)	_	_	_	0.10 (0.14)	-1.43 (-2.55)	-0.09 (-0.13)
industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.5409	0.6340	0.6510	0.6511	0.5858	0.6341
# of Obs.	66	66	66	66	66	66

* The number in ( ) is the OLS *t* value.

METR, BCA, and EX stand for the marginal effective tax rate,

the balance on current account, and the trade-weighted exchange rate, respectively.

** log(BCA)=log(195,818+balance on current account).

CHAPTER V

FDI IN THE U. S.
AND THE INTERNATIONAL TAX SYSTEM
OF THE INVESTOR COUNTRY

1. Overview of the International Taxation System[38]

International transactions, by their nature, entail a double-taxation problem that could result in a heavy tax burden for multinational enterprises. In general, there are two different approaches to avoiding the double-taxation problem. Some countries, such as the United States, the United Kingdom, Japan, and Italy, adopt the *worldwide* (or *residence-based*) system. Under the *worldwide system*, the home-country government taxes the worldwide income of its residents, and then allows a credit for foreign taxes paid on foreign-source income. The *worldwide system* is based on the principle that a tax system should not distort the investment location decision of a home-country firm (*capital export neutrality*). Other countries, such as France and the Netherlands, adopt the *territorial* (or *source-based*) system. Under the *territorial system*, the home-country government taxes only home-country-source income, and foreign-source income is exempt from the home-country taxation. The *territorial system* is based on the principle that there should be no discrimination within a country between domestic and foreign

[38] For more details, see Ballard (1999).

investors, or between foreign investors from different countries (*capital import neutrality*). In the case of Canada and Germany, by statute, they adopt a worldwide system. However, by income tax treaty with the United States, Canada and Germany exempt U.S.-source income from its domestic taxation.[39] Thus, Canada and Germany are considered to have a territorial system, from the perspective of foreign direct investment in the U.S.

2. The Response of FDI in the U.S. to the International Tax Regime

The effect of a host country's tax rate on inward foreign direct investment depends on the tax system of the foreign investor's home country. For example, when the home country of the foreign investor has a *territorial system*, the effective corporate tax rate on FDI is equal to the tax rate imposed by the host country, because multinationals do not pay taxes on foreign-source income to the home-country government. Therefore, differences among host-country effective tax rates would be expected to have an effect on the investment location decisions of firms from territorial tax countries. The effect of the host country's tax rate would be expected to have less influence on foreign investment from countries that have a *worldwide system* with a foreign tax credit. In a simple case without *deferral*[40], if the host country's tax rate is less than the home country's tax rate,

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[39] Slemrod (1990b), p.179.

[40] Under the worldwide system, a subsidiary's profits are typically not taxed until they are repatriated to its parent firm, whereas a branch's profits are taxed as they accrue. This is called *deferral*. Deferral in the worldwide system gives firms an incentive to accumulate profits in low-tax countries, rather than to repatriate them to its home country. For more details, see Alworth (1988), Altshuler and Newlon (1993),

the effective tax rate on FDI is the home country's, but if the host country's tax rate is higher than the home country's tax rate (the firm is in *excess-foreign-tax-credit position*), the effective tax rate on FDI is the host country's. Therefore, for firms from a worldwide tax regime, the effect of the host country's tax system is filtered through the tax system of the home country, and may be substantially mitigated. Table 12 summarizes the relationship between the home-country tax system and the after-tax return on U.S. investments.

Table 12. Home Country's International Tax System and After-tax Return

Home country's international tax system	After-tax return on U.S. investments
Territorial	$R_{US}(1-T_{US})$
Worldwide	$R_{US}(1-T_{US}) + R_{US}(T_{US} - T_H) = R_{US}(1-T_H)$ if $T_{US} < T_H$ $R_{US}(1-T_{US})$ if $T_{US} > T_H$

3. Empirical Results of Previous Studies

According to the traditional view, it is expected that investment by *territorial firms* would respond negatively to an increase in the U.S. tax rate, and that FDI from *worldwide countries* should be insensitive to U.S. tax rates, or less sensitive to U.S. tax rates than FDI from *territorial countries*. On the contrary, the New View (associated with

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Altshuler, Newlon, and Randolph (1995), and Hines and Hubbard (1990).

Scholes and Wolfson (1990)) argues that *worldwide* investors should respond positively to the U.S. tax rate, while *territorial* investors should not be sensitive to the U.S. tax rate.

Slemrod (1990) analyzes the effect of the home-country tax system on FDI in the U.S. He uses the *capital-flow data* for four *territorial countries* and three *worldwide countries*. He finds a significantly negative effect of U.S. taxes on FDI from only two countries (France, Germany) out of four territorial countries, and from only two countries (Japan, and the U.K) out of three worldwide countries. In addition, he does not find any support for the prediction that FDI from *territorial countries* should be more sensitive to U.S. tax rates than FDI from *worldwide countries*. Slemrod interprets these results as meaning that, because multinationals take full advantage of deferral and sophisticated accounting and financial strategies, the home country's system of alleviating double taxation is not an important determinant of FDI.

Swenson (1994) uses the *acquisition-and-establishment data* for manufacturing-sector FDI from four territorial countries and two worldwide countries. She finds a positive and significant effect of U.S. taxes on FDI from worldwide countries. However, in the case of territorial countries, the tax effect is much smaller than it is for the worldwide investors, and it is rarely significant. These results conform to the prediction of Scholes and Wolfson (1992) that *worldwide* investors respond positively to the host-country tax rate, while *territorial* investors are not sensitive to the host-country tax rate.

While Slemrod does not find any significant effect of the home-country tax system with the *capital flow* data, Swenson finds significant results supporting the argument of Scholes and Wolfson (1992) with *acquisition and establishment* data. This chapter investigates the effect of the home-country tax system on FDI in the U.S. with *acquisition*

and establishment data and with the average effective tax rate, which is different from that used by Swenson.

4. Model Specification and Data

For the estimation of the effect of foreign investor country's double-taxation-relief system on FDI in the U.S., I use the following specification.

(2) $log(FDI_{ct}) = a_0 + a_1 log(ETR_t) + a_2 log(GDP_t) + a_3 log(BCA_{ct}) + \sum a_c d_c + u_{ct}$,

where

FDI_{ct} = foreign direct investment of country c in year t,

ETR_t = effective tax rate in year t,

BCA_{ct} = U.S. balance on current account with country c in year t,

GDP_t = U.S. real GDP in year t,

d_c = country dummy,

u_{ct} = error term.

The dependent variable is the log of FDI of country c in year t, and the main independent variable is the log of the effective tax rate in year t. The rationales for the control variables are the same as those in the previous chapter, except for the country dummies. Country-specific factors, such as differences in language, differences in geographical location, and cultural affinity, might have an influence on the communication and information cost and the transaction cost of FDI. To control for these

country-specific factors, I include the country dummies.

The data used in this chapter are slightly different from those used in the previous chapter. While the dependent variable in Chapter 4 was total outlays of FDI disaggregated by industry, it is total outlays of FDI from seven major investor countries in this chapter. The outlays of FDI by the seven major investor countries ($\sum FDI_c$) account for about 70-80% of total FDI ($\sum FDI_i$). Table 13 shows the acquisition and establishment FDI in the U.S. for seven investor countries.

I use the annual average and marginal effective tax rates for all industries as the tax variable. Figure 7 presents my calculation of the annual average and marginal effective corporate tax rates of the U.S. I provide the methodology and the data sources in Chapter 2 and an appendix.

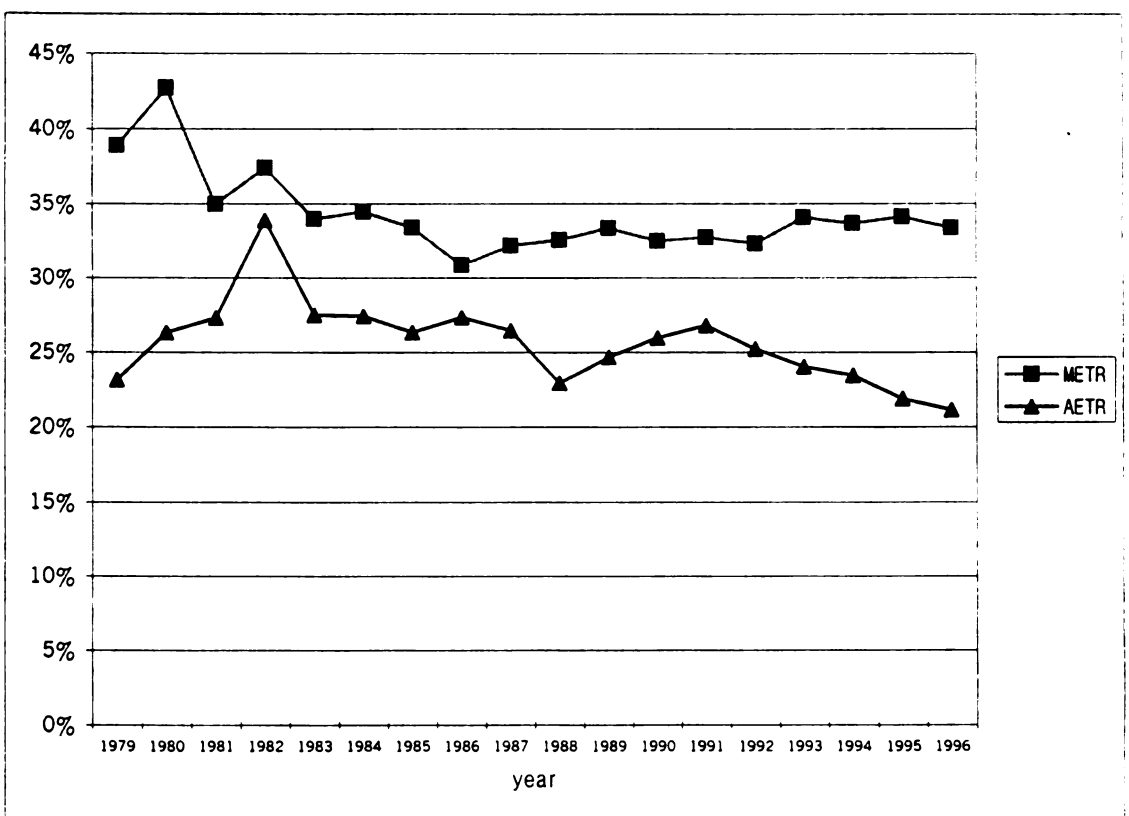
For the estimation of equation (2), I use the U.S. balance on current account with each foreign investor country, instead of total U.S. balance on current account. The historical data on the U.S. balance on current account with major trade-partner countries are downloadable from the home page of the Bureau of Economic Analysis. Figure 8 shows the movements of the U.S. balance on current account with the seven major investor countries, along with FDI from the countries.

Table 13. FDI in the U.S. by Major Investor Countries: 1979-1996 (millions of dollars)

Year	Territorial Countries				Worldwide Countries		
	Canada	France	Germany	Netherlands	U.K.	Japan	Italy
1979	1,414	262	2,436	4,955	2,511	257	NA
1980	1,956	600	1,424	1,650	3,066	596	97
1981	6,084	903	1,149	572	6,178	616	NA
1982	1,196	455	601	330	3,128	587	213
1983	1,072	295	584	492	2,366	392	NA
1984	2,587	330	685	562	3,714	1,806	45
1985	2,914	754	2,270	771	6,732	1,152	NA
1986	6,503	2,491	1,351	4,700	8,572	5,416	166
1987	1,276	2,044	4,664	391	15,142	7,006	268
1988	11,360	4,199	2,090	2,214	22,559	16,188	313
1989	4,403	3,469	2,435	3,629	23,047	17,410	436
1990	3,430	10,217	2,363	2,247	13,096	19,933	1,786
1991	3,454	4,976	1,922	1,661	2,169	5,357	435
1992	1,351	406	1,964	1,331	2,255	2,921	228
1993	3,797	1,249	2,841	2,074	8,238	2,065	375
1994	4,128	1,404	3,328	1,537	17,261	2,715	412
1995	8,029	1,129	13,117	1,061	9,094	3,602	NA
1996	9,700	6,021	12,858	6,476	14,757	8,813	NA

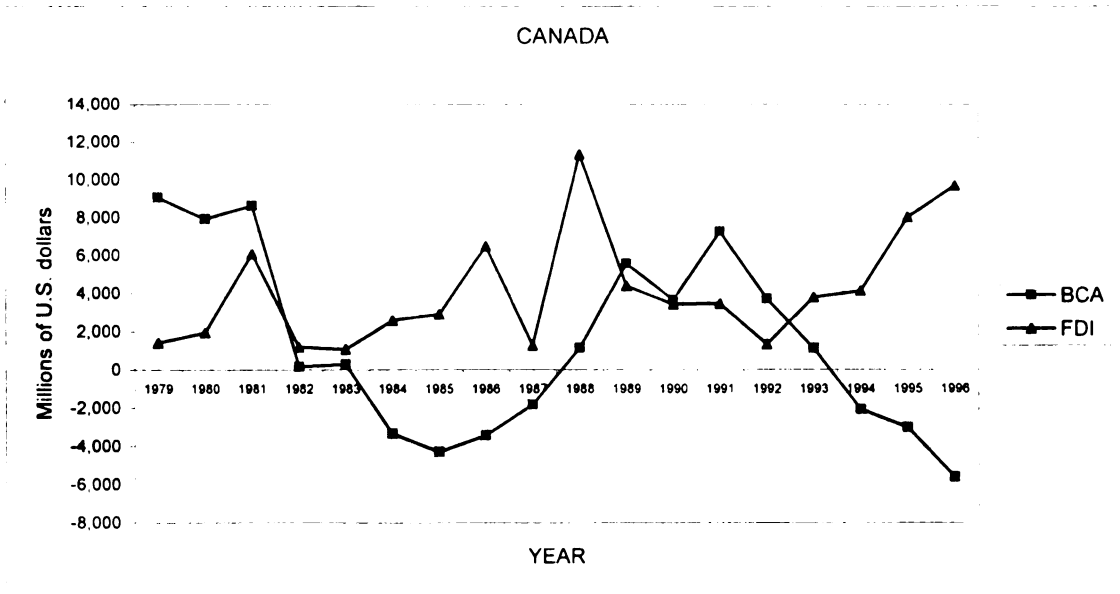
Source: *Survey of Current Business*, various issues.

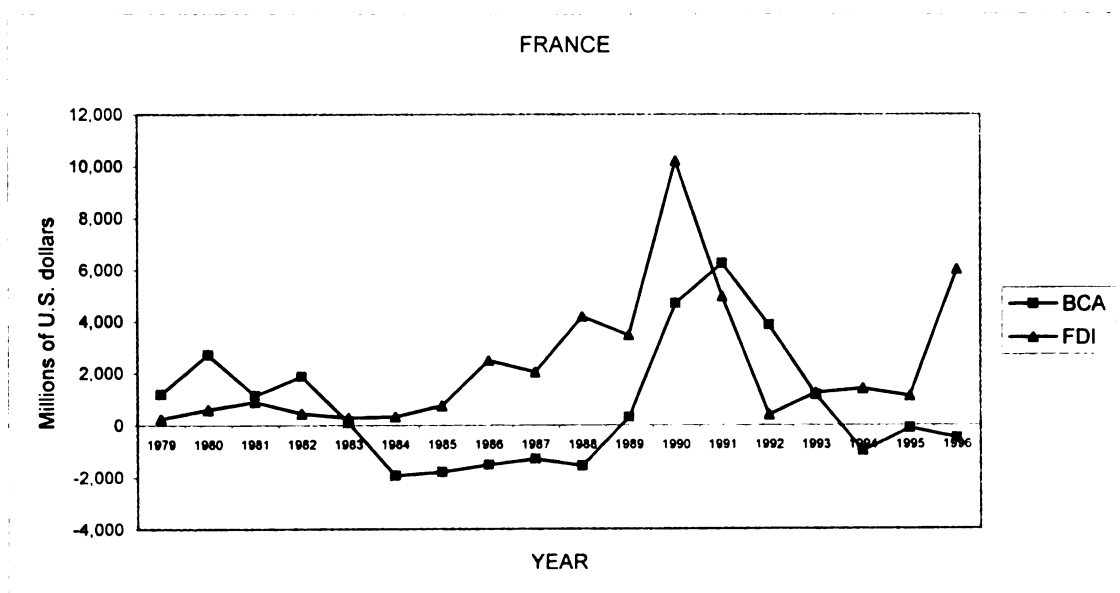
Figure 7. Effective Corporate Tax Rates in the U.S.: 1979 - 1996

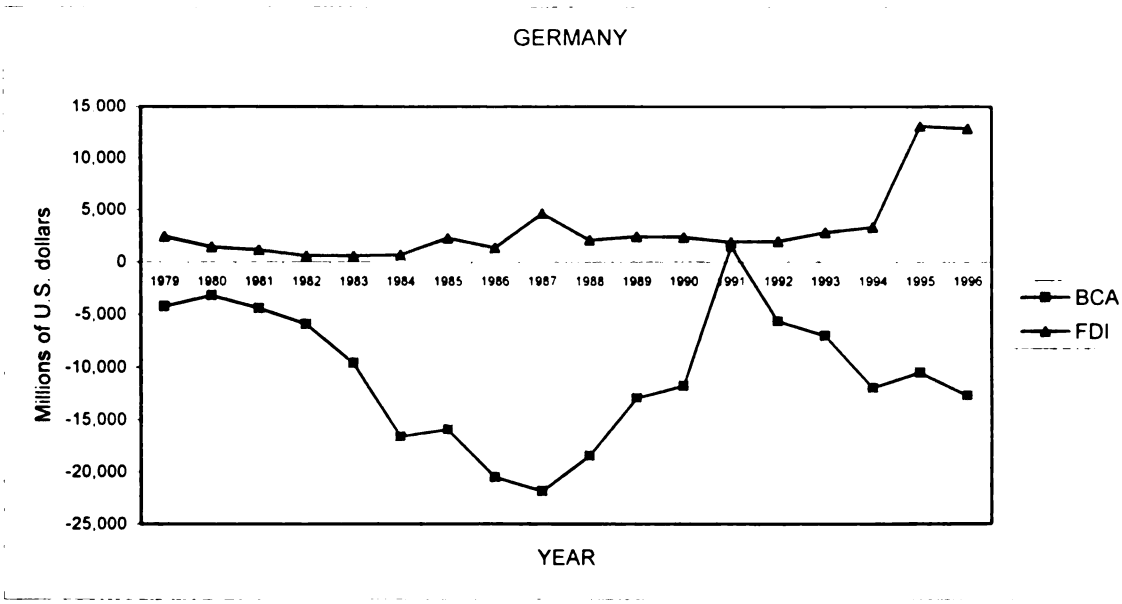


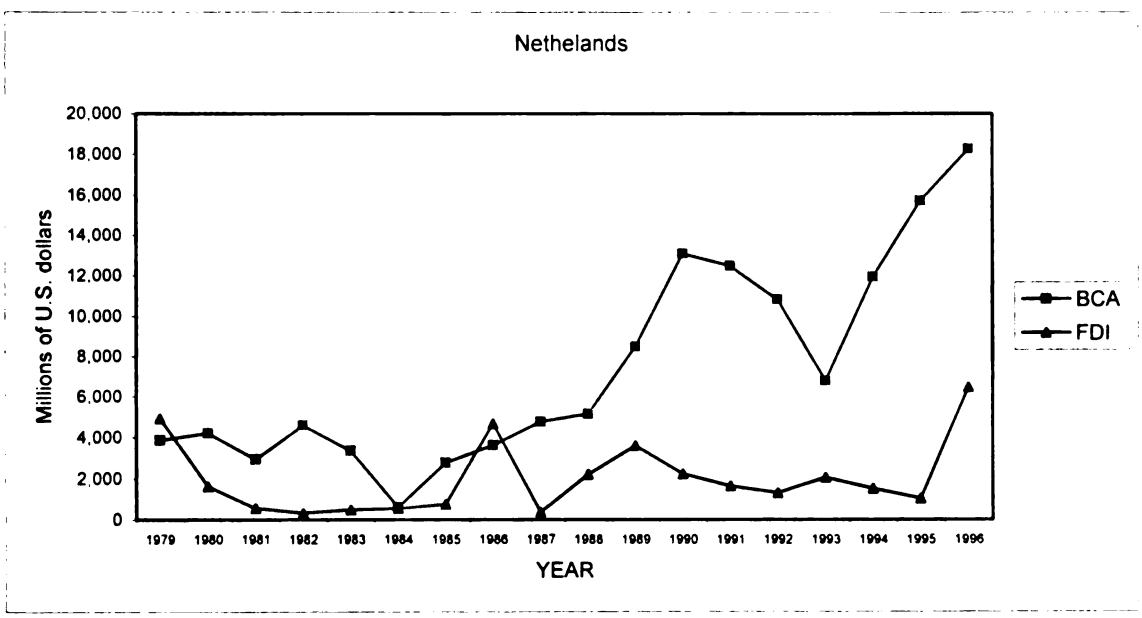
Source: text and appendix

Figure 8. The U.S. Balance on Current Account with the Seven Major Investor Countries and FDI from the Countries (Sources: *Survey of Current Business* and www. bea.doc.gov)

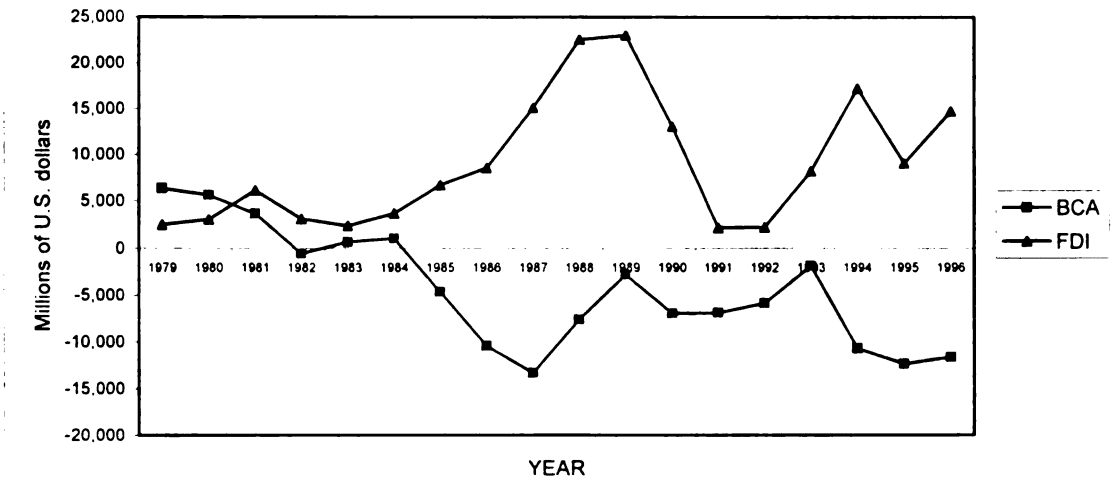




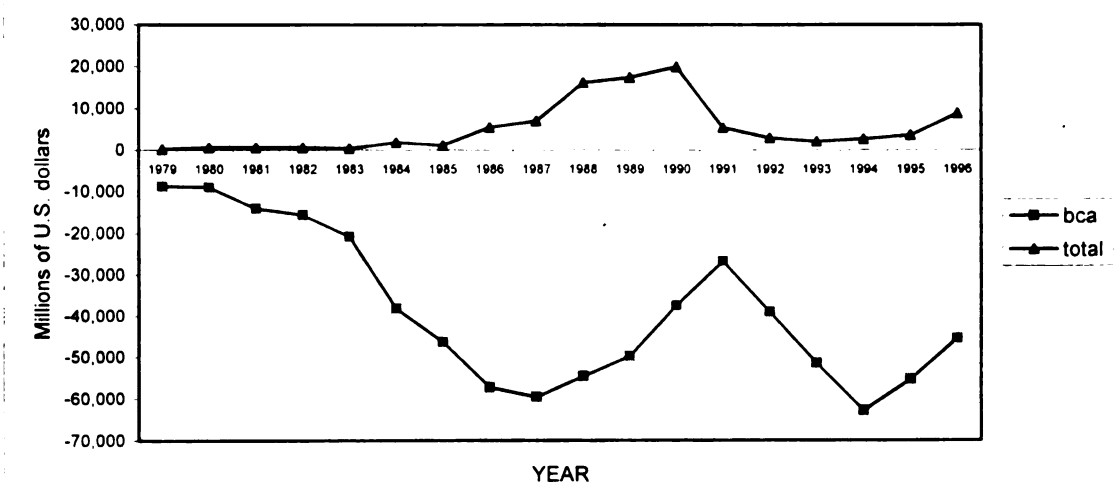

GERMANY
15,000
10,000
5,000
0
-5,000
-10,000
-15,000
-20,000
-25,000
Millions of U.S. dollars
1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996
YEAR
BCA
FDI

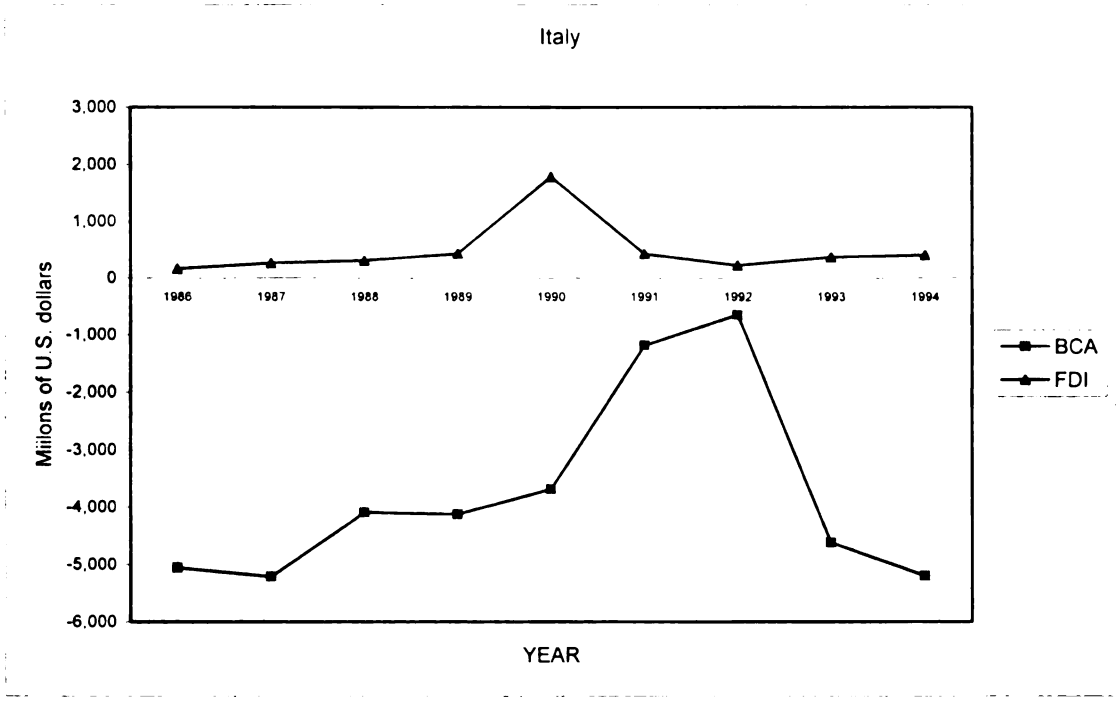

Nethelands
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Millions of U.S. dollars
1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996
YEAR
BCA
FDI

U.K.


25,000
20,000
15,000
10,000
5,000
0
-5,000
-10,000
-15,000
-20,000
Millions of U.S. dollars
1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996
YEAR
BCA
FDI

JAPAN


30,000
20,000
10,000
0
-10,000
-20,000
-30,000
-40,000
-50,000
-60,000
-70,000
Millions of U.S. dollars
1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996
YEAR
bca
total


Italy
3,000
2,000
1,000
0
-1,000
-2,000
-3,000
-4,000
-5,000
-6,000
Millons of U.S. dollars
1986
1987
1988
1989
1990
1991
1992
1993
1994
YEAR
BCA
FDI

5. Estimation Results

Effective Tax rates and FDI of Territorial Investors

To see how the foreign investor country's double-taxation-relief system affects FDI in the U.S., I run regressions of FDI from the territorial countries and regressions of FDI from the worldwide countries on the effective tax rate measures, separately.

Table 14 presents the estimation results of the regressions of FDI from territorial countries on the average effective tax rate. I test for heteroskadasticity and serial correlation, and it turns out that there is little evidence of heteroskedasticity or autocorrelation. Column two, column three, and column four show that adding log(GDP), log(BCA), and log(EX) do not have a great effect on the FDI elasticity with respect to the AETR for investors from territorial countries. These results suggest that the average effective tax rate is the most important factor for territorial investors' investment-decision making. According to the estimation results from my baseline specification (column 3), the average-effective-tax-rate elasticity of FDI from territorial countries is negative (-3.5) and statistically significant (t-value: -2.69). This result is consistent with what is expected by the traditional view: territorial firms should respond negatively to an increase in the U.S. effective corporate tax rate.

Table 15 reports the estimation results of the regressions of FDI from territorial countries on the marginal effective tax rate. Adding control variables changes the sign of the METR elasticity and reduces its statistical significance level quite substantially. According to the estimation results from my baseline specification (column 3), the marginal effective tax rate has little power in explaining the FDI behavior.

Table 14. FDI from Territorial Countries and the Average Effective Tax Rate*

Independent Variables	Dependent Variable: log of total FDI (in 1992 dollars)					
	(1)	(2)	(3)	(4)	(5)	(6)
log(AETR)	-3.90 (-4.62)	-3.47 (-2.66)	-3.54 (-2.69)	-3.18 (-2.37)	-3.40 (-3.64)	-3.13 (-2.34)
log(GDP)	_	0.42 (0.43)	0.38 (0.39)	0.23 (0.24)	_	0.29 (0.29)
log(BCA)**	_	_	-0.06 (-0.80)	-0.07 (-0.92)	_	_
log(EX)	_	_	_	-0.66 (-1.24)	-0.63 (-1.20)	-0.61 (-1.15)
country dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.3669	0.3686	0.3747	0.3894	0.3804	0.3812
# of Obs.	72	72	72	72	72	72

* The number in ( ) is the OLS *t* value.

AETR, BCA, and EX stand for the average effective tax rate, the balance on current account, and the exchange rate, respectively.

** log(BCA)=log(26,320+balance on current account).

Table 15. FDI from Territorial Countries and the Marginal Effective Tax Rate*

Independent Variables	Dependent Variable: log of total FDI (in 1992 dollars)					
	(1)	(2)	(3)	(4)	(5)	(6)
log(METR)	-1.93 (-1.47)	1.22 (0.79)	1.56 (0.97)	0.34 (0.19)	-2.34 (-1.88)	-0.01 (-0.004)
log(GDP)	_	2.82 (3.34)	2.94 (3.42)	2.05 (1.95)	_	1.93 (1.86)
log(BCA)**	_	_	-0.07 (-0.83)	-0.07 (-0.82)	_	_
log(EX)	_	_	_	-0.88 (-1.43)	-1.56 (-3.01)	-0.89 (-1.45)
country dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.1909	0.3077	0.3149	0.3362	0.2937	0.3292
# of Obs.	72	72	72	72	72	72

* The number in ( ) is the OLS *t* value.

METR, BCA, and EX stand for the marginal effective tax rate,

the balance on current account, and the exchange rate, respectively.

** log(BCA)=log(26,320+balance on current account).

Effective Tax rates and FDI of Worldwide Investors

Table 16 presents the results of the regressions of FDI from worldwide investors on the average effective tax rate. Adding log(GDP) to the regression (column 2) reduces the absolute value of the AETR elasticity and its significance level substantially. And log(GDP) turns out to have a significant effect on log(FDI). Adding log(BCA) to the regression makes the AETR elasticity smaller, and reduces its significance level further. Log(BCA) also has a significant effect on log(FDI). These results suggest that the average effective tax rate is not an important factor for worldwide investors' investment-decision making. According to the estimation results from my baseline specification (column 3), the average-effective-tax-rate elasticity of FDI from territorial countries is positive (0.45) but its t-value is quite small (0.25). This result is consistent with the expectation of the traditional view that FDI from worldwide countries should be insensitive to U.S. tax rates, or less sensitive to U.S. tax rates than FDI from territorial countries.

Table 17 presents the results of the regressions of FDI from worldwide investors on the marginal effective tax rate. The estimation results from the baseline specification (column 3) show that marginal effective tax rate has little power in explaining FDI behavior. This result is similar to the result from the regression of territorial FDI on the marginal effective tax rate.

Conclusion

Comparing the elasticity of FDI in column (3) in Table 14 and that in column (3) in Table 16, we see that FDI of territorial countries responds negatively to an increase in the

U.S. average effective tax rate, while the response of FDI from worldwide countries to the U.S. average effective tax rate is insignificant. This finding is consistent with the expectations of the traditional view that the investment by the *territorial firms* would respond negatively to an increase in U.S. tax rate, and that FDI from *worldwide countries* should be insensitive to U.S. tax rates, or less sensitive to U.S. tax rates than FDI from *territorial countries*.

Column three of Table 10 shows that overall FDI is negatively affected by the AETR (elasticity: -0.85), but the effect is only marginally significant. This estimate may be interpreted as a mingled effect of the results in Table 14 and Table 16. That is, the overall elasticity of FDI with respect to the AETR is the result of the combination of territorial investors' sensitive response and worldwide investors' insensitive response.

Comparing the elasticity of FDI in column (3) in Table 15 and that in column (3) in Table 17, the marginal-effective-tax-rate elasticities of FDI of both worldwide and territorial investors are statistically insignificant. So, we cannot say that the marginal effective tax rate has any relationship with FDI of either territorial firms or worldwide firms. This finding suggests that the marginal effective tax rate is not a good explanatory variable for FDI behavior. This result is generally similar to the result from the overall analysis in Chapter 4, and the reason is addressed in Chapter 6.

Table 16. FDI from Worldwide Countries and the Average Effective Tax Rate*

Independent Variables	Dependent Variable: log of total FDI (in 1992 dollars)					
	(1)	(2)	(3)	(4)	(5)	(6)
log(AETR)	-3.45 (-2.68)	0.77 (0.42)	0.45 (0.25)	0.44 (0.25)	-2.07 (-1.56)	0.74 (0.41)
log(GDP)	_	4.23 (2.95)	3.87 (2.75)	3.06 (2.04)	_	3.29 (2.15)
log(BCA)**	_	_	-0.15 (-1.89)	-0.14 (-1.76)	_	_
log(EX)	_	_	_	-0.83 (-1.43)	-1.44 (-2.51)	-0.94 (-1.58)
country dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.6951	0.7463	0.7663	0.7774	0.7342	0.7656
# of Obs.	48	48	48	48	48	48

* The number in ( ) is the OLS *t* value.

AETR, BCA, and EX stand for the average effective tax rate, the balance on current account, and the exchange rate, respectively.

** log(BCA)=log(71,747+balance on current account).

Table 17. FDI from worldwide countries and the Marginal Effective Tax Rate*

Independent Variables	Dependent Variable: log of total FDI (in 1992 dollars)					
	(1)	(2)	(3)	(4)	(5)	(6)
log(METR)	-5.55 (-3.39)	-2.46 (-1.24)	-1.54 (-0.76)	-1.93 (-0.96)	-4.33 (-2.72)	-2.77 (-1.42)
log(GDP)	_	2.87 (2.48)	3.05 (2.68)	2.05 (1.58)	_	1.76 (1.36)
log(BCA)**	_	_	-0.13 (-1.66)	-0.11 (-0.46)	_	_
log(EX)	_	_	_	-0.91 (-1.55)	-1.41 (-2.74)	-1.02 (-1.74)
industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.7187	0.7541	0.7691	0.7820	0.7656	0.7706
# of Obs.	48	48	48	48	48	48

* The number in ( ) is the OLS *t* value.

METR, BCA, and EX stand for the marginal effective tax rate,

the balance on current account, and the exchange rate, respectively.

** log(BCA)=log(71,747+balance on current account).

CHAPTER VI

TYPES OF FDI AND EFFECTIVE TAX RATES

This chapter seeks to find out the answer to the question raised in Chapter 4 and Chapter 5: "Why is FDI affected more significantly and strongly by the average effective tax rate than by the marginal effective tax rate?" Swenson (1994) estimates not only the effect of the average effective tax rate on FDI but also the effect of the marginal effective tax rate on FDI. She finds a positive significant effect of the AETR on FDI but a negative significant effect of the METR on FDI. She explains the negative METR-elasticity of FDI with the limitations of the METR itself. That is, she says that she does not accept the negative response of FDI to the METR as a reliable one, because she does not think the METR is a good measure of tax burden. In my own estimation, I find a positive (0.27) and quite insignificant (t-value: 0.18) coefficient. This suggests that the marginal effective tax rate has nothing to do with FDI. This chapter tries to present a systematic explanation for the relation between FDI and the measures of effective tax rates. In doing so, this chapter takes advantage of the industrial organization theories of FDI.

This chapter also explores empirical evidence regarding the conjecture of Auerbach and Hassett (1993). They conjecture that *establishment* FDI could be affected by the marginal effective tax rate, but that *acquisition* FDI should not be affected by the marginal effective tax rate. The second goal of this chapter is to answer the question, "Does establishment FDI respond to the marginal effective tax rate?"

1. FDI and the Measures of Effective Tax Rates

As is shown in Chapter 4 and Chapter 5, our baseline estimates indicate that FDI in the U.S. does not respond significantly to the marginal effective tax rate. This phenomenon may be explained by considering the *characteristics of FDI* and the *composition of FDI.* While FDI is closely related to market imperfections, the concept of the marginal effective tax rate is based on the assumption of perfect competition. While most FDI is accounted for by acquisition-type FDI (purchase of existing U.S. firms), the marginal effective tax rate measures the tax burden of a new investment project. This section discusses why the marginal effective tax rate has little power in explaining FDI behavior, in terms of the characteristics of FDI and the composition of FDI.

1.1. Characteristics of FDI

Foreign direct investment is closely related to the concept of *control and ownership* and the special characteristics of *multinational corporations* (MNCs, hereafter). That is, in general, FDI is undertaken by MNCs for the purpose of obtaining control and ownership of a business in a foreign country. The fact that MNCs are undertaking FDI is very important in explaining the response of FDI to the effective tax rates. According to modern theories of FDI, the monopolistic characteristics of MNCs enable or drive MNCs to make FDI. Therefore, the marginal effective tax rate, which is based on the assumption of a perfect market, has limitations in explaining FDI, which is related to market imperfections. To make clear this point, it is needed to review the industrial organization

theories of FDI. I summarize the industrial organization theories of FDI, based on Graham and Krugman (1995), Casey (1998), and Caves (1996).

The monopolistic advantage theory: Hymer (1976)[41] and Kindleberger (1969)

The monopolistic advantage theory explains how MNCs, which are in a disadvantageous position compared to local firms, are able to do foreign investment. A firm that undertakes investment in a foreign country faces some additional costs that a local firm, which is limited to the local market, does not incur. These costs are related to geographical distance between home and host country, exchange-rate risk, and differences in languages, cultures, technical standards, and customer preferences. For a MNC to overcome these disadvantages and invest in a foreign country, there must be some advantages over its local rivals. These advantages take the form of economies of scale or of superior technology. The conclusion of this theory is that FDI takes place because the MNCs have enough monopolistic advantages over their local competitors.

The oligopolistic reaction theory: Knickerbocker (1973)

The oligopolistic reaction theory tries to explain the observation that large U.S. multinationals tend to follow one another into foreign markets. A firm operating in an oligopolistic industry is compelled to follow its rival into a foreign market, even though the firm's assessment of the expected profit of the project in the foreign market may not

[41] Originally, Stephen Hymer's Ph.D. dissertation was written in 1959. It was published posthumously in 1976.

be so good. This oligopolistic follow-the-leader behavior is motivated not by the desire to earn more profit, but by the desire to avoid getting shut out of a new market by an aggressive rival (leading firm). If the leader establishes a subsidiary in a foreign country, the rivals recognize that this investment might give the leader first-mover advantage and knock out their export business in the foreign country. These considerations dispose the rivals to imitate the leader and establish their own subsidiaries in the foreign country.

The internalization theory: Buckley and Casson (1976)

Internalization theory criticizes the 'monopolistic advantage theory,' on the ground that it does not give an adequate explanation for why the MNCs choose FDI, rather than alternative modes of servicing the foreign market (such as export and licensing). According to internalization theory, for a MNC to service a foreign market via direct investment, rather than exporting or licensing, there must be some *internalization advantage*. That is, there must be economies for a MNC to exploit a market opportunity through internal operations rather than through exporting or licensing. These economies might be associated with costs of contract enforcement, or maintenance of quality or other standards. If these costs are absent, firms use licensing or exporting as a means of serving the foreign market. For example, a MNC can establish a subsidiary to maintain dependable suppliers of intermediate goods or to protect leakage of technology (maintaining technological monopoly).

The eclectic theory: Dunning (1992)

According to the eclectic theory, for FDI to take place there should be three advantages: ownership-specific advantages, internalization-specific advantages, and location-specific advantages. Firstly, an MNC should possess some advantages that its local rivals do not have, such as product differentiation, advanced technology, and special marketing and managerial skills. Secondly, there should be some internalization incentives. That is, FDI should be more profitable than licensing or exporting. Thirdly, the foreign country should have some specific characteristics (e.g., low labor costs, abundance of raw materials, infrastructure, etc.) that can be linked with the other two advantages. For a MNC, which has owner-specific and internalization-specific advantages, to invest in a certain country, the country must have some characteristics to attract the MNC.

By reviewing the industrial organization theories of FDI, we can understand that FDI is closely related to *market imperfections* and that FDI is a *highly strategic* behavior. Only firms with monopolistic advantages can undertake FDI. The firms in an oligopolistic industry may have incentives to undertake FDI. Maintaining technological monopoly is a source of market power in the product market, and thus it gives rise to an incentive to undertake FDI.

In addition, FDI entails externalities. Examples include the introduction of new technology (e.g., just-in-time inventory method from Japanese automakers) and the

training of workers who may transfer their skills elsewhere[42]. So, we can conclude that FDI is closely related to market imperfections, and that FDI is a result of the strategic decision-making of a MNC. However, the concept of the marginal effective tax rate is based on the assumption of perfect competition and no uncertainty, and takes account of a very limited number of tax parameters. This discrepancy between the two can be an explanation of why FDI does not respond to the marginal effective tax rate.

1.2. Composition of FDI

As shown in Figure 2 in Chapter 2, most FDI (over 80%) is accounted for by acquisition-type FDI. The preference for the acquisition mode can be accounted for by the advantages of acquisition-type FDI over establishment-type FDI. The choice between the acquisition route and the establishment route depends on the factors of time, risk, and the market for takeover. According to Caves (1996), the acquisition route is very quick and less risky than the new-establishment route. The MNC that buys the foreign firm also buys access to the valuable information and the existing distribution network of the foreign firm. It also acquires the local management team, who are aware of the local market environment. These factors reduce the risk of foreign investment. Of course, the acquisition is constrained by the availability of target firms. In contrast, the establishment route requires a long time to achieve the desired size and profitability, and it is much riskier than the acquisition route.

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[42] Graham and Krugman (1995), p. 59.

If foreign investors, who are attempting to purchase an existing U.S. company or acquire some control over a U.S. company, were to consider the tax burden of the acquisition project, they would consider the current tax burden of the target company, not the tax burden from a new establishment project. However, the typical calculation of the marginal effective tax rate measures the tax burden of a new investment project. In addition, the marginal effective tax rate, which considers only a limited number of tax parameters, such as the investment tax credit, depreciation allowances, and the statutory tax rate, cannot capture all the factors that are relevant for acquisition-type FDI. In sum, while most FDI is accounted for by acquiring existing firms, the METR measures the tax burden of a new investment project, considering only a few tax parameters. This logic can be another explanation to the question of why the marginal effective tax rate is not a good explanatory variable for FDI. In order to see if this hypothesis is correct, I run a regression of acquisition-type FDI on the AETR and on the METR separately. I use the following specification that is the same as equation (1) in Chapter 4, except for the dependent variable. The dependent variable is acquisition-type FDI, rather than total FDI.

(3) $log(Acquisition_{it}) = a_0 + a_1 log(ETR_{it}) + a_2 log(BCA_t) + a_3 log(GDP_t) + \sum a_i d_i + u_{it}$

where

$Acquisition_{it}$ = acquisition type FDI of industry i in year t,

ETR_{it} = effective tax rate of industry i in year t,

BCA_t = balance on current account in year t,

GDP_t = U.S. real GDP in year t,

d_i = industry dummy,

u_{it} = error term.

Table 18 and Table 19 present the results of the regressions of *acquisition* FDI on the average effective tax rates and the marginal effective tax rate, respectively. Column three of Table 18 (my baseline specification) shows that after controlling for GDP and the U.S. balance on current account, the estimated elasticity of the acquisition FDI with respect to the AETR is –0.78. Thus, the sign and magnitude of this coefficient are consistent with my hypothesis that acquisition FDI is influenced by the average effective tax rate. However, the coefficient is not statistically significant (t-value: -1.12 and p-value: 0.27). With this estimation result, we cannot reject the null hypothesis that the elasticity of acquisition FDI with respect to the AETR is zero.

Column three of Table 19 shows the estimated elasticity of the acquisition FDI with respect to the METR is 0.23. Thus, this coefficient is not only small in magnitude, but it is also of the wrong sign. In addition, the coefficient is not even close to statistical significance. Its t-value and p-value are 0.13 and 0.89, respectively. Therefore, we can certainly not reject the null hypothesis that the METR elasticity is zero.

My hypothesis is that acquisition FDI cannot be accounted for by the marginal effective tax rate, but can be accounted for by the average effective tax rate strongly. These results give at least some support to the hypothesis. Comparing column three of Table 18 and that of Table 19, the magnitude of the estimated elasticity of acquisition FDI with respect to the AETR is larger than that of the estimated elasticity of acquisition FDI with respect to the METR. The AETR elasticity is of the predicted sign, although it falls somewhat short of statistical significance. The METR elasticity, however, is very small and quite insignificant. Therefore, I can say that the estimation results modestly support my hypothesis. At least, the empirical evidence is not against my hypothesis.

Table 18. Acquisition FDI and the Average Effective Tax Rate*

Independent Variables	Dependent Variable: log of acquisition FDI (in 1992 dollars)					
	(1)	(2)	(3)	(4)	(5)	(6)
log(AETR)	-1.36 (-1.91)	-0.66 (-0.94)	-0.78 (-1.12)	-0.79 (-1.11)	-1.09 (-1.48)	-0.67 (-0.93)
log(GDP)	_	2.65 (2.99)	2.67 (3.06)	2.73 (2.72)	_	2.70 (2.65)
log(BCA)**	_	_	-0.05 (-1.63)	-0.05 (-1.62)	_	_
log(EX)	_	_	_	0.09 (0.12)	-0.94 (-1.24)	0.08 (0.10)
industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.4860	0.5638	0.5862	0.5864	0.5013	0.5639
# of Obs.	56	56	56	56	56	56

* The number in ( ) is the OLS *t* value.

AETR, BCA, and EX stand for the average effective tax rate, the balance on current account, and the trade-weighted exchange rate, respectively.

** log(BCA)=log(195,818+balance on current account).

Table 19. Acquisition FDI and the Marginal Effective Tax Rate*

independent Variables	Dependent Variable: log of acquisition FDI (in 1992 dollars)					
	(1)	(2)	(3)	(4)	(5)	(6)
log(METR)	-2.84 (-1.80)	-0.64 (-0.39)	0.23 (0.13)	0.24 (0.13)	-2.98 (-1.94)	-0.78 (-0.43)
log(GDP)	_	2.76 (2.92)	3.06 (3.19)	3.07 (2.47)	_	2.62 (2.16)
log(BCA)**	_	_	-0.05 (-1.45)	-0.05 (-1.43)	_	_
log(EX)	_	_	_	0.01 (0.02)	-1.34 (-1.87)	-0.17 (-0.19)
industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.4820	0.5515	0.5758	0.5758	0.5157	0.5578
# of Obs.	56	56	56	56	56	56

* The number in ( ) is the OLS *t* value.

METR, BCA, and EX stand for the marginal effective tax rate,

the balance on current account, and the trade-weighted exchange rate, respectively.

** log(BCA)=log(195,818+balance on current account).

2. Establishment FDI and the Effective Tax Rates

According to the conjecture of Auerbach and Hassett (1993), *establishment* FDI could be affected by the marginal effective tax rate, but *acquisition* FDI should not be affected by the marginal effective tax rate. They state, "...the theoretical discussion and empirical analysis of the impact of taxation on FDI has treated the problem as one of acquiring new capital, even though this is only one of the possible modes. .... The mode of investment chosen affects tax liability differently because the choice to acquire a U.S. company will depend on the U.S. merger law governing, for example, step-up in basis and transfer of tax benefits, whereas investment in new capital will depend on the statutory tax rate, the investment tax credit, and depreciation schedules."[43] I agree with the second part of their conjecture, and I have explained this in terms of the characteristics of FDI (industrial organization theory of FDI). In addition, I have provided some empirical evidence that the acquisition FDI does not respond to the marginal effective tax rates, but modestly responds to the average effective tax rate. However, I do not agree with the first part of their conjecture. In principle, Auerbach and Hassett are making a valid point regarding establishment FDI. In principle, a marginal calculation is the correct one to make for a new establishment. However, in practice, the marginal effective tax rate is calculated under a set of very strong assumptions, so that the METR is not a very effective explanatory variable. My hypothesis is that the establishment-type FDI does not respond strongly to either the marginal effective tax rate (as measured) or to the average effective tax rate.

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[43] Auerbach and Hassett (1993), p. 123.

First of all, why does the establishment FDI not respond to the marginal effective tax rate? Even though the establishment FDI is a new investment, the establishment FDI is also a mode of FDI. That is, establishment FDI is also related to imperfect competition, and it is a highly strategic behavior. Therefore, by the same reason I explained in the previous section, the marginal effective tax rate is unlikely to be a good explanatory variable for establishment FDI.

In addition, the effects of establishment FDI on an industry or market are different from those of acquisition FDI. In general, the acquisition route of FDI does not bring new capacity to the market in question. Of course, in some cases, the MNCs may bring an expansion of production capacity by vitalizing the acquired company or enhancing the productivity. However, the establishment route of FDI adds production capacity to the market. It also entails some external economies - the creation of job opportunities and the training of workers. Therefore, each level of government in the U.S. offers investment incentives to foreign investors. Especially, state and local governments provide financial, tax, and other incentives to stimulate the local economy. These investment incentives might make the marginal effective tax rate faced by foreign investors different from the marginal effective tax rate calculated from some limited number of tax parameters. Consequently, the METR that can be calculated using available data may not capture some important aspects of the actual marginal incentives facing firms.

Secondly, why does establishment FDI not respond to the average effective tax rate? As explained in Chapter 2, the average effective tax rate, which is defined as the ratio of taxes paid to net income, is a good measure of the tax burden of existing firms, but it cannot be a good measure of the impact of taxes on the incentives to make a new

investment. Accordingly, the establishment FDI, which is new investment in nature, does not respond to the average effective tax rate of existing U.S. firms.

In sum, since establishment FDI is also related to market imperfections and strategic behavior, and it is attracted by special investment incentives, the METR cannot be expected to do a good job of explaining establishment FDI. And since establishment FDI is new investment, it is not to respond to the AETR. Therefore, neither the METR nor the AETR is expected to explain establishment (greenfield investment) –type FDI. To give support to my hypothesis, I discuss the foreign investment incentives programs provided by state governments in section 2.1. And to test whether my hypothesis is supported by empirical evidence, I try to estimate the elasticity of establishment FDI with respect to the AETR and that with respect to the METR in section 2.2.

2.1. Incentives to the Establishment FDI

In general, the attitudes toward FDI of each level of government in the U.S. depend on the types of FDI. In general, most countries have a tendency not to welcome the transfer of ownership or control of domestic firms from domestic citizens to foreigners. Accordingly, acquisition of domestic firms by foreigners is restricted, or at least it is not promoted. For an extreme example, foreign control in nuclear energy, broadcasting, telecommunication, gas pipelines, and mining certain minerals and fuels is restricted in the United States[44]. However, a new investment, which adds production capacity and entails external economies of job creation and technology diffusion, is often promoted by

[44] Graham and Krugman (1995), pp. 122-123.

local governments. A number of state and local governments in the United States provide a variety of investment incentives for foreign investors. The state and local governments provide these incentives to stimulate the local economies. Therefore, the primary targets of these incentives are the establishment-type FDI, rather than the acquisition-type FDI. The state and local governments do not consider the acquisition of an existing firm by a foreign investor as an *investment* that is eligible for the incentive programs, because it is nothing but a change of ownership. Graham and Krugman (1995) use an example of Honda Motor Company in explaining how state governments are eager to attract foreign direct investment. "... it was widely reported that at least three subnational governments – the state governments of Ohio and Pennsylvania and the provincial government of Ontario – competed to attract the large Honda Motor Company facility that eventually was located in Marysville, Ohio."[45] These investment incentives consist of various forms of tax relief, financial assistance, and provision of infrastructure and land free of charge. The following measures to attract foreign direct investment are excerpted from Poniachek (1986) and Casey (1998).

(a) Financial assistance: Most states offer some type of financial aid to new investment within their borders. Many states have established loan funds and mortgage guarantee programs to help firms locating or expanding within the state. Four types of financing are commonly used – industrial revenue bonds and mortgages, loan guarantee programs, direct loan programs, and development credit corporations.

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[45] Graham and Krugman (1995), p. 141.

(b) Tax incentives: Various kinds of state and local tax incentives are available on a negotiated or case-by-case basis. Among them are tax reductions and exemptions, tax credits, and preferential assessment. These are usually offered as exemptions or deferrals from property, inventory, sales, or income tax. Many states have enacted legislation to exempt new companies from various state taxes for specified periods. Some states provide a corporate income tax exemption for qualified companies. Preferred property-tax assessment is commonly applied to machinery and equipment. Business purchases may be exempted from sales tax. Reduced income tax is sometimes provided for out-of-state sales, and preferential income tax write-offs may be given for selected types of investment.

(c) Infrastructure incentives: Infrastructure incentives include state government support of transportation, electric power, communications, and other forms of social overhead capital and public services, such as rail and highway connections, free land for industrial development, and low-cost sites in industrial parks.

(d) Training programs and labor incentives: These incentives include payment for the testing and screening of work-force personnel, and subsidies for job advertisements. Sometimes local educational institutions support curriculum efforts related to the needs of the incoming foreign companies.

(e) Natural resource incentives: These incentives involve government assistance in providing foreign businesses with industrial resources such as land and energy. In areas where state environmental controls are more rigid than federal standards (e.g., pollution

control), exemptions or special exclusions to state law are sometimes granted to the foreign producers.

All of these investment incentives provided by local governments make the expected tax burden of a new investment project faced by a foreign investor different from the marginal effective tax rate calculated with only a limited number of tax parameters. Therefore, establishment FDI is not expected to respond to the marginal effective tax rate, as the METR is usually measured. In conclusion, my hypothesis regarding the relationship between establishment FDI and the effective tax rates is that neither the AETR nor the METR will do a good job of explaining establishment-type FDI. In the next section, I present empirical support for this hypothesis.

2.2. Empirical Analysis

To test my hypothesis, I run a regression of establishment-type FDI on the AETR and on the METR separately. I use the following specification that is the same as equation (3) in section 1 of this chapter, except for the dependent variable. The dependent variable is establishment-type FDI, rather than acquisition-type FDI.

(4) $log(Establishment_{it}) = a_0 + a_1 log(ETR_{it}) + a_2 log(BCA_t) + a_3 log(GDP_t) + \sum a_i d_i + u_{it}$,

where

$Establishment_{it}$ = establishment-type FDI of industry i in year t,

ETR_{it} = effective tax rate of industry i in year t,

BCA_t = balance on current account in year t,

GDP_t = U.S. real GDP in year t,

d_i = industry dummy, and

u_{it} = error term.

Table 20 and Table 21 present the results of the regressions of *establishment* FDI on the average effective tax rates and the marginal effective tax rate, respectively. Column three of Table 20 (my baseline specification) shows that, after controlling for GDP and the U.S. balance on current account, the estimated elasticity of establishment FDI with respect to the AETR is –0.60, but it is not statistically significant (t-value: -1.01 and p-value: 0.32). With this estimation result, we cannot reject the null hypothesis that the elasticity of establishment FDI with respect to the AETR is zero even at the 30% significance level.

Column three of Table 21 shows the estimated elasticity of the establishment FDI with respect to the METR is –0.49, and that its t-value and p-value are -0.33 and 0.74, respectively. Therefore, we cannot reject the null hypothesis that the elasticity is zero.

Comparing column three of Table 20 and that of Table 21, the magnitude of the estimated elasticity of establishment FDI with respect to the AETR is slightly larger than that of the estimated elasticity of establishment FDI with respect to the METR. And the p-value of the METR elasticity is about two times higher than that of the AETR elasticity. The estimated elasticity of establishment FDI with respect to the AETR looks better than the estimated elasticity of establishment FDI with respect to the METR. Therefore, these estimation results do not strongly support my hypothesis that establishment FDI cannot be accounted for very well by either the METR or the AETR. However, I can say that the estimation results modestly support my hypothesis. While establishment FDI can only be explained very weakly by the AETR, establishment FDI

cannot be said to be explained by the METR. At least, the empirical evidence suggests that establishment FDI does not respond to the METR, which is opposite to what is expected by Auerbach and Hassett (1993).

Columns three and four of Table 20 and Table 21 show that the balance of current account does not play a significant role in explaining establishment FDI. This is in contrast to the results in Table 18 and Table 19, in which the balance of current account is shown to have a marginally significant effect on acquisition FDI. This is an intuitive result. The balance-of-current-account variable is associated with the idea that, when the United States incurs a large current-account deficit, foreign investors are provided with a greater opportunity to acquire U.S. assets. This explanation of the role of the current account balance is more powerful in the case of acquisition investment than in the case of establishment investment.

Table 20. Establishment FDI and the Average Effective Tax Rate*

Independent Variables	Dependent Variable: log of establishment FDI (in 1992 dollars)					
	(1)	(2)	(3)	(4)	(5)	(6)
log(AETR)	-1.28 (-2.09)	-0.58 (-0.99)	-0.60 (-1.01)	-0.54 (-0.90)	-0.89 (-1.45)	-0.52 (-0.87)
log(GDP)	_	2.65 (3.58)	2.65 (3.56)	2.38 (2.79)	_	2.37 (2.81)
log(BCA)**	_	_	-0.01 (-0.34)	-0.01 (-0.38)	_	_
log(EX)	_	_	_	-0.46 (-0.68)	-1.36 (-2.15)	-0.46 (-0.69)
industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.7871	0.8305	0.8311	0.8327	0.8051	0.8322
# of Obs.	56	56	56	56	56	56

* The number in ( ) is the OLS *t* value.

AETR, BCA, and EX stand for the average effective tax rate, the balance on current account, and the trade-weighted exchange rate, respectively.

** log(BCA)=log(195,818+balance on current account).

Table 21. Establishment FDI and the Marginal Effective Tax Rate*

independent Variables	Dependent Variable: log of establishment FDI (in 1992 dollars)					
	(1)	(2)	(3)	(4)	(5)	(6)
log(METR)	-2.75 (-2.03)	-0.57 (-0.41)	-0.49 (-0.33)	-1.17 (-0.72)	-2.93 (-2.31)	-1.17 (-0.79)
log(GDP)	_	2.74 (3.48)	2.77 (3.40)	2.10 (2.00)	_	2.10 (2.10)
log(BCA)**	_	_	-0.004 (-0.15)	-0.0002 (-0.006)	_	_
log(EX)	_	_	_	-0.76 (-1.03)	-1.70 (-2.88)	-0.76 (-1.06)
industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.7861	0.8278	0.8279	0.8317	0.8165	0.8317
# of Obs.	56	56	56	56	56	56

* The number in ( ) is the OLS *t* value.

METR, BCA, and EX stand for the marginal effective tax rate,

the balance on current account, and the trade-weighted exchange rate, respectively.

** log(BCA)=log(195,818+balance on current account).

CHAPTER VII

CONCLUSION

(1) The estimation results of this dissertation (Chapter 4) suggest that overall foreign direct investment in the U.S. decreases 0.85 percent with a one-percent increase in the U.S. average effective tax rate. This estimate is not statistically significant at the 5% or the 10% significance level, but it is marginally significant at the 15% level (p-value: 0.15, t-value: -1.45). And the sign of the FDI elasticity with respect to the AETR is not positive at the 10% significance level. The 10% critical value for a one-tailed test with 60 degrees of freedom is -1.296. Therefore, the hypothesis that the FDI elasticity with respect to the AETR has a positive sign can be rejected at the 10% significance level.

These results are weakly consistent with the traditional view, in which foreign investors tend to undertake investment in the location with the higher after-tax rate of return. And these results are opposite to the new view, in which FDI responds positively to the host-country tax rate. In addition, I find that FDI does not respond to the marginal effective tax rate. The marginal-effective-tax-elasticity of FDI is close to zero (0.27) and statistically insignificant (t-value: 0.18).

(2) The estimation results in Chapter 5 suggest that multinationals from countries with a *worldwide* tax system appear not to adjust their investment in response to changes in tax rates in the U.S., but multinationals from countries with *territorial system* reduce their investment in response to an increase in the U.S. average effective tax rate. The average-effective-tax-rate elasticity of FDI from territorial countries is negative (-3.54) and

statistically significant (t-value: -2.69). The average-effective-tax-rate elasticity from worldwide countries is positive (1.56) but statistically insignificant (t-value: 0.97). These results are consistent with the prediction of the traditional view that the investment by *territorial firms* would respond negatively to an increase in the U.S. tax rate, and that FDI from *worldwide countries* should not respond sensitively to the U.S. tax rates. These results are opposite to the argument of the new view, in which the *worldwide* investors respond positively to the host-country tax rate, and the *territorial* investors are not sensitive to host-country tax rate.

(3) This paper also gives an answer to the question of why neoclassical investment theory (the cost-of-capital theory) cannot be easily applied to foreign direct investment behavior. I find the answers in the characteristics of FDI and the composition of FDI in the U.S.

Firstly, FDI is closely related to market imperfections, and FDI is a result of strategic decision-making on the part of an MNC. However, the concept of the marginal effective tax rate is based on the assumption of perfect competition. Secondly, the calculation of the METR considers only a limited number of tax parameters. Thirdly, while most FDI is accounted for by acquisition of existing firms, the METR measures the tax burden of a new investment project.

My estimation results weakly support the last point. The elasticity of the acquisition FDI with respect to the AETR is negative (-0.78) and statistically insignificant (t-value: -1.12). But, the elasticity of the acquisition FDI with respect to the METR is close to zero (0.23) and statistically insignificant (t-value: 0.13). Although both the estimated AETR-elasticity and the estimated METR-elasticity are insignificant, the former appears to have better explanatory power than the latter.

(4) I test the conjecture of Auerbach and Hassett (1993): *establishment* FDI could be affected by the marginal effective tax rate, but *acquisition* FDI should not be affected by the marginal effective tax rate. I agree with the second part of their conjecture, and I explain this in terms of the characteristics of FDI and the composition of FDI in the U.S. However, I do not agree with the first part of their conjecture. My hypothesis is that establishment-type FDI does not respond to either the marginal effective tax rate or the average effective tax rate.

Firstly, since establishment FDI is also related to market imperfections and it is a highly strategic behavior, the marginal effective tax rate, which is based on perfect competition and considers only a few tax parameters, is unlikely to be a good explanatory variable for establishment FDI. Secondly, the average effective tax rate, which measures the tax burden of existing firms, is unlikely to be a good measure of the impact of taxes on the incentives to make new investment. That is, since establishment FDI is new investment in nature, it does not respond to the average effective tax rate of existing U.S. firms.

And I find the empirical estimation results supporting my hypothesis. The elasticity of establishment FDI with respect to the AETR is negative (-0.60) and statistically insignificant (t-value: -1.01). And, the elasticity of establishment FDI with respect to the METR is a little smaller (-0.49) and also statistically insignificant (t-value: -0.33). At least, we can say that establishment FDI does not respond to the METR, which is opposite to what is expected by Auerbach and Hassett (1993).

(5) The difference between this paper and the earlier papers belonging to the traditional view is that this paper uses the *acquisition and establishment* data rather than *capital-flow*

data. As Young (1988), Auerbach and Hassett (1993), and Swenson (1994) point out, it is more appropriate to use acquisition and establishment data in explaining investment behavior. Even though this paper uses different data, the results of this paper are consistent with the arguments of the traditional view.

The estimation results of this paper are exactly opposite to those of Swenson (1994). She finds a positive average-tax-rate effect on FDI, and she finds a positive average-tax effect on FDI by foreign firms from worldwide tax regimes, and an insignificant average-tax-rate effect on FDI by foreign firms from territorial tax regimes. The different point of this paper from Swenson (1994) lies in the calculation of the average effective tax rate. She uses average effective tax rates calculated by *Tax Analysts*, but I calculate the AETR based on the data in the *Statistics of Income Bulletin* by the Internal Revenue Service.

(6) In order to see what makes the results of this paper different from those of Swenson, I collect Swenson's data set and replicate her estimation. As a result of replication, I find that the FDI elasticity with respect to the AETR turns out to be smaller (0.24) than her original number (0.75), and statistically insignificant. However, I find that there are some serious mistakes in her analysis that may make her results unreliable. One problem is that the average effective tax rate calculated by Tax Analysts may not be a good measure for the actual tax burden of U.S. firms. Tax Analysts calculate the average effective tax rate by using information in financial statements, and only the largest U.S. firms are included in their sample. Because there is some evidence that big firms engage in more deception, it does not seem that the Tax Analysts' average effective tax rate is a representative U.S. average tax rate. The other problem is that Swenson uses Tax Analysts' data very

arbitrarily in her analysis, by having the AETR of a subset of an industry represent the AETR of the entire industry. I redo the estimation with the corrected AETRs. The estimation results, using the AETRs for each industry calculated more appropriately, no longer support Swenson's conclusion. I conclude that Swenson's industry-level analysis suffers from the mismatching problem that the AETRs of large-digit industries are used to represent small-digit industries, and that it is hard to think Swenson's estimation result is reliable.

(7) The problems of the New View arise from its assumptions. The New View assumes that capital is perfectly mobile among countries and among assets. And it assumes that every adjustment process take place immediately. So, in the world of the New View, the economy is always in the equilibrium state. However, it is generally accepted that capital is not so mobile among countries and among assets.

In the case of direct investment, capital seems to move slowly in response to a change in relative tax rate between countries and between assets. These capital movements, in turn, may lead to changes in asset prices and in the pretax returns of the assets. That is, the change in the pre-tax rate of return in response to a change in tax rate is the result of the process of capital movements. But, the New View thinks that every adjustment process occurs immediately, and the price and the pretax return change immediately in response to a tax change. And then capital (direct investment) moves again in response to these changes in asset price. Every problem of the New View seems to arise from this misunderstanding.

(8) Lastly, I want to point out that *foreign direct investment* is an investment itself, but it is significantly different from *domestic investment* in general meaning. In economic analysis, investment is defined as an increase in the capital stock of an economy or an increase in a fixed asset (*PPE*: property, plant, and equipment) of a business. However, foreign direct investment includes both the increase in capital stock by foreign investors and the transfer of ownership or control of domestic firms from U.S. citizens to foreigners. The most important portion of FDI is accounted for by the transfer of ownership or control. Therefore, in economic analysis, foreign direct investment should be treated differently from domestic investment. My estimation results, which suggest that the response of FDI to the marginal effective tax rate is different from the commonly expected response of investment to the marginal effective tax rate, can be explained by this characteristic of FDI.

APPENDIX

APPENDIX

CALCULATION OF MARGINAL EFFECTIVE TAX RATES

1. Model

The marginal effective tax rate measures what fraction of the real pretax rate of return to a new investment will be collected as taxes. The marginal effective tax rate accounts for tax benefits and penalties on income from a new investment that do not take the form of changes in the statutory tax rate. The calculation of the marginal effective tax rate assumes a perfectly competitive firm in a world with no uncertainty[46]. In a world without uncertainty a firm will invest a unit of capital up to the point where the present value of future receipts is equal to the cost of acquiring the asset. The model in this appendix draws on Gravelle (1982)'s reformulation of the neoclassical model of Hall and Jorgenson (1967).

The rental price of capital services is defined by the equality between the cost of acquisition of an asset at time 0, and the present value of future rental prices. In the absence of taxes, this equality can be written as

$$\text{(A1)} \quad q = \int_0^\infty c\, e^{-\delta t} e^{\pi t} e^{-(r+\pi)t} dt = c \int_0^\infty e^{-(r+\delta)t} dt = \frac{c}{r+\delta},$$

[46] Fullerton and Henderson (1987).

where q = acquisition cost,

c = the rental price of a new unit of capital,

r = the real return or discount rate,

π = the expected inflation rate, and

δ = the rate of depreciation of asset.

Rearranging terms, equation (A1) can be expressed as follows:

$$\text{(A2)} \quad \frac{c}{q} = (r + \delta)$$

This means that the rental price is equal to the sum of the rate of return and the depreciation rate, for each dollar of capital (q is normalized to \$1).

In the presence of taxes, q can be written as follows.

$$\text{(A3)} \quad q = \int_0^{\infty} c(1-u)e^{-\delta t}e^{\pi t}e^{-(r^*+\pi)t}dt + uq\int_0^{\infty} D(t)e^{-(r^*+\pi)t}dt + kq$$

$$= c(1-u)\int_0^{\infty} e^{-(r^*+\delta)t}dt + uqz + kq$$

$$= \frac{c(1-u)}{r^*+\delta} + uqz + kq \quad ,$$

where u = statutory tax rate,

$D(t)$ = depreciation deductions allowed at time t per dollar of investment,

k = the investment credit rate,

r^* = the real after-tax discount rate, and

z = present discounted value of depreciation allowances.

Rearranging terms, equation (A3) can be expressed as follows:

$$(A4) \quad \frac{c}{q} = \frac{r^* + \delta}{1 - u}(1 - uz - k)$$

When the equation (A2) and (A4) are combined, it is possible to express the real pretax return (r) as a function of the required after tax real return (r^*), the economic depreciation rate (δ), and tax variables (u, z, k):

$$(A5) \quad r = \frac{r^* + \delta}{1 - u}(1 - uz - k) - \delta$$

The marginal effective tax rate is defined as follows:

$$(A6) \quad u^* = \frac{r - r^*}{r},$$

where u* = marginal effective tax rate.

2. Tax Variables

Statutory tax rate (u)

Corporate income is subject to federal, state, and local income taxes. For the federal income tax, most corporations do not reach the top marginal tax rate, but the great bulk of corporate capital is held by firms that do. So I can model the top marginal corporate income tax rate as federal corporate tax rate.[47] Jorgenson and Yun (1991) estimated state and local tax rates. Since the state and local tax rates show rising trends, I assumed 9% for 1987-1990 and 9.5% for 1991-1996. Because of the deductibility of state tax from federal tax, the combined tax rate can be estimated as follows: $u = u_F(1-u_S) + u_S$, where u_F is the federal corporate tax rate and u_S is the state corporate tax rate. Table A-1 shows my calculation of the statutory tax rates.

Investment tax credit rates

Before 1986, the tax code included an investment tax credit (ITC), which permitted a firm to subtract some portion of the purchase price of an asset from its tax liability at the time the asset was acquired. The TRA 1986 eliminated the investment tax credit. Table A-2 shows the investment tax credit rates by asset types.

[47] See King and Fullerton (1984), p 202.

Table A-1. Corporate Income Tax Rates

year	Federal	State and Local	Federal, State, Local
1978	0.48	0.0645	0.514
1979	0.46	0.0657	0.496
1980	0.46	0.0724	0.499
1981	0.46	0.0773	0.502
1982	0.46	0.0885	0.508
1983	0.46	0.0863	0.507
.1984	0.46	0.0834	0.505
1985	0.46	0.0874	0.507
1986	0.46	0.0896	0.508
1987	0.34	0.0900	0.399
1988	0.34	0.0900	0.399
1989	0.34	0.0900	0.399
1990	0.34	0.0900	0.399
1991	0.34	0.0950	0.403
1992	0.34	0.0950	0.403
1993	0.35	0.0950	0.412
1994	0.35	0.0950	0.412
1995	0.35	0.0950	0.412
1996	0.35	0.0950	0.412

Source : Jorgenson and Yun (1991) and text.

Table A-2. Investment Tax Credit Rates

Asset type	1978-1980	1981-1986	1987-
EQUIPMENT			
Autos	3.3	6	0
Office/computing equipment	10	10	0
Trucks, buses, and trailers	6.6	10	0
Aircraft	7	10	0
Construction machinery	6.6	10	0
Mining/oilfield equipment	10	10	0
Service industry equipment	10	10	0
Tractors	9	10	0
Instruments	10	10	0
Others	10	10	0
General industrial equipment	9.1	9.6	0
Metalworking machinery	8.6	9.4	0
Electric transmission equipment	10	10	0
Communications equipment	10	10	0
Other electrical equipment	10	10	0
Furniture and fixture	10	10	0
Special industrial equipment	10	10	0
Agricultural equipment	10	10	0
Fabricated metal	10	10	0
Engines and turbines	10	10	0
Ships and boats	10	10	0
Railroad equipment	10	10	0
STRUCTURES			
Public utility	10	10	0

Source: Gravelle (1994) and text.

Depreciation Allowances

Historically, the United States has adopted various methods of depreciation: straight-line method, sum-of-the-years'-digits method (SYD), and declining-balance methods. Gravelle (1994) summarizes the depreciation methods adopted by the U.S. Table A-3 shows the depreciation methods historically adopted by the U.S. tax code.

The straight-line method allows the taxpayer to deduct $1/T$ of the purchase price of the asset each year for T years. The asset is fully depreciated after T years. The formula of the present discounted value of depreciation allowances under the straight-line scheme[48] can be derived as follows:

$$z = \int_0^T (\frac{1}{T}) e^{-\rho t} dt = \frac{1 - e^{-\rho T}}{\rho T}$$

The declining-balance method allows the taxpayer to deduct a every year from the remaining value of the asset, where a denotes the depreciation rate for tax purposes. For the double-declining balance method, the taxpayer can deduct a (=$2/T$) of the purchase price in the first year, and he deducts $2/T$ of the remaining depreciation basis in later years. The formula of the declining-balance method[49] is as follows:

$$z = \int_0^\infty a e^{-(a+\rho)t} dt = \frac{a}{a + \rho}$$

[48] King and Fullerton (1984), p. 20.

[49] King and Fullerton (1984), p. 20.

For the sum-of-the-years'-digits (SYD) method, the taxpayer starts by calculating the sum of 1 through T. Let the sum be *SUM*. The taxpayer can deduct *T/SUM* of the purchase price in the first year, *(T-1)/SUM* in the second year, and *1/SUM* in the last year. If T=3, for example, the purchase price is allocated as 3/6, 2/6, and 1/6 across the three years. Under the SYD scheme, the asset is fully depreciated, as under the straight-line scheme. The formula can be derived as follows:

$$z = \int_0^T \frac{(T-t)}{\int_0^T t\,dt} e^{-\rho t}\,dt = \frac{2}{T}\int_0^T e^{-\rho t}\,dt - \frac{2}{T^2}\int_0^T te^{-\rho t}\,dt$$

$$= \frac{2}{T}\left(\frac{1-e^{-\rho T}}{\rho}\right) + \frac{2}{\rho T^2}\left(Te^{-\rho T} + \frac{e^{-\rho T}-1}{\rho}\right)$$

$$= \frac{2}{\rho T}\left[1 - \frac{1}{\rho T}\left(1 - e^{-\rho T}\right)\right]$$

If we know the value of ρ and T, we can calculate the present discounted value of depreciation allowances under each method. The discount rate (ρ) of the corporations is the sum of the real after-tax discount rate (r*) and the expected inflation rate (π). The real after-tax discount rate is equal to a weighted average of the rate of return on debt and equity[50]:

$$r^* = f(\,i\,(1-u_F) - \pi\,) + (1-f)\,E,$$

[50] See Gravelle (1994), p. 291.

where f is the fraction financed by debt, i is nominal interest rate, u_F is the corporate statutory tax rate, and E is the return required by stockholders prior the personal level taxes.

Table A-3. Depreciation Methods

Asset type	Year	Depreciation Methods
Equipment (including Public Utility Structures)	1978-80	SYD
	1981	Double declining balance
	1982-86	150% declining balance
	1987-	3, 5, 7, 10-year class; double declining balance 15, 20-year class; 150% declining balance
Structures	1978-80	Nonresidential structures; 150% declining balance Residential; SYD
	1981-86	175% declining balance
	1987-	Straight line

Source: Gravelle (1994).

3. Expected Inflation Rate

In calculating the marginal effective tax rate, Hendershott & Hu (1981) calculate the expected inflation rate using the adaptive expectations model (a geometric weighted average of inflation of the previous seven quarters). Gravelle (1994) uses the expected inflation rates of the Drexel-Burnham-Lambert Decision Makers Poll for the period 1979-1989, and those calculated, based on Hendershott and Hu's adaptive expectations model, for the period 1953-1978.

The data of the Drexel-Burnham-Lambert Decision Makers Poll is no longer available since 1989. And the adaptive expectation model has lost its theoretical reliability. So, I use the *Livingston Survey* data, which is historical data on the expected inflation rates maintained by the Federal Reserve Bank (FRB) of Philadelphia. The FRB of Philadelphia collects forecasts of inflation and other economic variables from economists in academic profession and business. The Livingston Survey data are frequently used in empirical studies in macroeconomics[51]. Table A-4 compares the expected inflation rates from the Livingston Survey and actual inflation rates. For the years 1979-1981 and 1988-1991, the actual inflation rates were higher than the expected inflation rates. And for the years 1982-1987 and 1992-1996, the actual inflation rates were lower than the expected inflation rates.

[51] For example, Clarida (2000).

Table A-4. Comparison of the expected and actual inflation rates

Year	Livingston Survey (CPI)	Actual CPI	Actual GDP Deflator
1979	7.096	11.3497	8.5
1980	9.629	13.4986	9.2
1981	10.269	10.3155	9.4
1982	7.198	6.1606	6.3
1983	5.131	3.2124	4.3
1984	5.319	4.3173	3.8
1985	4.781	3.5611	3.4
1986	3.954	1.8587	2.6
1987	3.689	3.6496	3.1
1988	4.095	4.1373	3.7
1989	4.769	4.8183	4.2
1990	3.964	5.4032	4.3
1991	3.835	4.2081	4
1992	3.364	3.0103	2.8
1993	3.387	2.9936	2.6
1994	3.183	2.5606	2.4
1995	3.469	2.8340	2.3
1996	2.879	2.9528	1.9

Sources: *Economic Report of the President* and www.phil.frb.org.

4. Other Variables

Hulten and Wykoff (1981) estimate the economic depreciation rates for 34 asset categories. For the economic depreciation rates for each asset, I assume that Hulten and Wykoff (1981)'s estimated values still hold. Gravelle (1994) recalculates the economic depreciation rates for 28 asset categories based on Hulten and Wykoff's estimated values. Gravelle (1994)'s economic depreciation is presented in Table A-5. Lifetime of assets is reported in Table A-6. For nominal interest rates, I use Baa bond rates from *Economic Report of the President 1999*.[52] For the required return to stockholders prior to personal taxes, I set it equal to the real after-tax rate of return, plus a risk premium of 4 percent.[53]

[52] See Gravelle (1994), p. 293.

[53] See Gravelle (1994), pp. 291-293.

Table A-5. Economic Depreciation Rates

Asset Type	Economic Depreciation Rate
EQUIPMENT	
1. Autos	0.3333
2. Office/computing Equipment	0.2729
3. Trucks, Buses, and Trailers	0.2537
4. Aircraft	0.1818
5. Construction machinary	0.1722
6. Mining/oilfield equipment	0.1650
7. Service industry equipment	0.1650
8. Tractors	0.1633
9. Instruments	0.1473
10. Others	0.1473
11. General industrial equipment	0.1225
12. Metalworking machinery	0.1225
13. Electric transmission Equipment	0.1179
14. Communications equipment	0.1179
15. Other electrical equipment	0.1179
16. Furniture and fixtures	0.1100
17. Special industrial equipment	0.1031
18. Agricultural equipment	0.0971
19. Fabricated metal	0.0971
20. Engines and turbines	0.0786
21. Ships and boats	0.0750
22. Railroad equipment	0.0660
STRUCTURE	
1. Others	0.0663
2. Industrial	0.0454
3. Public utility	0.033
4. Commercial	0.0316
5. Farm	0.0230
6. Residential	0.0237

Source: Gravelle (1994).

Table A-6. Asset Lifetimes

Asset type	78-80	81	82-83	84-86	87-92	93-
EQUIPMENT						
Autos	3	2.5	2.5	2.5	5	5
Office/computing equipment	7	4.5	4.5	4.5	5	5
Trucks, buses, and trailers	5	4.5	4.5	4.5	5	5
Aircraft	9.2	4.5	4.5	4.5	6.8	6.8
Construction machinery	5	4.5	4.5	4.5	5	5
Mining/oilfield equipment	9.2	4.5	4.5	4.5	7	7
Service industry equipment	9.9	4.5	4.5	4.5	7	7
Tractors	7.1	4.5	4.5	4.5	6.4	6.4
Instruments	10.3	5.1	5.1	5.1		
					5(12%)	5(12%)
					7(81%)	7(81%)
					20(7%)	20(7%)
Others	8.8	4.5	4.5	4.5	7	7
General industrial equipment	9.9	4.9	4.9	4.9		
					3(4%)	3(4%)
					5(14%)	5(14%)
					7(73%)	7(73%)
					20(9%)	20(9%)
Metalworking machinery	7.8	4.2	4.2	4.2	6.7	6.7
Electric transmission equipment	13.8	7.3	7.3	7.3		
					5(5%)	5(5%)
					7(53%)	7(53%)
					20(42%)	20(42%)
Communications equipment	11.5	4.5	4.5	4.5	5	5
Other electrical equipment	9	4.5	4.5	4.5	7	7
Furniture and fixture	8	4.5	4.5	4.5	7	7
Special industrial equipment	9.2	4.5	4.5	4.5	6.5	6.5
Agricultural equipment	8	4.5	4.5	4.5	7	7
Fabricated metal	14.2	6.6	6.6	6.6		
					5(18%)	5(18%)
					7(40%)	7(40%)
					20(42%)	20(42%)
Engines and turbines	18.1	10.8	10.8	10.8		
					15(25%)	15(25%)
					2(75%)	2(75%)
Ships and boats	16	4.5	4.5	4.5	10	10
Railroad equipment	15	9.5	9.5	9.5	7	7
STRUCTURES						
Others	31	15	18	19	31.5	39
Industrial	36	15	18	19	31.5	39
Public utility	22	12.9	12.9	12.9		
					15(25%)	15(25%)
					2(75%)	2(75%)
Commercial	37	15	18	19	31.5	39
Farm	20	15	18	19	20	20
Residential	31	15	18	19	27.5	27.5

Source: Gravelle (1994).

5. Calculation

I calculate marginal effective tax rates for 28 assets, using the information described above. Then I calculated the METR for two broad assets (equipment and structures). I use Gravelle (1994)'s asset share calculation (Table A-7). To calculate the METR by industry, appropriate weights are needed. I use Gravelle (1994)'s capital stock share (Table A-8) as the weights. My calculation of the METR for 4 industries is presented in Table 8 in Chapter 4.

Table A-7. Asset Share

Asset type	Asset Share
EQUIPMENT	
Autos	4.6
Office/computing equipment	5.0
Trucks, buses, and trailers	8.3
Aircraft	1.9
Construction machinery	3.4
Mining/oilfield equipment	1.7
Service industry equipment	3.2
Tractors	2.9
Instruments	6.5
Others	2.7
General industrial equipment	6.8
Metalworking machinery	6.7
Electric transmission equipment	5.4
Communications equipment	10.5
Other electrical equipment	1.8
Furniture and fixture	5.8
Special industrial equipment	6.6
Agricultural equipment	4.9
Fabricated metal	3.3
Engines and turbines	2.0
Ships and boats	2.3
Railroad equipment	4.4
STRUCTURES	
Mining	7.6
Others	1.3
Industrial	16.7
Public utility	27.8
Commecial	40.6
Farm	6.1

Source: Gravelle (1994).

Table A-8. Capital Stock Share by Industry

Industry	Equipment	Structures
Agriculture	0.479	0.521
Mining	0.389	0.611
Construction	0.838	0.162
Transportation	0.766	0.234
Public Utility	0.174	0.826
Trade	0.299	0.701
Finance, Insurance, and Real Estate	0.354	0.646
Services	0.354	0.646
Manufacturing	0.508	0.402
Food	0.444	0.556
Chemicals	0.557	0.443
Metal	0.540	0.460
Machinery	0.531	0.469
Other Manufacturing	0.495	0.505

Source : Gravelle (1982).

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