

Chapter 1

Introduction

This dissertation integrates several areas for public finance and labor economics to answer open questions concerning taxation and compensation practices in the financial service industry. Chapter 2 and 3 studies taxation, while chapter 4 pertains to compensation practices in the financial service industry.

Although USA is the largest economic powerhouse in the world, the future of US economy may depend on international competitiveness of US firms. Competitiveness of American firms will be influenced by many different factors, and my dissertation is focused on the tax policy and employee compensation structure among those factors.

US tax policies are often blamed for undermining its international competitiveness. In the first two chapters of the dissertation, I analyze the impact of tax policy changes on American firms' profitability and strategic positioning by examining the banking industry. Recent trend of globalization and economic integration increase the importance of strategic development of human resources, and employee compensation regime would have a key role in maintaining competitiveness of work force. The last chapter of the dissertation is devoted to explain a stylized fact called the cohort effect in firms' wage determination process.

Chapter 2 relies on event-study methodology to examine the effect of "Subpart F exemption on active financing income" on the expected profitability of banks and bank holding companies(BHC). The U.S. adopts a worldwide tax system under which income is taxed regardless of whether it is earned in the U.S. or abroad. Income generated outside of U.S. in a foreign subsidiary is not in general subject to U.S. taxation until such earnings are repatriated to the home country. However, prior to TRA' 97, financial institutes were taxed on income from foreign loans and leases as the income was earned since Subpart F allowed immediate taxation for them. Lifting the Subpart F off for foreign finance companies by TRA' 97 was expected to strengthen the business carried on by the foreign finance subsidiaries. Therefore, investors in the Wall Street might react to this favorable information with pushing the equity prices to upper-right corner. Empirical tests are conducted over the data collected from two different sources. In line with the expectation, I find strong positive response to the tax policy change. Banks with

sizable foreign operation show significantly higher abnormal returns than banks without foreign operation as the exemption rule allows tax deferral on foreign source incomes.

Chapter 3 examines different responses on corporate taxation between manufacturing and banking FDI. There is considerable evidence that economic activities respond to the tax policies. Given the fact that tax planning is an important decision factor for a firm regardless of types of the industry, sizable evidence reported is rather expected. However, reported evidence so far omits consideration of differences in the business practices among different industries, specifically between manufacturing and banking. If a multinational company(MNC) in one industry has more advantages on any aspect of FDI than an MNC in another industry, different economic incentives may cause different tax response patterns between the industries. Empirical test is conducted with a difference equation on MNC's investment decision using the data on outgoing FDI and foreign income tax rates across countries. The result of empirical test indicates that tax rates negatively affect FDI decision for both banking and manufacturing sector as previously reported. However, banking FDI is more sensitive to variations in corporate tax rates across countries than manufacturing FDI is.

Chapter 4 departs from the topic of taxation, investigating the reasons why the cohort effect is observed in the labor market. Theories in firm's wage determination emphasize various functions of wage such as motivation/incentives, selection/assignment/retention, and risk sharing. It is quite obvious that wages should be associated with performance. Both theories and empirics support that employees with higher productivity are paid higher wage. However, patterns in wage increase appear to be somewhat inconsistent with employees' productivity improvement. Starting salaries for new hires in a firm are in general very flexible, reflecting current labor market conditions. In contrast, average wage growth with tenure once hired does not offset these initial effects, and variations in cohort starting wage are not related to observed cohort characteristics. Although some theoretical explanations for the cohort effect have been suggested, empirical analyses are relatively few partly due to limitation in available data. In this chapter, I test different theoretical implications to identify driving factors of the cohort effect. Personnel records from a large US insurance company are analyzed to identify the firm's wage cohort effect. From a long-term contract model and a human-capital accumulation model, I derive implications on the driving factors of the wage cohort effect. I find that the cohort effect is mainly driven through promotion and the entry-year unemployment rates partially explain the cohort effect. Contrary to the human-capital accumulation model's expectation, productivity is not observed to explain the cohort effect.

Chapter 2

Taxation and the Equity Value of Banks: Subpart F Exemption on Active Financing Income of TRA' 97

I. Introduction

The U.S. adopts a worldwide tax system under which income is taxed regardless of whether it is earned in the U.S. or abroad. Income generated outside of U.S. in a foreign subsidiary is not in general subject to U.S. taxation until such earnings are repatriated to the home country. However, rules have been added over the years which allow immediate taxation on certain types of business income earned abroad, not based on when such income is repatriated, but on when it is actually obtained. These rules are found in Subpart F of the Internal Revenue Code(henceforth, Subpart F). The initial targets of Subpart F, when first introduced in 1962, were primarily passive and/or mobile investment-type incomes earned by foreign subsidiaries of U.S. multinational companies. However, over the last 40 years, the scope of Subpart F income has been expanded quite beyond initial definition to contain certain active incomes from business activities abroad such as sales, services, shipping, pipeline, and other forms of active incomes.

Prior to the Taxpayer Relief Act of 1997(H.R. 2014), the Subpart F viewed all finance income as passive investment income, and the tax law was unanimously applied even when foreign operations were located in a country for reasons completely unrelated to tax considerations. Financial institutes including banks were taxed on income from foreign loans and leases as the income was earned, rather than permitted such income to be deferred until foreign dividends were paid. When compared with other countries' tax systems, U.S. has the most immediate taxing rules for foreign source income. Thus, Subpart F is often blamed for putting U.S. multinational banks in competitive disadvantage because of its unfavorable tax treatment for foreign incomes. Lifting the Subpart F off for foreign finance subsidiaries allows them to defer their US tax liabilities until repatriation. This might strengthen the business carried on by the foreign finance companies, and thus investors in Wall Street may react to it by pushing the equity price

upward.

This chapter relies on event-study methodology to examine the effect of a legislative change in taxation on the expected profitability of banks. Specifically, I intend to examine whether the Subpart F exemption rule has any impact on banking sector, and quantitatively measure the size of impact. The central argument is that a favorable tax law change may enhance banks' expected profitability, thus push the share prices upward under the efficient market hypothesis. Empirical result indicates stock prices positively respond to the legislative change, implying Subpart F exemption increases firm values.

The remainder of the chapter is organized as follows. Section II reviews previous studies and background of Subpart F. Section III explains events of interest related to TRA' 97. Section IV describes the data for empirical test and methodology, and the results are presented in Section V. The final section concludes and offers suggestions for future research.

II. Previous Studies and Legislative Background of Subpart F

Previous studies on the effect of tax on equity values are heavily focused on the relationship between investor level taxation and stock returns, while little attention has been paid to the consequence of taxation on corporate income toward stock returns. Views on the effect of personal tax rates on equity values in the existing literature are quite mixed. Brennan(1970), Auerbach(1979), and Bradford(1981) argue that the taxation of dividends and/or capital gains would affect share prices since the equity prices in market capitalize potential future tax liabilities along with present ones. In contrast, Miller and Scholes(1978, 1982), and Hamada and Scholes(1985) argue that taxes should not affect stock prices because investors can take advantage of tax rules by converting dividends into capital gains, and thus tax differentials can be neutralized on the margin.

Empirical evidence so far is mixed as well. Black and Scholes(1974), Gordon and Bradford(1980), Lakonishok and Vermaelen(1983), and Chen, Grundy, and Stambaugh(1990) report evidence to support that tax is irrelevant to stock prices. However, evidence supporting the other side is abundant. Litzenberger and Ramaswamy(1982), Booth and Johnston(1984), Poterba and Summers(1984, 1985), McKenzie and Thompson(1995), McGrattan and Prescott(2005), and Sialm(2005) provide support for the tax relevance. This mixed evidence does not provide any conclusive consensus about the effect of individual tax rates on the equity values.

One of the important recent foreign tax changes for financial firms is the exemption for active financing income. In the early 1960s, the U.S. Treasury Department,

concerned about tax haven operations and transfer pricing abuses, initiated procedures not to allow deferral by taxing foreign subsidiaries' incomes when they were earned. However, the U.S. Congress eventually rejected the proposal and adopted instead the Subpart F provisions that eliminated deferral selectively for the types of income that could be easily shifted to tax havens such as passive investment income, third-country sales and service income, and income from insuring U.S. risks. The Subpart F was additionally applied to international shipping income that was not reinvested in shipping assets in 1976, and to oil-related income in 1983. The Tax Reform Act of 1986 extended application of Subpart F furthermore and enacted new limitations on the foreign tax credit. The series of changes in Subpart F affected business income of various service industries, including dividends and interest income earned by foreign banking, insurance, and other financial service subsidiaries, even when such income was resulted from unrelated persons and in the active practice of a bona fide business of a foreign subsidiary.

In 1997 Congress adopted an exception to subpart F of the Internal Revenue Code of 1986 for foreign finance companies that comply with significant active business tests in Section 954(h)(2)(A) of the Code. This exception is considered to strengthen the business carried on by the foreign finance companies. Moreover, the exception is expected to be considerably important even to manufacturing firms as the customers of manufacturers have strong needs in securing adequate financing for their purchases of manufactured goods. However, the provision was selected for line-item veto by President Clinton in 1997, and later reinstated as a result of the United States Supreme Court decision ruling the line-item veto unconstitutional in 1998. The reinstated provision was applied only for taxable years of foreign subsidiaries beginning in calendar year 1998. Since 1997, Congress has acted twice to keep in place the subpart F reforms for financial services firms. In the Tax and Trade Relief Extension Act of 1998 included in the omnibus FY 1999 appropriation legislation, Congress modified and extended the reforms for an additional year. In 1999, Congress again extended the reforms, this time for two years, in the Tax Relief Extension Act of 1999. The deadline was extended until December 30, 2006 with repeated amendments, and permanent exemption is likely to be established.

Changes in Subpart F regulations can alter the firm's decision on whether to invest earnings and profits abroad in passive investments. If the pretax rate of return on passive investments abroad is the same as one in the home country, then the firm would opt to reinvest abroad as long as the foreign earnings are taxed at home only on repatriation. This is because repatriation tax on foreign incomes can be deferred.

Consider a firm which repatriates its foreign earning and reinvests at home for n periods¹. If E_0 represents the amount of earnings and profits that are repatriated, the amount remaining after paying the home-country tax is:

$$E_0 - \frac{E_0}{(1-t_f)}(t_d - t_f) = \frac{E_0(1-t_d)}{1-t_f} \quad (1)$$

where t_d is a domestic tax rate, and t_f is a foreign tax rate.

If the company reinvests this amount at home for n periods at a pre-tax rate of return of R_d , the accumulation in n periods yields:

$$\left[\frac{E_0(1-t_d)}{(1-t_f)} \right] \times [1 + R_d(1-t_d)]^n \quad (2)$$

Compare above domestic investment opportunity in passive assets with one abroad. Suppose that the firm leaves the earnings and profits abroad and invests in passive assets. Then, the annual rate of return from the passive assets after paying the home tax will be:

$$R_f(1-t_f) - \frac{R_f(1-t_f)}{1-t_f}(t_d - t_f) = R_f(1-t_d) \quad (3)$$

where R_f is a foreign pre-tax rate of return. After the firm repatriates in n periods and pays home tax on the original earnings and profits(E_0), the net accumulation will be:

$$E_0[1 + R_f(1-t_d)]^n - \frac{E_0}{1-t_f}(t_d - t_f) \quad (4)$$

If we assume $R_f = R_d$, then the firm's net accumulation after n periods will be:

$$E_0(1+r_d)^n - \frac{E_0}{1-t_f}(t_d - t_f) \quad (5)$$

¹ See Hines(1994) for more detailed discussion.

where r_d is the after-tax rate of return at home. Note that E_0 in (5) represents the non-Subpart F earnings and profits that is not subject to domestic taxation until repatriation. The first term in the above represents the net-of-tax accumulation from earnings reinvested in passive assets abroad. The second term shows a fixed amount of tax liability on repatriation. If the home country imposed an interest charge on the repatriation tax at r_d , then the firm would be indifferent between reinvesting abroad and repatriation. However, such an interest charge is in general unlikely. Thus, it will benefit the firm by reducing the present value of the tax liability as long as the firm keeps reinvesting abroad. Reinvesting abroad in passive assets can be superior to repatriating even when the pretax return on foreign passive assets is lower than ones at home. However, it is typical for firms to invest in the same passive assets abroad as they do domestically, so the pretax returns between foreign and domestic passive investments will be quite close to each other.

III. Events in Legislation Process

Dates of two significant events are identified. A tentative agreement between the White House and GOP leaders on the final details of a plan to balance the budget and a major tax cut, which included the provision of Subpart F exemption for active financing income, was announced on July 29, 1997. Then, the House adopted the tax cut plan by a 389 to 43 vote on July 31, 1997, and the Senate promptly voted 92 to 8 to approve the tax package on the same date. Clinton signed for the balanced budget plan and tax cut package on August 5, 1997. Although the provision of Subpart F exemption was finalized by Clinton's signing of the bill, it is more reasonable to recognize the date on which the agreement was announced as the day of the event since Wall Street would interpret the announcement as actual approval. This agreement is referred to as Event 1 later on.

Clinton surprised Wall Street by selecting Subpart F exemption rule for his first-ever line-item veto on August 11, 1997. However, this surprise immediately triggered doubt on whether the line-item veto power is constitutional. The United States Supreme Court ruled the line-item veto unconstitutional as expected on June 25, 1998, and the Subpart F exemption on active financing income was reinstated as a result. The exercise of line-item veto is referred as Event 2 later on. Table 2.1 summarizes these two events.

Given the dates of events, two different event windows are considered, 3-day and 7-day event windows. 3-day interval spans from day -1 through day +1, and 7-day does from day -4 through day +2. The inclusion of days prior to the event day reflects the

possibility of pre-event information leakage and/or the market's anticipation for the ultimate fate of the provision, which are not uncommon. For estimation windows, I use return records on 200 trading days prior to the events. The estimation period begins October 10, 1996 and ends on July 22, 1997 which is one day prior to the 7-day window for the Event 1.

IV. Data and Methodology

The stock market data are daily returns obtained from CRSP. The sample consists of 30 publicly traded banks or bank holding companies (BHCs) listed in the NYSE. Of these 30 sample firms, twelve are titled either national commercial banks or state commercial banks, and the other eighteen are titled bank holding companies by SIC. Table 2.2 describes detailed list of banks and BHCs included in this study. Return on S&P 500 index obtained from CRSP is used as a proxy for the market return. Data on the foreign tax status of banks or BHCs are gathered from SEC's EDGAR database. Sixteen banks filed positive amounts of foreign income tax averaging \$215 millions, while the other 14 show no record of foreign income tax.

To examine the effect of Subpart F exemption on expected profitability, I investigate the stock market effect prior and after the events. If Subpart F exemption ameliorates expectation on potential bank profitability, then share prices should pick up as the market receives the information. In contrast, share prices should fall back to prior-to-event levels when the market was surprised by Clinton's line-item veto exercise which reversed the Subpart F exemption on active financing income.

Normal outcomes during the event window in the absence of the event are predicted as follows:

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \varepsilon_{jt} \quad (6)$$

where R_{jt} is a daily return on individual bank, R_{mt} is a daily market return measured by the return on S&P 500 index, j indexes individual banks, and t indexes time over the trading days to estimate α_j and β_j , and ε_{jt} is an error term with identically and independently distributed $N(0, \rho_j^2)$. Estimates of α_j and β_j are obtained through running separate regressions for each bank on 200 observations before the events. Note that return, the dependent variable in the regression, is simply the CRSP variable for a given stock's daily return, while the independent variable is the value-weighted return of an index. This

process iterates over the banks, runs a regression in the estimation window for each, and then uses that regression to predict a normal return in the event windows. Let a_j and b_j denote the OLS estimates of α_j and β_j , then the estimate of ρ_j^2 will be:

$$s_j^2 = \frac{1}{T_j - 2} \sum_{t=1}^{T_j} (R_{jt} - (a_j + b_j R_{mt}))^2 \quad (7)$$

where T_j represents the number of observations in the estimation window.

I calculate the abnormal and cumulative abnormal returns based on previous estimation results on a_j and b_j . The daily abnormal return (AR) is computed by subtracting the predicted normal return from the actual return for each day in the event window.

$$AR_{jf} = R_{jf} - (a_j + b_j R_{mf}) \quad (8)$$

where f indexes the event windows and $f = -4, -3, \dots, +2$ for 7-day event windows, and $f = 1, 0, +1$ for 3-day event windows. The sum of the abnormal returns over the event window is the cumulative abnormal return (CAR).

$$CAR_{jf} = \sum_f AR_{jf} \quad (9)$$

Cumulative abnormal returns show the market reaction to the events. If all the assumptions of the model are correct, and if the event has no effect, then the cumulative abnormal returns should not be significantly different from zero. Instead of looking at the average abnormal return for each bank, I run regressions of the cumulative abnormal returns for all banks treated as a group on a constant. The P-value on the constant from this regression will provide the significance of the cumulative abnormal return for all banks.

V. Empirical Results

Table 2.3 shows the results from stock market response with respect to the change in Subpart F rules. As shown in the first row of the table, bank stocks appear to outperform the market by 2% over the 3-day event window, and by about 3% over the 7-

day event window, and returns are statistically significant for both time spans. Note, however, that this result may show how the banking sector evaluates not the changes in Subpart F exemption rule, but overall tax law changes.

Based on the foreign income tax found in 10-K filing, I divide banks into two different groups to measure the effect of Subpart F exemption on active financing income. Sixteen banks filed positive amount of foreign income tax in 1997, and 14 banks filed either negligible or no foreign income tax. If a bank does not have any foreign tax liability, the changes in Subpart F rule would be less likely to affect its tax deferral prospect, and thus its stock price might move differently from that of a bank with foreign income tax. Results in Table 2.3 are consistent with this argument. Banks filing positive foreign income tax outperform the market by 2.85% on average for the 3-day time span, while banks with no foreign income tax show lower CAR at 1.16% over the same time period. The difference between the groups is 1.69% over 3 days, and is statistically significant. As the event window is extended, the sizes of CARs increase for both groups. Over the 7-day time span, banks filing positive foreign income tax outperform the market by 3.69% on average, and the other group by 2.76%. Though the group with foreign income tax outperforms the group without one, the difference between the groups is no longer significant.

Although the estimation of the coefficients is rather straight forward, interpretation is quite complicated as in most of event studies. The estimated coefficients measure the effect of the Subpart F exemption rule only to the extent of how uncertain the rule would become part of the tax reform act. If the provision was well-expected to be included in TRA'97 in advance, then the estimated coefficients would measure only very limited portion of the effect of Subpart F exemption rule. Media research reveals that banks kept lobbying actively for a long time prior to TRA'97 in order to obtain the exemption rule. While it would be hard to determine to what extent the exemption rule was expected, this implies that the estimated coefficients could under-estimate the actual effect of the Subpart F exemption rule.

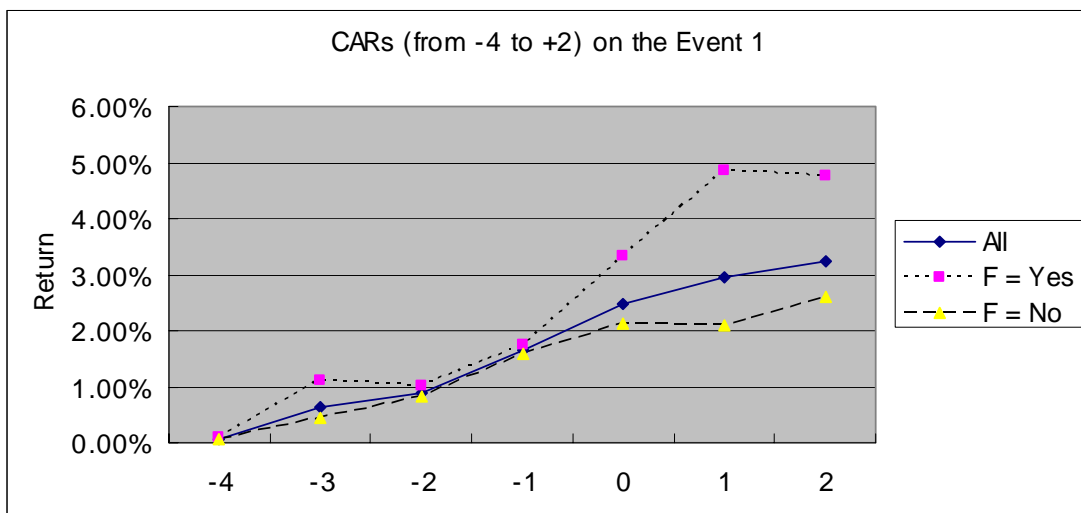
Effect of the Subpart F exemption is also subject to the duration of the tax reform act. TRA'97 allows the Subpart F exemption to the financial service firms only for two years. If the exemption is only temporary for relatively short time period, the effect may not be so significant. However, the majority expectation was on the side of future extension of the provision. Actually, the exemption rule was kept in place through repeated revision of related act. Observed coefficients, then, may measure the effect of the exemption rule which is reasonably assumed to be permanent.

TRA'97 includes tax provisions which could potentially affect the performance of

financial service firms. If so, the observed coefficients would include the effect of the other tax provisions, and they can either over-state or under-state the effect depending on what other tax provisions do for the financial sector. This type of bias could be partially controlled by dividing banks into two different groups with their foreign presence and focusing on the variation between the groups. There appears not to be other tax provisions which differently affect the two groups as the Subpart F exemption rule does.

Figure 2.1 shows the movement of the cumulative abnormal returns for each group over the 7-day event window before and after the Subpart F exemption rule was agreed.

Figure 2.1

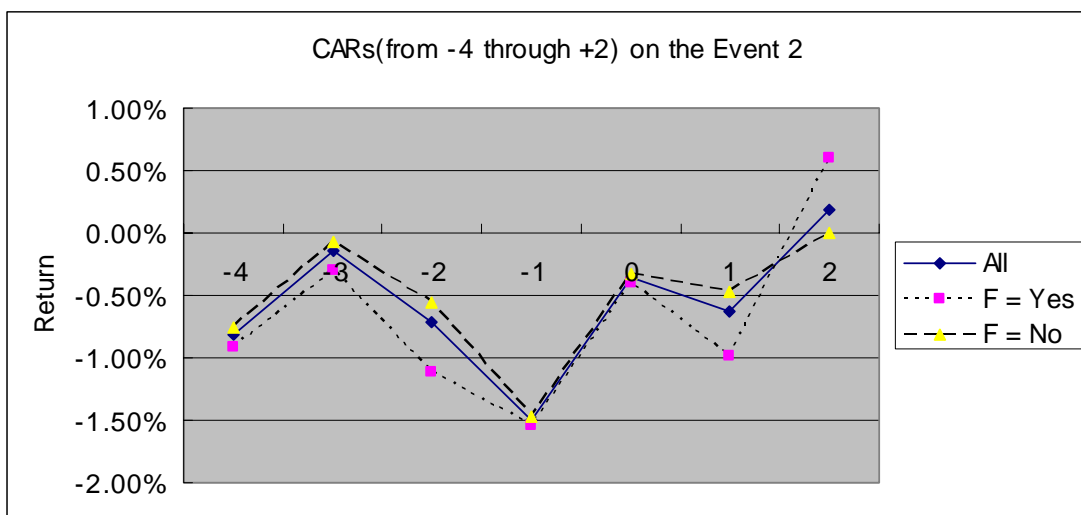


The analysis is repeated for the second event of interest. Table 2.4 shows the resulting stock market response with respect to Clinton's exercising the line-item veto. Since the reversal of Subpart F exemption had a negative impact on banks' tax prospect, this new information is expected to drive down the stock prices for banks, especially for banks with significant foreign operations. However, as shown in the first row of the table, CAR on average is not significantly different from zero, providing no evidence for underperforming in the market. This is true even when tests are done for the two different groups. Both for 3-day and for 7-day event windows, CARs are not significantly different from zero, and difference between the groups does not appear to be meaningful.

For the banks without foreign operations, the market performance during the event windows looks quite reasonable since the reversal does not directly affect their tax

status. On the contrary, the absence of movement in red for stock prices in the other group is contradictory to the expectation. This seemingly contradictory result can be reconciled when we take the expectation of line-item veto power into account. Though Clinton’s line-item veto surprised the market enough, it was strongly doubted whether Clinton’s new power was constitutional. Line-item veto was immediately challenged by a lawsuit, and its short-lived fate was widely expected. If this was Wall Street’s consensus on the issue, the market might not react to the news. Figure 2.2 shows the movement of the cumulative abnormal returns for each group over the 7-day event window before and after the line-item veto by Clinton.

Figure 2.2



A close investigation on 10-K filing reveals that most of foreign banking activities are involved with major big players. The major big 6² banks account for more than 90% of total foreign income taxes, and thus these big 6 are more likely to benefit by the Subpart F exemption than other banks. An analysis on the difference between these newly defined groups will add a robustness check on the previous test. Instead of analyzing the difference between the big 6 and all other banks, I rather focus on the big 4 banks with BankAmerica and Morgan JP excluded from the big 6. This is because detailed financial information needed in later analysis is only available for the included four banks. However, test results using either big 4 or big 6 are consistent with each other, and

² The major 6 banks include BankAmerica, Citicorp, Chase Manhattan, Morgan JP, Bankers Trust, and BankBoston.

estimated figures are not significantly different between big 4 and big 6. Actually, the test results with big 6 strengthen the difference between the major banks and the other banks.

Table 2.5 shows the test results on the event 1. The big 4 shows superior performance to all others over the event windows, and this is more obvious over the 7-day time span. Big 4 outperformed the market by 3.55% and the other banks by 1.72% over the 3-day period, and these are statistically significant. The result is even stronger over the 7-day period. The difference in CARs between the groups increases to 2.32% during the period.

The analysis is repeated for Event 2, and Table 2.6 shows the test results. As in Table 2.4, banks other than the big 4 do not show any significant response on the line-item veto. In contrast, it is surprising that the big 4 keep reporting significantly positive abnormal returns for both the 3-day and the 7-day event windows. Even if a short-lived fate of the line-item veto was well expected, it is puzzling to have such significant price movements on the news.

Analyses so far indicate that stock prices positively respond to Subpart F exemption on active financing income, and neutrally on line-item veto except the big 4 case. Note that the big 4 outperformed the other banks by 1.72% over the 3-day event window, and by 2.32% over the 7-day one for the event of Subpart F exemption. It would be quite useful to examine whether the stated return gaps are reasonable. Constructed from financial information on the big 4, Table 2.7 estimates potential tax deferral benefits for the big 4 due to Subpart F exemption, and relates the estimated benefits with the abnormal returns observed in stock prices. If it is effective in year 1997, Subpart F exemption is estimated on average to allow \$198 millions of potential tax deferral benefits for the big 4. Based on the share prices as of July 22, 1997, the stated tax deferral benefit is found to be on average as large as a return of 1.02% in stock price.

The estimated return from the tax deferral benefit can be biased in two different ways when we compare it with the abnormal returns observed from stock prices. On one hand, the estimated return may be too small since it does not include the benefits from all future years. Note that the estimated return is only for 1997, while the abnormal returns in stock prices theoretically reflect all future benefits. On the other hand, the estimated return may be too large since deferral of foreign income tax is not equivalent to the exemption of foreign income tax. Note that the estimated return treats the deferral benefit the same as tax exemption, but banks may have to pay US tax eventually. With two offsetting biases considered, it may not be unreasonable to interpret the figures as being in sensible range.

Standard event study methodology is based on the assumption that the error terms

follow an independent and identical normal distribution. As is pointed out in several studies, however, the normality assumption on stock returns may not hold here. Hence, the application of bootstrapping is additionally conducted.³ Bootstrapping results are reported in Table 2.8 and 2.9 for the Event 1 and Event 2 respectively. Test results from bootstrapping are all consistent with the results reported in previous tables, and do not show any significant differences.

VI. Conclusion

In this chapter, I have examined the effect that Subpart F exemption on active financing income has on the expected profitability of banks. I find that, in the stock market, banks with significant foreign operations outperform banks without ones when Subpart F exemption was announced. The positive abnormal returns pick up as I narrow the target to the major banks to which most of foreign banking activities can be attributed. This is consistent with theoretical expectation. I also find that the line-item veto rather neutrally impacts stock prices possibly because it was expected to be ruled unconstitutional. When I compare the out-performance by major banks with potential tax deferral benefits due to Subpart F exemption, the overall results are indicative of reasonable market responses.

Subpart F exemption is not restricted only to banks and bank holding companies. Companies in insurance and other financial service areas are also exempted. While this study is focused only on the banking sector, it provides useful insights for other financial service companies as well. Testing the effect of the tax policy change over different types financial company would ameliorate our understanding on the issue.

³ Kramer(2001) and Lyon, Barber and Tsai(1999) discuss the bootstrap method in event studies. For a comprehensive introduction to the bootstrap method, see Horowitz(2001).

Table 2.1
Description of Events by Date

	Date	News
Event 1	7/29/1997	An agreement on the plan to balance budget and a major tax cut was announced.
Event 2	8/11/1997	Clinton exercised line-item veto power for the first time.

Table 2.2
List of Banks or BHCs by the Amount of Foreign Tax Paid in 1997

	Bank Name / Holding Co Name	
	Positive Foreign Tax	No Foreign Tax
	Banc One Corp	AmSouth Bancorporation
	BankAmerica Corp	Centura Banks Inc
	BankBoston Corp	First Virginia Banks Inc
	Bankers Trust Corp	Firststar Corp
	Bank New York Inc	Fleet Financial Group Inc
	Chase Manhattan Corp	Keycorp
	Citicorp	National City Corp
	Comerica Inc	PNC Bank Corp
	First Union Corp	Star Banc Corp
	Mellon Bank Corp	Summit Bancorp
	Morgan JP & Co Inc	Suntrust Banks Inc
	Nationsbank Corp	TCF Financial Corp
	Norwest Corp	US Bancorp
	Republic New York Corp	Wachovia Corp
	State Street Corp	
	Wells Fargo & Co	
<i>n</i>	16	14
Avg. Foreign Tax	\$ 215 million	\$ 0

Table 2.3
Cumulative Abnormal Returns(CARs) on the Event 1^a

Sample	<i>N</i>	3 days (-1, 0, +1)	<i>t</i>	7 days (from -4 to +2)	<i>t</i>
All	30	2.06%	6.37**	3.25%	6.95**
F ^b = Yes	16	2.85%	6.07**	3.69%	5.16**
F ^b = No	14	1.16%	3.84**	2.76%	4.73**
Difference		1.69%	2.94**	0.93%	0.99

Notes) *a*: This table presents the mean cumulative abnormal returns(CARs) for banks and BHCs on the event of the Congressional approval of the TRA' 97 which includes the Subpart F Exemption on the Active Financing Income. *b*: F = Yes if a bank or BHC has any positive foreign tax in 1997, and F = No otherwise. **Statistically significant at the 0.05 level. *Statistically significant at 0.10 level.

Table 2.4
Cumulative Abnormal Returns(CARs) on the Event 2^a

Sample	<i>n</i>	3 days (-1, 0, +1)	<i>t</i>	7 days (from -4 to +2)	<i>t</i>
All	30	0.09%	0.31	0.18%	0.44
F ^b = Yes	16	0.33%	0.75	-0.01%	-0.02
F ^b = No	14	-0.18%	-0.47	0.40%	0.91
Difference		0.51%	0.86	-0.41%	-0.50

Notes) *a*: This table presents the mean cumulative abnormal returns(CARs) for banks and BHCs on the event of Clinton's line-item veto on TRA' 97 which includes the Subpart F Exemption on the Active Financing Income. *b*: F = Yes if a bank or BHC has any positive foreign tax in 1997, and F = No otherwise. **Statistically significant at the 0.05 level. *Statistically significant at 0.10 level.

Table 2.5
Cumulative Abnormal Returns(CARs) of Big 4 on the Event 1^a

Sample	<i>n</i>	3 days (-1, 0, +1)	<i>t</i>	7 days (from -4 to +2)	<i>t</i>
All	30	2.06%	6.37**	3.25%	6.95**
F ^b = Yes	4	3.55%	5.63**	5.26%	5.70**
F ^b = No	26	1.83%	5.36**	2.94%	5.90**
Difference		1.72%	1.88*	2.32%	1.74*

Notes) *a*: This table presents the mean cumulative abnormal returns(CARs) for banks and BHCs on the event of the Congressional approval of the TRA' 97 which includes the Subpart F Exemption on the Active Financing Income. *b*: F = Yes if a bank or BHC has significant foreign tax paid in 1997, and F = No otherwise. **Statistically significant at the 0.05 level. *Statistically significant at 0.10 level.

Table 2.6
Cumulative Abnormal Returns(CARs) of Big 4 on the Event 2^a

Sample	<i>n</i>	3 days (-1, 0, +1)	<i>t</i>	7 days (from -4 to +2)	<i>T</i>
All	30	0.09%	0.31	0.18%	0.44
F ^b = Yes	4	1.87%	2.59*	3.70%	7.35**
F ^b = No	26	-0.18%	-0.63	-0.36%	-0.99
Difference		2.05%	2.59**	4.06%	4.25**

Notes) *a*: This table presents the mean cumulative abnormal returns(CARs) for banks and BHCs on the event of Clinton's line-item veto on TRA' 97 which includes the Subpart F Exemption on the Active Financing Income. *b*: F = Yes if a bank or BHC has significant foreign tax paid in 1997, and F = No otherwise. **Statistically significant at the 0.05 level. *Statistically significant at 0.10 level.

Table 2.7
Estimated Benefit from Deferred Foreign Tax on Big 4 in 1997

	CHM	Citicorp	BT	BKB	Average
Foreign					
Income*	1,823	4,300	599	469	1,797
Foreign Tax*	575	1,225	201	105	526
Foreign					
Tax Rate ^a	31.54%	28.48%	33.56%	22.39%	28.99%
Domestic					
Tax Rate ^a	39.81%	37.20%	58.28%	48.45%	45.93%
Difference	8.27%	8.71%	24.73%	26.06%	16.94%
Potential					
Deferral					
Benefit (A)*	150	374	148	122	198
Shares					
Outstanding**	426,122	459,524	77,608	146,867	
Share Price ^b	105.50	127.62	95.12	77.06	
(A) / Share	0.3537	0.8152	1.9084	0.8322	0.9774
Estimated					
Return	0.34%	0.64%	2.00%	1.08%	1.02%

Notes) * in million US dollars. ** in thousand shares. *a*: Foreign and domestic tax rates are calculated using pre-tax incomes and total income taxes. *b*: Share price as of 7/22/1997.

Table 2.8
Parametric Statistics Repeated with Bootstrap Significance Levels on Event 1^a

Sample	<i>n</i>	3 days	3 days	7 days	7 days
		Patell	Portfolio Time-series	Patell	Portfolio Time-series
		<i>Z</i>	<i>t</i>	<i>Z</i>	<i>t</i>
All	30	5.22**	1.74**	5.48**	1.83**
F ^b = Yes	16	5.15**	2.15**	4.35**	1.83**
F ^b = No	14	2.22**	1.05**	3.37**	1.64**

Notes) *a*: This table presents the parametric statistics repeated with bootstrap significance levels for banks and BHCs on the event of the Congressional approval of the TRA' 97 which includes the Subpart F Exemption on the Active Financing Income. *b*: F = Yes if a bank or BHC has significant foreign tax paid in 1997, and F = No otherwise. **Statistically significant at the 0.05 level. *Statistically significant at 0.10 level.

Table 2.9
Parametric Statistics Repeated with Bootstrap Significance Levels on Event 2^a

Sample	<i>n</i>	3 days	3 days	7 days	7 days
		Patell	Portfolio Time-series	Patell	Portfolio Time-series
		<i>Z</i>	<i>t</i>	<i>Z</i>	<i>t</i>
All	30	0.52	0.15	0.58	0.18
F ^b = Yes	16	0.87	0.31	0.15	0.06
F ^b = No	14	-0.17	-0.08	0.69	0.33

Notes) *a*: This table presents the parametric statistics repeated with bootstrap significance levels for banks and BHCs on the event of Clinton's line-item veto on TRA' 97 which includes the Subpart F Exemption on the Active Financing Income. *b*: F = Yes if a bank or BHC has significant foreign tax paid in 1997, and F = No otherwise. **Statistically significant at the 0.05 level. *Statistically significant at 0.10 level.

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Chapter 3

Taxation and Foreign Banking Activities

I. Introduction

There is considerable evidence that economic activities respond to the tax policies. Given the fact that tax planning is an important decision factor for a firm regardless of types of the industry in which the firm belongs, sizable evidence reported is rather expected. However, reported evidence so far omits consideration of differences in the business practices among different industries, specifically between manufacturing and banking. Multinational corporations(henceforth, MNCs) in banking can be distinguished from manufacturing counterparts by the primary forms of assets in their balance sheets, methods of financing investment projects, degree of liquidity on capital, and/or tax treatment on their profits earned by their foreign affiliates. If an MNC in one industry has more advantages on any aspect of FDI than an MNC in the other industry, different economic incentives may cause different tax response patterns between the industries.

This chapter, thus, examines different responses to corporate taxation between manufacturing and banking FDI, to which little research attention has been paid. The result of empirical tests indicates that banking FDI is more sensitive to variations in corporate tax rates across countries than manufacturing FDI is. This is an interesting finding since different views of taxation may result in unintended tax incision and resource allocation. It is well-known that when tax is levied on a more mobile sector such as banking capital, a large portion of the tax burden is transferred to less mobile sector such as manufacturing capital. That is, banking capital turns its direction relatively quickly away from a country imposing higher tax rates by financing fewer investment projects in the country, resulting in actual tax burden partially falling on the manufacturing sector. From the perspective of policy-makers, this may not be desirable since such distorted capital allocation can cause economic inefficiency. Therefore, this finding would provide a supporting argument for such hotly-debated issues as extension of the Subpart F exemption for active financing.

The remainder of the chapter is organized as follows. Section II reviews a brief history of U.S. FDI abroad and discusses determinants of FDI. Section III explains recent trends in international taxation and related strategic issues. Section IV describes the data for empirical test, and the results are presented in Section V. The final section concludes and offers suggestions for future research.

II. Evolution of US FDI Abroad and Driving Factors

Trends in manufacturing FDI

The United States has experienced different phases in its foreign investment account. It was a borrower and international debtor before World War I, and turned to a lender for the first time between the World Wars. After World War II, the U.S. emerged as a major lender and creditor in the international financial world, but it became a borrower again from late 1980s to the present. U.S. direct investment abroad began while U.S. was still in a borrowing position, as U.S. pioneer manufacturers intended to exploit their competitive advantages over foreign competitors. The major expansion in the U.S. direct investment abroad took place through 1950s and 60s, and it exhibited a continuous upward trend throughout the 1990s. Table 3.1 shows the evolution of US direct investment abroad from the late 1980s in terms of the total assets of foreign affiliates.

As indicated in the table, the growth rates of total assets held by all foreign affiliates vary from 7.15% to 19.65%, averaging about 14% across 15 years.⁴ This contrasts with the growth rates of total assets held by manufacturing affiliates for the same period, which vary from 1.54% to 18.84%, averaging about 9.41%. This clearly indicates that the US FDI abroad expands more aggressively in areas other than manufacturing industry since early 1990s. Actually, the share of manufacturing FDI out of total FDI in terms of total assets held by foreign affiliates continues to decrease from 34.15% in 1998 to 18.42% in 2002 by almost half.

Literature on international economics has tried to explain various determinants of FDI. One of the prime decisions to be made is the location of FDI. Some seek the determinants from economic factors of host countries, arguing that FDI is drawn to countries with favorable market opportunities or production costs provided by lower wages or more abundant natural resources. Other theories are more focused on tax and other government policies as FDI determinants, suggesting that MNCs expand their

⁴ BEA data does not include information on depository institutions, mainly commercial banks. The industry classification is based on the industry of foreign affiliates.

presence across borders to take advantage of the benefits from the tax and other policy systems. Both theories analyze different facets of FDI, and are rather more complementary than mutually exclusive. Hence, the literature tends to combine these two streams of explanations on FDI determinants at the same time. Kravis and Lipsey(1982) find that the size of regional markets and propensity to trade have important roles determining the location of FDI, while the labor cost of the host country, which appears to be another important factor, does not significantly affect FDI choice of location. Lucas(1993), in contrast, finds that FDI is more elastic with respect to wages than to the cost of capital including taxes, confirming that size of market matters. He also argues that FDI rises with increasing costs within the investors' home countries and that political stability considerably affects FDI location choice. Head, Ries, and Swenson(1995) suggest that firms in the same industry may be drawn to the same locations since proximity provides with positive externalities or 'agglomeration effect'. With Japanese manufacturing FDI in the United States, they find that industry-level agglomeration benefits play an important role in location decisions. Mody, Razin, and Sadka(2002) argue that the abundance of intangible capital in the source countries, which generates expertise in cream-skimming investment projects in the host countries, enhances FDI. This implies that countries with a higher quality of corporate transparencies and stronger capital market institutions may attract less FDI flow. Cheng and Kwan(2000), analyzing FDI inflow in China, find that size of the regional market, infrastructure, preferential policy, and wage cost are important determinants of FDI. They also confirm that there is a self-reinforcing effect of FDI.

International exposure of U.S. Banks

International banking of U.S. banks has been heavily focused on Europe since the early 1900's and this reflects the importance of European countries as prime trade partners of the U.S.. During 1970's and 1980's, fast economic growth in some Asian and Latin American countries provided new profitable opportunities for American banks, resulting in a rising share of international banking by U.S. banks in those areas. In recent years, while the importance of European countries remains high, the share in the emerging market rises and that in Latin American countries declines relatively. Country exposure report by the Federal Financial Institutions Examination Council(FFIEC) exhibits ups and downs of U.S. banks' lending pattern around the world.

Foreign claims of U.S. banks are measured by the sum of cross-border claims and local country claims, and foreign lending constitutes a significant portion of foreign

claims to recipient countries. The cross-border claims cover all claims of the domestic offices of U.S. banks with residents of foreign countries regardless of the currency in which the claim is denominated. Local country claims consist of outstanding claims of the foreign offices of U.S. banks that are on residents of the country in which the offices are located. As represented in Table 3.2, both cross-border claims and local country claims continue to grow over time except in 1999, while the local country claims grow a little faster than the cross-border claims. The number of U.S. banks with significant foreign operations keeps decreasing from about 190 in the mid-1980s to 75 in 2004. Along with growing U.S. foreign claims, this implies that most U.S. foreign lending is provided by a few very large U.S. banks.

Distinct characteristics in the banking industry and concerns about monetary control make it more complicated to analyze banking FDI. Countries tend to put more restrictions on banking FDI than on other FDI since monetary authorities fear losing control of their money supply. Under the supervision of the Federal Reserve, U.S. international lending decisions tend to be determined by two different factors, external and internal. External factors are those considered to be beyond the control of a typical borrowing country. They include structural and cyclical elements leading U.S. banks to diversify their portfolios around the world. Such elements operate mainly through a temporary reduction in the attractiveness of industrial country assets, as may result from lower returns on investment or depressed cyclical conditions.

Two of the most widely discussed external factors are cyclical movements in interest rates and GDP in lending countries. In the early 1990s, short-term interest rates in the United States were declining, which directed investors in the developed countries to more attractive investment opportunities in Asian and Latin American nations with improving economic prospects. This implies in contrast that the monetary contraction in the U.S. would trigger capital out-flow from emerging markets since higher interest rates need debt price adjustment for developing countries. Fernandez-Arias(1996) argues that the widespread private capital inflows in 1990s is primarily driven by the decline in international interest rates which caused improvement in country creditworthiness during the period. In conjunction with interest rates, cyclical movement of GDP in lending countries is considered as another key determinant in international capital flow. Economic recessions in many developed countries in the early 1990s made investment opportunities in developing countries relatively more appealing, resulting in large capital inflow to developing countries. As with many of macroeconomic variables, interest rates and GDP fluctuate together with stylized patterns. Hence, literature focused on external determinants of international capital flow has tended to take both factors into account

given complex co-movements of macroeconomic factors. Gourinchas, Valdes, and Landerretche(2001) argue that capital inflows to Latin American countries are often associated with macroeconomic factors of lending countries such as an increase in domestic interest rates, decline in output growth, and domestic investment boom. Goldberg(2001) also finds that U.S. bank claims on emerging markets by U.S. banks are sensitive to fluctuations in U.S. interest rates and GDP, confirming the role of external factors in international capital flow.

Internal factors, which are generally related to domestic economic policies and economic performance, work through expectations of sustained improvements in the risk-return trade-off of investment projects in borrowing countries. These include broad improvement in macroeconomic policies, such as a stabilization of inflation combined with fiscal adjustment, short-run policies that boost the expected rate of return on local financial assets, and institutional reforms that increase the openness of domestic financial markets. Major disinflation policies implemented in some Latin American countries in the late 1980s and early 1990s reduced macroeconomic risks and stimulated capital inflow into the region. This provides a good example of the role of internal factors. Dahl and Shrieves(1999) find that more foreign credit extension is given by U.S. banks to countries with relatively sound economic performance. Monitel and Reinhart(1999) argue that capital flow responds to the countercyclical policies adopted by capital-importing countries such as sterilized intervention and capital controls.

Recent studies have tended to emphasize the complementary relationship of external and internal factors, with the first set of factors determining the timing and magnitude of flow and the second, their geographical distribution. Portes and Rey(1999) suggest that cross-border capital flow depends on the market size of both source and destination country as well as trading cost, supporting both external and internal factors as determinants of international capital flow. Chuhan, Claessens, and Mamingi(1998) find that country specific developments are at least as important as global factors such as the drop in the U.S. interest rates and the slowdown in the U.S. industrial production in explaining U.S. capital out-flow.

Comparison between manufacturing and banking

Comparison of balance sheet items between manufacturing and banking is useful in understanding intrinsic characteristics of each industry. When FDI is realized, a balance sheet reflects the finalized form of the investment regardless of how the investments are financed. Consider a manufacturing MNC in general. When FDI is made,

the investment would be usually realized as an asset in the form of property, plant and equipment. For many manufacturing firms, this type of property, plant and equipment is often firm-specific capital, or industry-specific at most. This implies that if a manufacturing MNC decides to move some of its capital from one country to another, or to retreat from a country, capital mobility and/or convertibility would be restricted to a certain extent.

In contrast to manufacturing firms, banks in general maintain their assets in forms of loans, deposit balance, or securities such as stocks, bonds, and various sorts of derivatives. One common characteristic of these types of assets is that they are relatively more liquid when compared with assets held by manufacturing firms. While some of the above are restricted in liquidity by term and maturity conditions, many of them are quite liquid in that they can be converted from one form to another within a short period of time at minimal cost due to developments in communication technology. Even for assets with maturity restrictions, existence of active secondary markets allow them to be regarded as reasonably liquid assets. Moreover, light-speed progress in computerized financial transaction technology enables these liquid assets to fly freely across borders.

Described differences in the nature of assets held by industries can result in different economic incentives between manufacturing and banking, and thus different patterns in business practices. Few studies have ever tried to analyze the potential importance and policy implications from this perspective.

III. International Corporate Taxation

This section presents recent changes and trends in international corporate taxation along with strategic issues faced by multinationals. Descriptions of strategic issues on multinational taxation are useful in understanding the business behavior of U.S. MNCs, and thus establishing a model framework described in Section V.

Recent trends in international corporate taxation

Literature on international tax competition has repeatedly found a recent trend of declining corporate income tax rates around the world. While statutory tax rates remained unchanged for some developed countries such as U.S., Belgium, and Canada, they show declining tendency on average. As described in table 3, U.S., Canada, and Belgium maintained the statutory tax rates for the period, but other countries experienced falling rates in general. One exceptional case is found in Argentina, which showed increases

through 1990s and early 2000s.

Table 3.3 describes the statutory corporate tax rates for selected countries. The downward trend found in the statutory tax rates is detected in the effective tax rate for U.S. MNCs over the same period as well. The effective tax rate is calculated as the ratio of foreign corporate income tax paid by foreign affiliates of U.S. MNCs to pretax net income. Effective tax rates on manufacturing MNCs are calculated using data from U.S. BEA, and these rates for banking industry using data from Bankscope database. Since the effective tax rate is calculated from the actual tax amount paid by the foreign affiliates, it conveys more information on tax environment faced by the MNCs. However, there are some companies with negative income, which causes an overstating problem in effective tax rates calculation.

In the analysis, the effective tax rate is defined as the lesser of the statutory tax rate and the average tax rate calculated as corporate income taxes paid by all U.S. affiliates in a country, divided by their total pretax net income⁵. In principle, this has the advantage of reflecting the amount of taxes that corporate affiliates actually pay. Note, however, that no single measure of the corporate income tax rate can accurately capture the precise differences in tax burdens corporations face in different countries. For instance, the complexity of tax codes such as different provisions for tax deductions and depreciation rules precludes the possibility of distilling a well-defined tax rate for each country. Although effective tax rates fluctuate over the time period, they show a relatively faster decline than statutory tax rates. Hines(2005) reports that the average effective tax rate faced by U.S. MNCs dropped by about 15% since early 1980s.

Table 3.4 shows the effective tax rate on U.S. headquartered manufacturing MNCs for selected countries. The effective tax rates for manufacturing firms exhibit significant discrepancy with the statutory tax rates. Primary reasons include the availability of generous depreciation deductions, tax credits, immediate write-offs of certain investments(such as advertising, research and development, and certain personnel costs), and myriad opportunities to postpone the recognition of taxable income. However, many of the above are not applied to commercial banks due to the characteristics of the banking industry. For example, commercial banks have little capital to which generous depreciation deductions are applied. Thus, effective tax rates for the banking industry are closer to the statutory tax rates than ones for manufacturing.

The effective tax rate can be written as:

⁵ Hines and Rice(1994)

$$t = \frac{(c - \delta) - r}{(c - \delta)} \quad (1)$$

where c is the user cost of capital, δ is the rate of economic depreciation, and r is the real after-tax rate of discount. The standard Hall-Jorgenson expression for c is given as follows:

$$(r + \delta) \frac{(1 - k)(1 - uz)}{1 - u} \quad (2)$$

where k is the rate of investment tax credit, u is the statutory corporation tax rate, and z is the present value of the depreciation allowances from one unit of capital. The unit cost of capital is assumed to be one for simplicity. Substituting (2) into (1) yields

$$t = \frac{(r + \delta)(u - k - uz + uz k)}{(1 - k)(1 - uz)(r + \delta) - \delta(1 - u)} \quad (3)$$

Note that the investment tax credit is seldom given to the banking sector, which implies k is equal to zero in the banking sector. Then, (3) reduces to

$$t = \frac{(r + \delta)(u - uz)}{(1 - uz)(r + \delta) - \delta(1 - u)} \quad (4)$$

Consider the depreciation factor in the banking sector. Unlike manufacturing firms, commercial banks have little capital for which general depreciation is applied. This implies that δ and z are almost equal to zero, resulting in the effective tax rate in the banking sector staying close to the statutory tax rate as follows:

$$t = \frac{(r + \delta)(u - uz)}{(1 - uz)(r + \delta) - \delta(1 - u)} \approx u \quad (5)$$

Therefore, the statutory tax rate offers a reliable proxy for the effective tax rate in the banking sector as the effective tax rate is not available.

Strategic issues in multinational tax planning

Many industrialized countries including the United States adopt the worldwide tax system. Under this system, a country would in general tax the worldwide income of its residents and domestic corporations and allow foreign tax credits to relieve the double taxation problem. Along with U.S. tax deferral for foreign subsidiaries, the system of foreign tax credits presents sophisticated problems and opportunities for U.S. MNCs.

American corporations are allowed to defer U.S. tax liabilities on their income earned by their foreign subsidiaries until repatriation.⁶ Then U.S. MNCs may want to delay their repatriation of foreign earnings for a long time, so that they can fully take advantage of tax deferral. The U.S. tax authorities have recognized such strategies and have written anti-abuse rules, namely the Subpart F rules. The Subpart F provisions classify certain types of income as Subpart F income which is subject to U.S. taxation not when the income is repatriated, but when the income is actually earned. Subpart F income is defined as passive income that can be easily transferred across jurisdictions and thus at risk of being shifted to tax havens.

It is necessary to describe how foreign tax credits are practiced for the purpose of complete understanding of the advantages of U.S. tax deferral on foreign subsidiaries. If U.S. multinationals pay foreign income tax, they are given foreign tax credits for the foreign taxes paid by their subsidiaries when the earnings are distributed to U.S. parents. Consider a U.S. multinational with a subsidiary only in two different countries, namely country A and B. For comparison, assume both subsidiaries earn \$100 in a given year. Country A and B impose corporate income tax rates of 30% and 20%, respectively, and the withholding tax rates on dividends are the same at 10%. U.S. corporate income tax rate is 35%. The resulting dividend for U.S. parent net of U.S. tax is given at Table 3.5.

Notice that when the foreign tax credit only for country A is calculated, only \$35 out of \$37 is allowed as a tax credit. This is due to the foreign tax credit limitation rules. Thus, the U.S. parent would receive dividends net of domestic and foreign taxes with \$63 generated by the subsidiary in country A, and \$65 by one in country B when a separate limitation on a country-by-country basis is applied. If the foreign tax credit limitation is calculated based on worldwide income which is the case in the United States, foreign tax credits are summed up to \$65. Hence, total dividend net of all taxes distributed to the U.S. parent is \$130, that is \$2 more than under the separate limitation rule since averaging out worldwide income balances off the \$2 of excess foreign credits from country A by \$7 of excess foreign tax credit limitation from country B.

One important decision in FDI with respect to tax is on the choice of

⁶ Notice that earnings by unincorporated foreign entities such as foreign branches are taxed immediately by the United States.

organizational form in a foreign country. Foreign subsidiary and foreign branch are the two most commonly taken. A foreign subsidiary is defined as a foreign entity classified as a corporation, and a foreign branch is a foreign entity not classified as a corporation. As the election of organizational form results in different tax environment in many countries, the U.S. tax law treats a foreign subsidiary and a foreign branch in different ways, giving advantages and disadvantages for both organizational forms. For a foreign branch, losses from foreign operation are immediately deductible against U.S. domestic income, which is very attractive in the start-up period. Property transfers to a foreign branch do not cause an additional tax burden to the U.S. parent, while transfers to a foreign subsidiary are taxed in a certain case. However, the earnings of the branch are immediately taxed by the U.S. government, while the earnings of the subsidiaries are not taxed until repatriation. This tax deferral is the most important advantage of foreign subsidiaries. In addition, branches may be required to disclose data including sensitive competitive information on their worldwide operations to local tax authorities. The election of organizational form by U.S. MNCs in foreign countries varies among corporations depending on the business environment faced by individual companies. Most U.S. multinationals including those in manufacturing earn foreign incomes from their subsidiaries. However, in contrast to overall preference for subsidiaries, foreign branches are more common in the banking industry.⁷ Specifically, bank branches are primarily established for wholesale activities, while bank subsidiaries are heavily engaged in retail activities.

Relatively low tax rates in a foreign country along with U.S. tax deferral until repatriation do not always offer more profitable investment opportunity abroad. Favorably low foreign tax rates are often associated with accordingly low pretax return in a host country, which limits attractiveness of FDI. In addition, the profitability relies heavily on the time duration of investment. Compare two alternative investment opportunities, one in a foreign country and the other at home. When it is assumed that the after-local-tax earnings with home tax liabilities deferred are reinvested in the host country, each dollar of foreign investment today generates repatriation income net of home country tax in n time periods as follows:

$$V_f = [1 + R_f(1 - t_f)]^n - \frac{(t_d - t_f)[1 + R_f(1 - t_f)]^n}{(1 - t_f)} = \frac{(1 - t_d)}{(1 - t_f)} [1 + R_f(1 - t_f)]^n \quad (6)$$

⁷ Goldberg and Johnson(1990)

where R_f is pretax rate of return abroad, t_d is domestic tax rate, t_f is foreign tax rate, and n is length of the investment horizon. Compare above foreign investment opportunity with one at home:

$$V_D = [1 + R_d(1 - t_d)]^n \quad (7)$$

where R_d is pretax rate of return in the home country, t_d is domestic tax rate, and n is length of the investment horizon. The implication from the comparison is simple. Consider 1-period only investment. Foreign investment would yield $[1 + R_f(1 - t_d)]$ on repatriation, while domestic investment would yield $[1 + R_d(1 - t_d)]$. As the investment horizon extends, the annualized after-tax return from domestic investment stays at $[1 + R_d(1 - t_d)]$, while the one from foreign investment continues to rise, converging $[1 + R_f(1 - t_f)]$ eventually with infinite investment horizon. Hence, the pretax foreign return should be higher than the pretax domestic return in order to attract investment from the home country with short investment duration. If the investment duration is long enough, however, investment would seek its way to the foreign country as long as the after-tax foreign return is higher than the after-tax domestic return.

If world capital market is perfect and frictionless, capital moves freely across the borders and thus risk-adjusted expected returns for domestic and foreign assets would stay at the same level. This implies that pretax return in a country that employs low tax rates to lure foreign investment should fall resulting in the same after-tax returns across countries in a perfect world market. Even without the adjustment on pretax returns, capital mobility would put pressure on tax authorities to reduce the corporate tax rates within its tax jurisdiction to attract more foreign investments, resulting in synchronization of after-tax returns. However, in our real economy which is less than perfect, variation in tax rates among countries appears to matter.

Empirical studies repeatedly find that MNCs do respond to the differences in tax rates across jurisdictions. Moreover, while there has been recent downward movement in international taxation, the corporate income tax rates for many countries still stay at a significant level as we consider the high degree of international capital mobility. Thus, the degree of international capital mobility has been a major concern in international economics and taxation. One possible explanation for the significant international tax rates under high degree of capital mobility is that tax authorities can recognize subtle differences between more-mobile and less-mobile capital. This differentiation approach offers a valuable implication for this study, that is, countries impose higher tax rates

toward less-mobile capital. Capital in the manufacturing industry is regarded as less mobile than one in banking, resulting in heavier taxation on manufacturing. Concerns on monetary control may dilute this effect, however.

Evidences of FDI responses to local tax rates are prevailing. For inward FDI in the United States, Hines(1996) argues that the foreign direct investment in the United States is found to be sensitive to the differences in state tax rates. He explains that high state tax rates have a significantly negative effect on local investment, suggesting that a decrease in state tax rate by 1 percent is associated with about 10% increase in investment. The Tax Reform Act of 1986 (TRA '86), which drastically changed the tax incentives faced by both U.S. firms with foreign operations and foreign firms investing in U.S., thus offered excellent research opportunities. Swenson(1994) examines the impact of TRA '86 on foreign direct investment in the United States. Based on the general equilibrium argument that TRA '86 offsets tax disincentives on foreign firms by eliminating firms' operation inefficiency, she reports that the inward investment surge in the late 1980s partially resulted from TRA '86, and that tax is one of the main driving factors in FDI movements.

Attention has been paid to outward FDI as well. Grubert and Mutti(1991) find that real investment by U.S. MNCs responds to host country effective tax rates and tariffs. Altshuler and Hubbard(2002) find that an effective tax increase on U.S. financial services firms reduces their responsiveness to cross-jurisdictional variation in effective tax rates, evaluating that TRA '86 has moved the United States closer to the status of capital export neutrality. Hines and Rice(1994) show cross-border income shifting by U.S. multinationals closely associated with differences in tax rates. They explain that the endogenous location of factors when combined with the ability to shift reported income away from high-tax jurisdictions make reported profits in a country sensitive to tax rates.

To the aspect of international tax coordination, Grubert, Randolph, and Roussalng(1996) argue that TRA '86 may trigger reduction in foreign tax rates which closely parallel the decrease in the U.S. statutory tax rate, suggesting that a decrease in average foreign tax rates on U.S. firms following TRA '86 was primarily caused by a reduction in country average tax rates. Slemrod(2004) also associates corporate taxation with international competitive pressures, reporting a negative relationship between statutory corporate tax rates and the degree of openness of economies. In general changes in tax policies at home and the host country appear to matter, and MNCs respond accordingly.

IV. Data Description

Two sets of data are used to measure U.S. direct investment abroad. The Bureau of Economic Analysis (BEA) releases annual information on international economic accounts including both U.S. direct investment abroad and foreign direct investment in the U.S.. Financial structure and operations of U.S. multinational companies and their non-bank foreign affiliates are collected and released in aggregate for U.S. parent companies, all foreign affiliates, and majority-owned foreign affiliates (MOFAs) separately⁸. For each different group, financial and operating data cover items in balance sheet (total assets), income statement (sales, foreign income taxes, and net income), employment and compensation of employees, U.S. trade in goods, and research & development. This information is in general itemized by country and by industry. The data on majority-owned foreign affiliates are relied on for analysis purpose if it is not noted otherwise. Total assets of MOFAs is taken to measure the size of FDI, and this is because of consistent comparison between manufacturing and banking.

For banking FDI information, the country exposure report from Federal Financial Institutions Examination Council (FFIEC) is a reliable source. Every U.S. chartered bank or banking holding company with significant foreign operation is required to file its claims on foreign borrowers, and annual statistic are released in aggregate for various categories⁹. The report itemizes cross-border claims and local country claims by country and details further claims on banks, public sectors, and other recipients. Additionally the report provides the maturity distribution on claims. As described at the appendix, claims consist mainly of deposit balances, foreign securities, and loans to foreign residents, all of which are categorized as asset items in a banking balance sheet. This would justify using the country exposure report for comparative analysis between manufacturing and banking. Two variables of interest are cross-border country claims and local country claims. Cross-border claims count claims by U.S. offices, and local country claims are claims by foreign offices. The local country claims are taken as proxy for the size of banking FDI.

Statutory tax rates for various countries are quoted from the World Tax Database available from the Office of Tax Policy Research (OTPR). The effective tax rates on U.S. manufacturing MNCs are calculated using data on pretax net income and foreign income taxes available from BEA. Related macro economic variables such as interest rate, inflation, GDP, population size are taken from the International Financial Statistics (IFS)

⁸ A “majority-owned nonblank affiliate” (MOFA) is a foreign affiliate in which the combined direct and indirect ownership interest of all U.S. parents exceeds 50 percent.

⁹ See the Appendix for detailed data descriptions on banking FDI.

by International Monetary Fund. The data used for interest rates are country lending rates (IFS 60p). If the lending rate is not available, I use instead either deposit rates (IFS 60L) or Treasury bill rates (IFS 60C)¹⁰. Inflation is calculated using CPI.

V. Model and Regression Result

This section describes a model of MNCs' investment decision with respect to foreign income taxation, with which empirical estimation is implemented. A detailed description of the empirical results is provided in the later section as well.

Model Specification

Consider a case in which a manufacturing MNC chooses its amount of capital in a country i , assuming the firm rents assets from itself or from another firm in order to obtain capital services. The firm's objective function to maximize its current profit is defined as gross revenue less the cost of current inputs and less the rental value of capital inputs. Then, the rental is determined by the price of a capital good and the discounted value of future capital services. Under static expectations on the price of capital goods, the rental of capital services without direct taxation is obtained as follows:

$$c^M = q(r + \delta) \quad (8)$$

where c^M is the user cost of capital, q the price of capital goods, δ the rate of economic depreciation, and r the discount rate.

The expression obtained above can be extended to take corporate income taxation into consideration. Given a predetermined depreciation schedule and an investment tax credit rate from the tax authority, the implicit rental value of capital services under static expectations becomes:

$$c^M = q(r + \delta) \frac{(1-k)(1-uz)}{(1-u)} \quad (9)$$

where k is the rate of investment tax credit, u the tax rate which is assumed to be constant

¹⁰ Goldberg(2005).

over time, z the present value of the depreciation deduction on one dollar's investment.

Consider a case in which a commercial bank chooses its amount of loan in a country i , assuming the loan is completely financed by equity. The cost of loan service can be calculated from the basic relationship between the price of a new loan and the discounted value of all the future services derived from this loan service. Under static expectations on the price of loans, the cost of loan services without direct taxation is obtained as follows:

$$c^B = L \frac{(r+p)}{(1-p)} \quad (10)$$

where c^B is the user cost of loan services, L the price of loans which is normalized to 1 for later analysis, p the probability of default which is assumed to be constant for simplicity, and r the discount rate.

As in the model for the manufacturing sector, the expression obtained above can be extended to take corporate income taxation into consideration. Given the fact that banks are allowed to expense their loan losses, the implicit value of loan services under static expectations becomes:

$$c^B = \frac{r+p(1-u)}{(1-p)(1-u)} \quad (11)$$

where u is the tax rate which is assumed to be constant over time. The marginal change of the cost of loan services with respect to a tax rate is obtained by differentiating the above equation:

$$\frac{\partial c^B}{\partial u} = \frac{r}{(1-p)(1-u)^2} \quad (12)$$

Consider the demand for loans. When an investment is financed through loans, the investor's demand for loans in country i conditional on the user cost of loan can be determined as follows:

$$\begin{aligned} \text{Max } \pi_i &= (1-u_i)(PQ_i - c_i^B K_i) \\ \text{s.t. } Q_i &= f(K_i) \end{aligned} \quad (13)$$

where P is the price of the product produced by the investor, Q the quantity of the production, K the amount of capital invested, and i subscripts country. The production function $f(K)$ is assumed to be constant returns to scale. Then, the first-order condition of above maximization problem is:

$$K_i: P \frac{\partial f}{\partial K_i} - c_i^B = 0 \quad (14)$$

Using the first-order condition, we can write the conditional demand function for loans from the investor as follows:

$$K_i^* = K_i^*(P, r, r_D, u_i, p, \lambda) \quad (15)$$

In order to estimate the investment pattern implied by above demand function, it is useful to consider the simple Cobb-Douglas production function specification:

$$f(K_i) = \alpha K_i^\gamma \quad (16)$$

Differentiating both sides of above production function with the first-order condition imposed, and rearranging it yields:

$$K_i^{1-\gamma} = \frac{\gamma \alpha P}{c_i^B} \quad (17)$$

Plugging the user cost of loan service into the above equation, and differentiating both sides with respect to the statutory tax rate yields:

$$\begin{aligned} \frac{dK_i}{du_i} &= \frac{r}{(1-p)(1-u_i)^2} \frac{(K_i)^{2-\gamma}}{\gamma(\gamma-1)\alpha P} \\ &= \frac{r}{(1-p)(1-u_i)^2 (\gamma-1)c_i^B} K_i \\ &= \phi(u_i)K_i \end{aligned} \quad (18)$$

where,

$$\phi(u_i) = \frac{r}{(1-p)(1-u_i)^2(\gamma-1)c_i^B}$$

A first-order Taylor approximation of capital demand function in u_i around the point at which $u_i = \bar{u}$, yields:

$$\begin{aligned} K_i(u_i) &\approx K(\bar{u}) + \frac{dK_i}{du_i}(u_i - \bar{u}) \\ &= K(\bar{u}) + \phi(\bar{u})K(\bar{u})(u_i - \bar{u}) \\ &= K(\bar{u})[1 + \phi(\bar{u})(u_i - \bar{u})] \end{aligned} \quad (19)$$

Dividing both sides of the above equation by the total sum of foreign-invested capital amount across countries, we obtain a country-share version of the capital demand function with respect to u_i :

$$\begin{aligned} \frac{K_i(u_i)}{\bar{K}} &\approx \frac{K(\bar{u})[1 + \phi(\bar{u})(u_i - \bar{u})]}{\bar{K}} = \frac{K(\bar{u})[1 - \bar{u}\phi(\bar{u})]}{\bar{K}} + \frac{\phi(\bar{u})K(\bar{u})}{\bar{K}}u_i \\ \Rightarrow s_i(u_i) &\approx \beta_0 + \beta_1 u_i \end{aligned} \quad (20)$$

where,

$$\begin{aligned} s_i(u_i) &= \frac{K_i(u_i)}{\bar{K}} \\ \beta_0 &= \frac{K(\bar{u})[1 - \bar{u}\phi(\bar{u})]}{\bar{K}} \\ \beta_1 &= \frac{\phi(\bar{u})K(\bar{u})}{\bar{K}} \end{aligned}$$

Since the foreign investment decision is affected by country-specific characteristics in general, it would be useful to introduce country fixed effect to the estimation equation.

$$\begin{aligned}\frac{K_i(u_i)}{\bar{K}} &\approx \frac{K(\bar{u})(1+\eta_i)[1+\phi(\bar{u})(u_i-\bar{u})]}{\bar{K}} \\ &= \frac{K(\bar{u})}{\bar{K}} + \frac{K(\bar{u})}{\bar{K}}\eta_i + \frac{\phi(\bar{u})K(\bar{u})}{\bar{K}}(1+\eta_i)(u_i-\bar{u})\end{aligned}\quad (21)$$

η_i is assumed to capture the size of business activity in country i , and also assumed to be observable (e.g., GDP share of a destination country). The tax variable is interacted with η_i to reflect the economic sizes of different countries. That is, a 1-percent change in the German tax rate is likely to have a larger effect on FDI pattern than would the same size change in Luxemburg tax rate because Germany has a larger economy and thus a larger capital stock.

Empirical work relies on the equation of the investment share (21) for banking and manufacturing, and its variants. Regression analysis using the difference equation of (21) between banking and manufacturing is also conducted in later part to observe possibly different degree of responses with respect to the tax rates between the industries.

Empirical Results

This section reports the correlation between the industry patterns of foreign direct investment and their tax incentives. The data are consistent with a different effect of foreign tax rates on FDI patterns between industries. I start with cross-sectional regressions of (21) on the banking sector for each of the six years from 1997 to 2002. I use the difference between FDI share and GDP share of a destination country as the left-hand side variable to relieve the concern on multi-collinearity. Principal results are reported in Table 3.6.

The estimation imposes a restriction that the coefficient of country-specific business activity equals to one to resolve the potential multi-collinearity on the right hand side variables. Then, the estimated tax coefficients capture the average propensity of U.S. investors in the banking sector to avoid high-tax countries. The coefficient estimates for the interaction term of statutory tax rate and GDP share are all consistently negative across years and statistically significant, while ones for the statutory tax rate alone are all statistically insignificant. This result indicates that the tax rate negatively affects FDI decisions for the banking sector, and the tax rate becomes more important as GDP share of the destination country rises. Therefore, the estimated negative coefficients on the interaction term can be interpreted as banks allocate relatively smaller fraction of their total FDI to countries in which the statutory tax rate is high, and GDP consideration even

amplifies this FDI pattern. The size of estimated coefficients on the interaction term is quite stable across years except 1998, and estimated confidence intervals overlap one another.

I conduct similar cross-sectional regressions on the manufacturing sector for the same time horizon. Principal results are reported in Table 3.7. Empirical results from the manufacturing sector are similar to the banking sector. The coefficient estimates for the interaction term of effective tax rate and GDP share are all consistently negative across years and statistically significant, while ones for the effective tax rate alone are all statistically insignificant. This result indicates that tax rate matters in FDI decision for manufacturing sector as well, and the tax rate appears to be increasingly important as GDP of the destination country rises. The estimated negative coefficients on the interaction term show that MNCs allocate a relatively smaller fraction of their total FDI to countries where the effective tax rate is high. The size of estimated coefficients on the interaction term is similar across years, and estimated confidence intervals overlap one another.

In addition to cross-sectional analyses by industry, I conduct the difference regression of (21) between two industries for the purpose of measuring difference in tax responses. Table 3.8 shows the main results. The estimation with the difference equation imposes restrictions that the coefficients for the tax rates of each industry are equal to each other, and that the country-specific business activities affect both industries to the same degree. Therefore, the estimated tax coefficient captures differences in the average propensities of investors in each industry to avoid high tax countries. The results from Table 3.8 are quite consistent across years. The coefficient estimates for the interaction between GDP shares and the difference between the effective tax rate for manufacturing and the statutory tax rate are all negative and statistically significant for 1999, 2000, and 2002. Increment of 1 percent in the tax rate difference between banking and manufacturing is associated with a 3.5 percent smaller difference between banking and manufacturing FDI shares, suggesting that host country taxes differentially influence the pattern of outgoing foreign direct investment between manufacturing and banking. The results are all consistent when I conduct the difference regression excluding Switzerland from the sample.

When I compare the size of estimated coefficients for tax variables with ones in previous studies, the elasticity difference between two industries appears to be large. The evidence of the effect of taxation on FDI is available in two different forms. First, the tax elasticity of FDI is estimated using time-series data. This estimation measures the responsiveness of FDI to annual variation in after-tax rates of return, and previous studies

with time-series analysis consistently find that FDI and after-tax rates of return have a positive correlation. Reported elasticity of FDI with respect to after-tax returns is in general close to one. Hartman(1984) finds that the elasticity with respect to after-tax rates of return is 1.4 for FDI financed by retained earnings and 0.5 for FDI financed by transfers of parent funds. Young(1988) reports that the elasticity is 1.89 and close to zero respectively. Swenson(1994) finds that a 1 percent increase in the taxation causes a 1.13 percent increase in FDI.

Other studies of the effect of taxation on FDI location rely on cross sectional data, focusing on the large variations in corporate tax rates across countries. Grubert and Mutti(1991) report a -0.1 elasticity with respect to host country tax rates. That is, ten percent differences in local tax rates are associated with one percent difference in American ownership of foreign assets. Hines and Rice(1994) reports a -1 elasticity of PPE ownership with respect to tax rates. Hines(1996) finds that U.S. State corporate tax rate differences of 1 percent are associated with differences of 9-11 percent between the investment shares of foreign-tax-credit investors and the investment shares of all others. Altshuler, Grubert, and Newlon(1998) estimate the tax sensitivity of PPE ownership in 1984 and 1992, and report estimated tax elasticities are -1.5 in 1984 and -2.8 in 1992.

The estimated responsiveness of FDI to host country tax rates in this paper implies that high tax rates may generate tax revenue at the cost of sizable loss of foreign direct investment. This can cause unwanted distortion especially when the responsiveness between manufacturing and financial sector is different, resulting in more tax burden falling on manufacturing sector. The tax responsiveness of FDI may be amplified as multinational firms to relocate their operations abroad in response to local tax rates.

VI. Conclusion

Foreign direct investment is strongly associated with foreign tax rates, and industry characteristics may provide sizable difference in FDI response with respect to variation in foreign tax rates. The evidence indicates foreign tax rates negatively affect FDI by U.S. multinational companies, and FDI in banking is relatively more sensitive to the variation in foreign tax rates than one in manufacturing.

This is an interesting finding since different sensitivities toward taxation may result in unintended tax incision and resource allocation. The different degree of response toward taxation between the industries could be caused by the differences in the primary forms of assets in their balance sheets, methods of financing investment projects, degree of

liquidity on capital. These new empirical results thus serve as valuable inputs into future research work on the differences among industries.

Appendix

Data Description on Country Exposure Report

Federal Financial Institutions Examination Council (FFIEC) requires U.S. banks and bank holding companies to report information on the distribution, by country, of claims on foreign residents. Aggregate data are released to the public including the Bank for International Settlements (BIS) for analysis of banking flows. Variables often used for analyses include cross-border claims, local country claims, and local country liabilities.

A. Who must report?

- (1) Every U.S. chartered insured commercial bank in the 50 State of the United States, the District of Colombia, Puerto Rico, and U.S. territories and possessions, that has, on a fully consolidated bank basis, total outstanding claims on residents of foreign countries exceeding \$30 million in the aggregate, and has at least one of the following:
 - a branch in a foreign country;
 - a consolidated subsidiary in a foreign country;
 - an Edge or Agreement subsidiary;
 - a branch in Puerto Rico or in any U.S. territory or possession;
 - an International Banking Facility (IBF);
- (2) Every Edge and/or Agreement corporation that has total outstanding claims on residents of foreign countries exceeding \$30 million, unless it is majority owned by a bank that is required to file a report.
- (3) Every institution that meets the Schedule 2 reporting requirements
- (4) Every U.S. bank holding company that is required to file the FR Y-6 report (Bank Holding Company Annual Report) and has a subsidiary bank that is required to report.

B. Definition of variables

(1) Claims

The term “claims” includes following types of assets:

- Deposit balances, both interest bearing and non-interest bearing, held at banks in foreign countries, foreign branches of other U.S. banks, foreign branches of foreign banks, and U.S. branches of foreign banks
- Balances with foreign central banks and foreign official institutions
- Foreign securities
- Federal funds sold to foreigners, U.S. branches of foreign bank, or other U.S. entities that are branches of a foreign company
- Loans to or guaranteed by non-U.S. addressees
- Holdings of acceptances of foreign banks
- Foreign direct lease financing
- Investments in unconsolidated foreign subsidiaries and associated companies
- Positive fair value of interest rate, foreign exchange, equity, commodity and other derivative contracts with non-U.S. addressees
- Customers’ liability on acceptances outstanding where the account party is foreign
- Accrued income receivables from or guaranteed by non-U.S. addressees
- Resale agreements and other financing agreements with non-U.S. addressees
- Asset sales with recourse with non-U.S. addressees
- Participations and syndications of loans to non-U.S. addressees

(2) Cross-border claims

The cross-border claims of each reporting institution cover:

- all claims of its U.S. offices with residents of foreign countries regardless of the currency in which the claim is denominated; and,
- all claims of each of its offices in a foreign country with residents of other foreign countries regardless of the currency in which the claim is denominated.

(3) Local country claims

Outstanding claims of the respondent’s foreign offices that are on residents of the country in which the offices are located. Revaluation gains on foreign exchange and derivative contract are not included.

Table 3.1
Total Assets Held by Foreign Affiliates, 1998-2002 (in millions of US dollar)

Year	All Industries		Manufacturing	
	Total Assets	Growth Rate(%)	Total Assets	Growth Rate(%)
1988	950,594	10.43	324,643	7.31
1989	1,080,247	13.64	371,392	14.40
1990	1,275,048	18.03	441,344	18.84
1991	1,375,789	7.90	458,133	3.80
1992	1,474,147	7.15	474,564	3.59
1993	1,738,028	17.90	481,856	1.54
1994	2,022,677	16.38	540,858	12.24
1995	2,420,115	19.65	637,408	17.85
1996	2,657,831	9.82	715,110	12.19
1997	2,952,021	11.07	748,234	4.63
1998	3,389,760	14.83	821,244	9.76
1999	4,046,424	19.37	946,831	15.29
2000	4,745,279	17.27	990,763	4.64
2001	5,254,456	10.73	1,024,476	3.40
2002	6,209,829	18.18	1,143,805	11.65

Source: Bureau of Economic Analysis

Table 3.2
Claims on Foreign Borrowers Held by U.S. Banks(in millions of US dollar)

Year	Cross-border claims	Local country claims	Ratio(%)
	(A)	(B)	B/(A+B)
1997	446,619	264,055	37.16%
1998	467,733	314,051	40.17%
1999	457,729	291,137	38.88%
2000	496,698	339,935	40.63%
2001	510,688	371,250	42.09%
2002	537,206	373,370	41.00%

Source: Federal Financial Institutions Examination Council

Table 3.3
Statutory Corporate Tax Rate for Selected Countries

Country	Year			
	1996	1998	2000	2002
Australia	0.360	0.360	0.340	0.300
Argentina	0.300	0.330	0.350	0.350
Belgium	0.390	0.390	0.390	0.390
Brazil	0.250	0.150	0.150	0.150
Canada	0.380	0.380	0.380	0.380
France	0.333	0.333	0.333	0.333
Germany	0.300	0.300	0.450	0.250
Japan	0.375	0.345	0.300	0.300
Switzerland	0.098	0.098	0.085	0.085
United Kingdom	0.330	0.310	0.300	0.300
United States	0.350	0.350	0.350	0.350

Source: Office of Tax Policy Research, World Tax Database

Table 3.4
Effective Tax Rate on U.S. Headquartered Manufacturing MNCs for Selected Countries

Country	Year			
	1996	1998	2000	2002
Australia	0.35	0.36	0.33	0.30
Argentina	0.30	0.33	0.35	0.35
Belgium	0.33	0.34	0.39	0.26
Brazil	0.19	0.09	0.15	0.15
Canada	0.33	0.36	0.35	0.34
France	0.32	0.33	0.33	0.33
Germany	0.30	0.30	0.30	0.25
Japan	0.38	0.35	0.30	0.30
Switzerland	0.10	0.10	0.17	0.09
United Kingdom	0.26	0.31	0.30	0.30

Source: Bureau of Economic Analysis

Table 3.5
Example of Foreign Tax Credits Calculation

	A (alone)	B (alone)	A + B
Earnings	\$100	\$100	\$200
Local tax	\$30	\$20	\$50
Withholding tax on dividends	\$7	\$8	\$15
Dividend net of foreign taxes	\$63	\$72	\$135
U.S. tax	\$35	\$35	\$70
Foreign tax credits	\$35	\$28	\$65
Additional U.S. tax due	\$0	\$7	\$5
Dividend net of all taxes	\$63	\$65	\$130

Table 3.6
Taxes and FDI Shares of U.S. Banks by Year

Dependent Variable:	Year				
	1998	1999	2000	2001	2002
$s_i^B - \eta_i$					
Constant	.0142 (.0134)	.0223 (.0200)	.0160 (.0197)	-.0002 (.0204)	-.0032 (.0202)
u_i^B	-.0362 (.0435)	-.0435 (.0645)	-.0300 (.0638)	.0261 (.0684)	.0315 (.0693)
$u_i^{B*} \eta_i$	-.7096** (.2613)	-1.6570** (.3592)	-1.2876** (.3345)	-1.5089** (.4191)	-1.2785** (.4379)
R-squared	.1647	.3289	.2701	.2204	.1565
Number of observations	50	50	49	49	49

** indicates being significant at 5% level, and * at 10% level. Standard errors are in the parentheses.

Table 3.7
Taxes and FDI Shares of U.S. Manufacturing MNCs by Year

Dependent Variable:	Year				
	1998	1999	2000	2001	2002
$s_i^M - \eta_i$					
Constant	.0052 (.0124)	.0016 (.0107)	.0007 (.0115)	.0027 (.0116)	.0009 (.0099)
u_i^M	.0199 (.0479)	.0351 (.0420)	.0411 (.0453)	.0332 (.0473)	.0361 (.0427)
$u_i^{M*} \eta_i$	-1.6270** (.3700)	-1.8873** (.3826)	-1.9748** (.3799)	-1.9477** (.4168)	-1.7699** (.4220)
R-squared	.3245	.3447	.3735	.3338	.2777
Number of observations	46	50	49	48	50

** indicates being significant at 5% level, and * at 10% level. Standard errors are in the parentheses.

Table 3.8
Taxes and Difference in FDI Shares between Manufacturing and Banking by Year

Dependent Variable:	Year				
	1998	1999	2000	2001	2002
$s_i^M - s_i^B$					
Constant	-.0008 (.0051)	-.0015 (.0036)	-.0024 (.0033)	-.0013 (.0042)	-.0018 (.0038)
$(u_i^M - u_i^B) * \eta_i$	-4.1663 (.3700)	-3.8278* (2.2368)	-3.3576** (1.3155)	-3.5740 (2.5088)	-3.3878* (2.2658)
R-squared	.0169	.0575	.1240	.0432	.0575
Number of observations	46	50	48	47	49

** indicates being significant at 5% level, and * at 10% level. Standard errors are in the parentheses.

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Chapter 4

The Cohort Effect: Evidence from Firm-Level Data

I. Introduction

How are wages determined within a firm? This has been one of the issues most actively studied by economists in labor economics and industrial organization. Theories in a firm's wage setting emphasize various functions such as motivation/incentives to work hard, selection/assignment/retention, and risk sharing. First and foremost, wages are naturally associated with performance. Both theories and empirics support that workers with higher productivity are paid higher wage. However, patterns in wage increase are found not to be supported by employee's productivity improvement, while wage patterns are found to be related with seniority.

One puzzling phenomenon related with wage increase patterns is the existence of cohort effect; Starting salaries for new hires in a firm are in general very flexible, reflecting current labor market conditions. In contrast, average wage growth with tenure once hired does not offset these initial effects, and changes in cohort starting wage are not related to observed cohort characteristics. Although some theoretical explanations for the cohort effect have been suggested, empirical analyses are relatively few partly due to limitation in available data. In this study, I test different theoretical approaches to identify the driving factors of cohort effect.

II. Previous Studies

Beaudry and DiNardo(1991) find that the entry-year unemployment rate affect the wage level in years since the entry using individual data from the CPS and the PSID. They also find that the current unemployment rate and the lowest unemployment rate since a worker began a job respectively have explanatory power on the current wage level. However, once the best labor market conditions since a worker's entry year are controlled, the contemporaneous unemployment rate does not affect wages any more. They interpret

these results to be consistent with implications from an implicit contract model.

Baker, Gibbs, and Holmstrom(1994b) use salary data from a single firm over a twenty-year period and find that the average wage at which a cohort enters is positively correlated with the cohort's average wage in years, even when differences in cohort mix such as age, gender, and education are controlled.

Harris and Holmstrom(1982) suggest a model of wage dynamics not based on workers' productivity, but based on a process in which both firm and worker learn about the worker's ability. Long term implicit contracts in which wages are downward rigid provide insurance for risk-averse workers and wages are bid up whenever the outside option provides higher wage than current wage. Thus, senior workers receive higher wages on average after productivity is controlled since they have had more time for their wages to be bid up in the market.

MacLeod and Malcomson(1993) suggest a model of fixed-price contract which can explain the cohort effect. This contract is implemented in a way that wages are specified at a predetermined level until it is renegotiated by mutual consent in such cases where one of outside options changes. The employment relationship is terminated if the renegotiation fails. Their model shares the similar idea about equilibrium contract in Harris and Holmstrom.

Gibbons and Waldman(2003) argue that task-specific human capital can explain the cohort effect. Based on the assumption that human-capital is task-specific, they argue some of a worker's human capital is unutilized when she is promoted. Higher proportion of a recession cohort is assigned to the low-level job than a boom cohort. Hence, part of her human capital is unutilized when she is promoted, and this will result in a lower wage for the recession cohort since she would spend relatively more time at the low-level positions with more unutilized human capital when promoted. Their model suggests that a cohort entering a firm when the market is favorable would show higher productivity on average since the worker has longer time to accumulate human capital.

III. Data Description

Empirical tests are performed using personnel records of a large US insurance company. The employees process health insurance claims and the main task is data entry of insurance claim to computer. The original data set is composed of 5,888 processors, but I focus on only 3242 indemnity processors over 5 six-month periods since human capital accumulation is very important in the job and workers appear to be more homogenous.

The data contain productivity measures, compensation, demographic and organizational variables. The fact that employees' productivity measures and organizational variables on job-level are available is one of the main advantages of this dataset. This is an especially attractive feature when we test implications from human capital accumulation theories. Empirical literature relying on public survey data such as CPI and PSID are restricted in their ability to test human capital accumulation theories since reliable productivity measures are not available on those dataset. In this company, the productivity is measured by the number of claims processed per day, and then weighted by the internally determined standard. This allows us to simply compare the productivity measures across different job-levels, and thus test the relationship among wage, promotion, and productivity.

The compensation variables include salary, salary change date, salary change reason, bonus, bonus date, overtime payment, and overtime payment date. The demographic variables consist of date of birth, education, gender, marital status, and residence zip code. The organizational variables contain date of hire, date of termination, termination reason, job-level, and job-level change date. The fact that detailed information on employment status is available is another advantage of this dataset.

The data is over 2.5 years between 1/1/1993 and 6/30/1995. For the regression purpose, 6 months are defined as one time period, and thus there are 5 time periods in the data. There are 49 different cohort groups, and the oldest cohort entered the firm in the first half of 1971. I restrict the regression analysis only to the last 21 cohorts since the number of observations is quite small for the earlier cohorts. This reduces the number of observations from 10,730 to 8,931.

The characteristic of the employees can be summarized as female, white-collar, non-managerial, full-timers. Average age of the workers is 29.87. Almost 92% of those observed are female and 58% are married. Average biannual compensation including salary, bonus, and overtime payment is \$10,283(in real value) ranging from \$4,262 to \$22,539. The average education level is 12.9 years and 71% of those observed are high school graduates. Table 4.1 describes the employees' characteristics more in detail.

The compensation consists of regular salary, bonus, and overtime payment. Table 4.2 summarizes the employee compensation. Employees are contracted to work 37.5 hours per week, and overtime work amount is recorded biweekly. The company relies on a predetermined salary for compensation even with available productivity measures. The average biannual salary is \$9,581. The salary is renewed approximately biannually through either merit or promotion. Date of salary change varies worker by worker across the year, and there is no evidence for collective bargaining in salary adjustment. The

average biannual bonus is \$196, and the average overtime payment is \$498 biannually. Entry wages are not available in this data.

For the following empirical tests, it is critical to identify the career path in this firm. Since the promotion effect on wages is my interest, job-levels are identified not by wages, but by movements in job-code. 5 main job-codes are identified with 4 different job-levels. Job-code 006207 is for the entry level(henceforth, level 1) position, 006189 for level 2, both 011654 and 011655 for level 3, and 021206 for level 4. Salary data confirm this career path as well. Significant salary increases are accompanied by movement to higher job-level. Higher job-level assigns different types of insurance claims to workers with more skills required, but the basic nature of the jobs is quite similar. While the dataset has many advantages for empirical analysis, generalization of the test results may be limited since what we derive from the data can be firm-specific. This is a common problem for data from a single firm.

IV. Empirical Models and Results

The central question in cohort effect literature is whether wages for incumbent employees are shielded from changes in external labor market conditions. The following section describes the identification of the cohort effect. Consider the following model to examine the cohort effect. A cohort who entered a firm in period i receives a wage W_{it} determined by

$$W_{it} = \beta_0 + \beta_1 Y_t + \beta_2 T_{it} + \beta_3 Z_i + \varepsilon_{it} \quad (1)$$

where Y_t is current time, T_{it} is tenure, and Z_i is time of entry. Note that the above model is not identified since time, tenure, and cohort are linearly dependent as $Y_t - Z_i = T_{it}$.¹¹ This implies that we can not identify their linear component. However, this does not mean that we cannot draw any conclusions on the cohort effect.

BGH suggest a two-step procedure to figure out this identification problem in the test. First, they run a regression without the cohort effect:

$$W_{it} = \alpha_0 + \alpha_1 Y_t + \alpha_3 T_{it} + \varepsilon_{it} \quad (2)$$

Then, they regress wages net of estimated tenure effect on time and cohort variables:

¹¹ See Heckman and Robb(1985) for more detailed discussion on this.

$$(W_{it} - \hat{\alpha}_3 T_{it}) = \alpha_0 + \alpha_1 Y_t + \alpha_2 Z_i + \varepsilon_{it} \quad (3)$$

where $\hat{\alpha}_3$ is the estimated parameter for tenure effect from the previous regression.

They calculate F-statistics testing (3) against (2), finding the hypothesis that all cohort dummies are zero is rejected. They interpret this result indicating that the inclusion of cohort effects significantly improves the simple tenure model (2). In BGH, the effect of tenure on wages is assumed to be linear, and they are focused on the variation in wage net of linear tenure effect.

An alternative for the identification problem is to run the regression (1) with two cohort dummies omitted, the first and the last cohort dummy. This approach was suggested by Hall(1968). This is to require that no cohort effect takes place over the first cohort, although this is a less natural normalization. However, we can avoid the exact collinearity among tenure, cohort, and time dummies by omitting the two cohort dummies. While this method shares the same idea of utilizing only identifiable component with BGH, it does not assume the linear tenure effect. Actually, decreasing marginal tenure effect will be allowed in following regressions. In addition, it includes time, tenure, and cohort in a single equation. I follow Hall's approach for later analysis.

To measure the cohort effect, I rely on the following reduced-form regression:

$$W_{it} = \beta_0 + \beta_1 Y_t + \beta_2 T_{it} + \beta_3 T_{it}^2 + \beta_4 Z_i + \beta_5 X_{it} + \varepsilon_{it} \quad (4)$$

where X_{it} is the usual demographic variables such as education, gender, marital status, and geographical areas. Now the tenure terms are entered as polynomials with non-increasing marginal tenure effect.

Estimation results from two different models are reported in Table 4.3. Model 1 is described as (4), and model 2 is the same with model 1 except that it does not contain cohort dummies. Inclusion of the cohort dummies does not cause significant difference in the estimated coefficients on the variables of interest, while it improves the explanatory power of the regression model. The coefficient for tenure is 393.79 and statistically significant, indicating average wages increase by almost \$400 every six months. Tenure square term has a negative coefficient, showing that marginal wage increase due to tenure is decreasing. Education has a positive effect on average wages as expected. Marital status appears to positively affect the wage level. Estimated coefficient indicates that married workers are paid \$174 more on average than unmarried workers. Gender does

not significantly affect wages.

When model 1 is tested against model 2, the F-statistic equals 7.99, indicating that the inclusion of cohort dummies improves the model's explanatory power. In addition, I test whether the cohort dummies in the model, taken as a whole, are significant. The F-statistic for the test is equal to 8.10, confirming that the cohort dummies, as a whole, are statistically significant. The highest coefficient estimate is observed from the cohort9(570.94) and the lowest observed from the cohort20(-299.81). This implies that the cohort20 receive about \$870 less than the cohort9 since they entered the firm in a bad year. This is a significant difference when we consider that average compensation for six months is \$10,283. If this were simply due to composition differences of cohorts, the existence of the cohort effect as above will not be remarkable. However, results are obtained with observed demographic and tenure variables controlled.

Literature on long-term contracts explain that we observe the cohort effects since incumbent employees are part of an internal labor market, and thus are shielded from changes in external labor market conditions. While entry wages are determined by the spot labor market, the post-entry wages grow by internally-determined rules. Hence, we observe wage gaps for seemingly similar employees except in their entry years. If this were the main source of the cohort effect, we would expect that the variations in the coefficients for cohort dummies in the equation (4) reduce as we control the entry year unemployment rates. Consider the following regression with entry year unemployment rates:

$$W_{it} = \beta_0 + \beta_1 Y_t + \beta_2 T_{it} + \beta_3 T_{it}^2 + \beta_4 Z_i + \beta_5 X_{it} + \beta_6 U_i + \varepsilon_{it} \quad (5)$$

where U_i is entry year unemployment rates¹².

Table 4.4 reports the regression results from the equation (5) in the second column. Inclusion of the entry year unemployment rate does not significantly change the result of the benchmark equation of (4), while the unemployment rate alone has a negative effect on the wage level as expected. The size of estimated coefficients for tenure and demographic variables and their significance are quite similar to ones from the equation (4). The estimated coefficient for the entry year unemployment rate is -89.71 and significant at 5%. Looser labor market inevitably reduces contemporaneous wages since

¹² Since geographic area for each worker can be identified from data, state overall unemployment rates are used for the regression.

the reservation utility level of job seekers is lower as well. However, the business cycle status of the entry year continues to affect wage levels in years. The coefficient estimates for each cohort change little as reported in the second column of Table 4.5, indicating the entry year unemployment rate does not explain the cohort effect well enough.

Beaudry and DiNardo(1991) allow the current unemployment rate and the lowest unemployment rate since a worker's entry year to affect current wages as well as the entry year unemployment, and find that three different unemployment rates are significant, but that only the lowest unemployment since entry is significant when these three are jointly included. Following their approach, I include the lowest unemployment rate since entry in addition. When only the lowest unemployment rate is included without the entry year unemployment, it is significant at 10%. However, it appears not to reduce the observed cohort effects significantly.

The coefficients for each cohort show little changes as the lowest unemployment rate since entry is added. When both are included, the entry year unemployment rate is significant, and consistent with the previous result. The lowest unemployment rate since entry is significant at 10%, but the sign of coefficient turns now to positive. This is very puzzling, since the positive estimate implies that if the lowest unemployment rate experienced is lower, a worker receives higher wages, which conflicts with previous findings.

The overall effect of including these two unemployment rates on the cohort dummies is still quite small. Cohort effects still show very similar patterns. Unemployment rates can explain the cohort effect in part, but most of the variation in cohorts still remains unexplained.

Theories on human capital accumulation rely on the differences in learning opportunities among cohorts to explain the cohort effect. When the entry wage is low(that is, the entry year unemployment rate is high), workers tend to stay longer in the lower job levels, and this affects workers' skill acquisition and thus productivity. Hence, the key factor that causes the cohort effect is the difference in productivity among cohorts resulting from unequal learning opportunities.

While the human capital accumulation approach provides us with very useful insights on the cohort effect, the empirical application of the approach is greatly restricted since the measures for productivity are hardly available in analyses. One of the major strengths of the data in this study is that workers' productivity is reported and standardized for comparison across different job-levels. If the cohort effect were driven by the differences in learning opportunities, and thus resulting differences in productivity, then the cohort effect would disappear when we control workers' productivity. Consider a

regression with productivity.

$$W_{it} = \beta_0 + \beta_1 Y_t + \beta_2 T_{it} + \beta_3 T_{it}^2 + \beta_4 Z_i + \beta_5 X_{it} + \beta_6 P_{it} + \varepsilon_{it} \quad (6)$$

where P_{it} is the observed productivity for a worker i at time t .

Table 4.4 reports the empirical results from the equation (6) in the third column. The estimated result is quite different from what is predicted by the human capital accumulation theories. Productivity itself has a significantly positive effect on average wages as expected. The estimated coefficient for the productivity is 4.4183 and significant at 5%. Though inclusion of the productivity to the equation improves the model's fit, it does not lessen the wage cohort effect, but rather appears to amplify the cohort effect. The estimated coefficients for the cohorts reported in the third column of Table 4.5 show overall size increase (in absolute value) after productivity is controlled. This is more obvious for the recent cohorts.

The fact that the inclusion of the productivity seems to exaggerate the wage cohort effect is quite puzzling. Firms' wage schemes are considered to provide incentives to enhance productivity. However, if the productivity amplifies the wage cohort effect, the direct productivity enhancement from compensation is softened via a different channel.

BGH find that a higher proportion of new workers entered the firm at lower job levels during a recession period. In addition to this, if a cohort that enters the firm when the economy is good is promoted faster, then this may imply that the cohort effect can be implemented through promotion. Considering the following regression with job-level:

$$W_{it} = \beta_0 + \beta_1 Y_t + \beta_2 T_{it} + \beta_3 T_{it}^2 + \beta_4 Z_i + \beta_5 X_{it} + \beta_6 L_{it} + \varepsilon_{it} \quad (7)$$

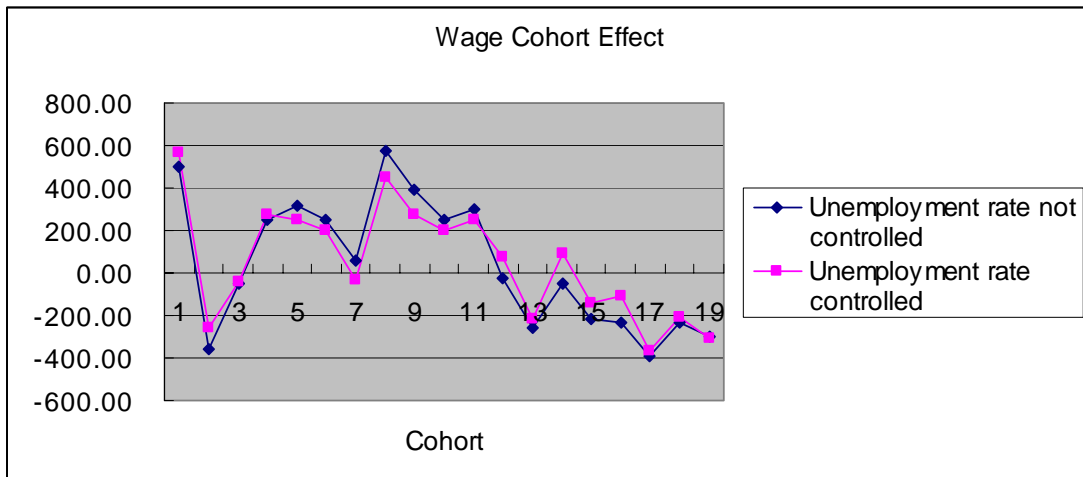
where L_{it} is the observed job-level for a worker i at time t .

The empirical result from the equation (7) is reported in table 4.4 at the fourth column. The inclusion of the job-level to the estimation gives remarkable differences in the result. The estimated coefficients for tenure and demographic variables significantly reduce, indicating that job-level is an important channel through which the wage changes are conveyed. Promotion is associated with significant increase in wage as expected. A worker promoted to one step higher job-level receives \$1264 more on average due to the promotion. Moreover, inclusion of job-level is accompanied with sizable reduction of the

wage cohort effect. Table 4.5 compares the estimated coefficients of the cohort dummies among different regression models.

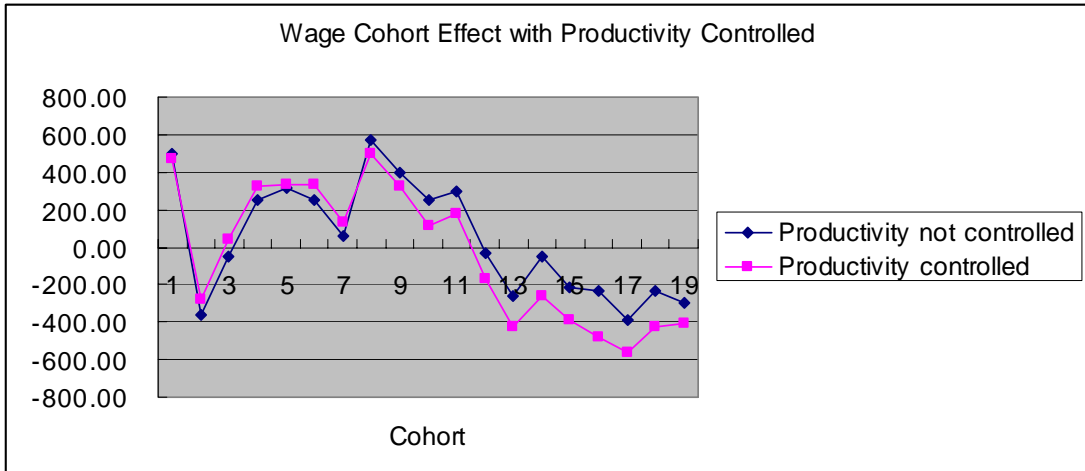
The estimated coefficients are somehow similar among the first three columns. However, inclusion of job-level to the estimation significantly reduces the size of cohort effect. While the entry year unemployment rates can explain in part the cohort effect, the proportion that is not explained by the unemployment rates in the cohort dummies is still quite large. Figure 4.1 below compares cohort effect with and without controlling unemployment rates.

Figure 4.1 Wage Cohort Effect with Unemployment Controlled



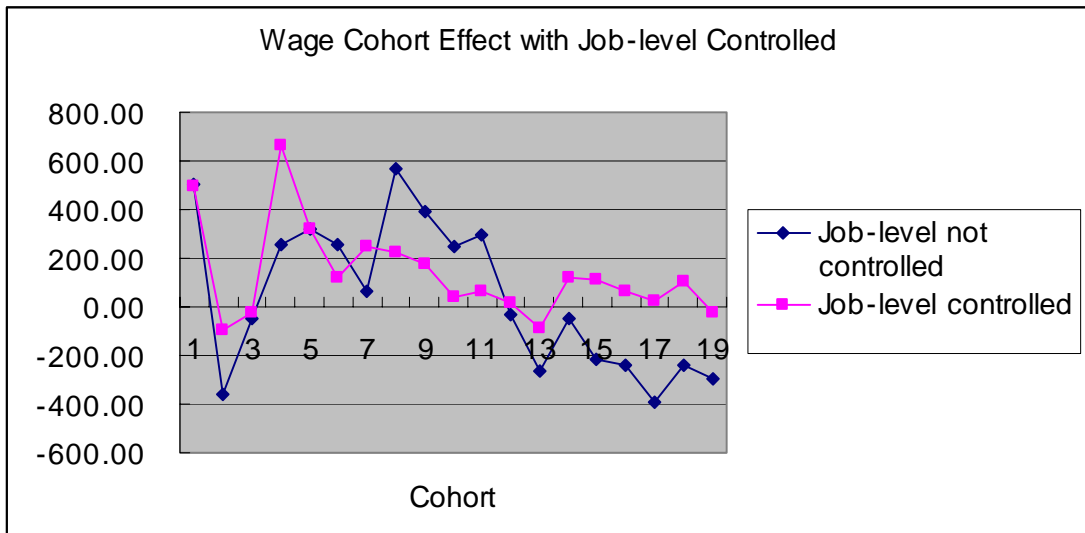
Inclusion of productivity measure to the regression does not reduce the cohort effect, but rather amplifies it. The fact that estimates for the cohort dummies are increased (in absolute value) after the observed productivity is added to the regression is easily identified from Figure 4.2. The figure compares the cohort effect before and after the productivity is controlled. The amplification effect is more obvious from the recent cohorts on the right tail of the figure.

Figure 4.2 Wage Cohort Effect with Productivity Controlled



Many coefficients for the cohort dummies that were significant without the job-level controlled turn insignificant after job-level is controlled. The cohort effect is quite flattened with job-level as is shown below. This result suggests that the wage cohort effect is mainly conveyed through promotion. The relationship between the job-level and the entry year unemployment rate is also consistent with this result. Figure 4.3 depicts effect of inclusion of job-level on the cohort effect.

Figure 4.3 Wage Cohort Effect with Job-level Controlled



In addition to the wage cohort analysis, regressions for productivity cohort effect are also conducted. Consider the following reduced-form regression:

$$P_{it} = \beta_0 + \beta_1 Y_t + \beta_2 T_{it} + \beta_3 T_{it}^2 + \beta_4 Z_i + \beta_5 X_{it} + \varepsilon_{it} \quad (8)$$

Principal results are reported in table 4.6. Empirical results confirm findings reported in many previous studies. Tenure positively affects productivity, and its square term does in negative direction as expected. Coefficient estimates on the tenure term are all positive and statistically significant across all different specifications. Negative coefficients for the squared tenure indicate productivity gain slows as a worker stays longer in the firm.

Education appears not to significantly affect productivity. Since the characteristics of jobs do not require a high degree of skill level at all, the low correlation between education and productivity is not surprising. However, the fact that those who have more schooling are paid more on average in the firm is contradictory to the low correlation between the education and the productivity. Women are more productive than men and this may be caused from the female-dominant employee composition. Estimated coefficients on entry year unemployment are negative in the column (iii) and (v).

It is somehow puzzling why the productivity is positively correlated with the unemployment rate. Some previous studies find that the education level of an entry cohort is positively correlated with the current unemployment rate. If the finding is true, a typical worker who enters in a high unemployment year would have relatively more schooling, and obtain less productivity gain. One possible explanation for this finding can be derived from job characteristics. The main task of workers in the firm is data entry of insurance claims to computer, which is a low-skilled, manual-oriented job. Those who have higher education levels may take advantage of this job as a stepping-stone to avoid harsh labor market conditions when the unemployment rate is high. Then they may have less incentive to develop their job skills, resulting in observed negative correlation between productivity and the unemployment rate.

Job-level is positively associated with productivity as expected, and inclusion of job-level to the model improves the explanatory power significantly. Promotion to adjacent upper job-level is associated with productivity increase of 26, and it is quite a sizable increase when compared with observed mean productivity of 162.

V. Conclusion

Overall regression results suggest that the entry year unemployment rate can

explain the cohort effect in part, but large portion of variation in the cohort effect still remains unexplained. Inclusion of the lowest unemployment rate since entry does not improve the result significantly. Predictions from the long-term contract are weakly supported by the data. Prediction from the human capital accumulation is not supported. The implication that the cohort effects are driven from the differences in productivity among cohort due to differences in learning opportunities is not supported by the data. However, data strongly support the cohort effect is mainly driven from differences in promotion among cohorts.

Previous studies find that education level of entry cohort is positively correlated with the current unemployment rate. This does not immediately reconcile with findings in this study that productivity cannot properly explain the wage cohort pattern observed in the data. We may need new explanations on why the promotion pattern may be correlated with the business cycle status, which leave opportunities for future research. A model with demand driven factors can provide a useful insight on this issue. Employees are promoted potentially by two reasons, productivity and the firm's demand for higher level officers. When an economy is expanding, firms will be involved with more business contracts. This implies that the firms' demand for higher level officers will rise in boom. Hence, firms have more incentive to promote their employees quickly when they need to deal with more business contracts. A cohort that enters a firm in an economic boom, thus, can be promoted faster even without superior productivity against a recession cohort.

Table 4.1
Demographic and Productivity

Variables (Unit)	Mean	Std. Dev	N
Age (year)	29.87	6.75	8,931
Education (year)	12.93	1.56	8,385
Gender (F=1)	0.92	0.08	8,931
Marital Status (M=1)	0.58	0.42	8,870
Productivity (6-month avg.)	162.18	95.79	8,931

Table 4.2
The Employees' Compensation

Compensation type	Mean	Std. Dev	N
Salary	\$9,581	1,817	8,761
Bonus	196	352	8,931
Overtime	498	671	8,931

Table 4.3
Wage Regression with and without Cohort Dummies

	Regression	
	Model 1	Model 2
Tenure	393.7972** (23.1234)	478.1496** (10.1090)
(Tenure) ²	-5.0581** (1.2439)	-8.2014** (0.6029)
Education	103.6304** (9.9426)	99.3768** (9.9900)
Marital (Married = 1)	174.7958** (31.7620)	171.1195** (31.8125)
Gender (Female = 1)	50.5144 (57.9631)	20.9018 (58.1421)
State dummies	Yes	Yes
Time dummies	Yes	Yes
Cohort dummies	Yes	No
R-squared	0.6504	0.6438
<i>n</i>	8,241	8,241

** indicates being significant at 5% level, and * at 10% level.

Standard errors are in the parentheses.

Table 4.4
Wage Regressions with Unemployment, Productivity, or Job-level Controlled

	Regression			
	Model 1	Model 3	Model 4	Model 5
Tenure	393.7972** (23.1234)	397.9459** (23.2532)	321.6211** (22.5437)	32.2470* (17.6936)
(Tenure) ²	-5.0581** (1.2439)	-5.0450** (1.2411)	-2.9993** (1.2049)	5.4724** (0.9306)
Education	103.6304** (9.9427)	101.7596** (9.9462)	105.2488** (9.6076)	67.9617** (7.3803)
Marital (Married = 1)	174.7958** (31.7620)	180.6357** (31.7788)	173.0020** (30.6915)	78.1474** (23.5653)
Gender (Female = 1)	50.5144 (57.9631)	58.0210 (58.0121)	18.2391 (56.0253)	0.9413 (42.9552)
Unemployment Rate		-89.7072** (20.1493)		
Productivity			4.1483** (0.1720)	
Job-level				1264.4320** (15.4310)
State dummies	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Cohort dummies	Yes	Yes	Yes	Yes
R-squared	0.6504	0.6509	0.6736	0.8081
<i>n</i>	8,241	8,234	8,241	8,241

Model 3 is with the entry year unemployment rate controlled, model 4 with the productivity controlled, and model 5 with the job-level controlled. ** indicates being significant at 5% level, and * at 10% level. Standard errors are in the parentheses.

Table 4.5
Estimated Coefficients for the Cohort Dummies

	Regression			
	Model 1	Model 3	Model 4	Model 5
Cohort 2	502.74 (154.89)	565.45 (156.25)	474.82 (149.67)	494.83 (114.77)
Cohort 3	-358.44 (162.98)	-259.19 (164.65)	-274.78 (157.52)	-97.42 (120.81)
Cohort 4	-51.37 (152.57)	-38.40 (153.99)	38.12 (147.47)	-22.25 (113.05)
Cohort 5	253.99 (150.26)	273.96 (151.47)	327.15 (145.22)	662.39 (111.45)
Cohort 6	317.46 (168.20)	249.75 (170.81)	338.28 (162.53)	318.05 (124.64)
Cohort 7	253.90 (183.83)	201.92 (185.63)	331.79 (177.66)	122.78 (136.22)
Cohort 8	61.77 (176.01)	-31.23 (179.04)	130.32 (170.09)	245.16 (130.44)
Cohort 9	570.94 (164.24)	446.00 (168.73)	502.76 (158.73)	226.99 (121.77)
Cohort 10	394.07 (147.25)	276.53 (151.70)	320.09 (142.31)	174.61 (109.14)
Cohort 11	248.20 (140.25)	197.76 (142.02)	118.72 (135.62)	39.04 (103.95)
Cohort 12	297.29 (136.39)	248.15 (138.07)	177.54 (131.88)	61.75 (101.10)
Cohort 13	-28.01 (132.70)	72.65 (134.24)	-165.50 (128.35)	17.02 (98.33)
Cohort 14	-260.16 (122.40)	-217.99 (122.87)	-421.83 (118.46)	-84.42 (90.72)
Cohort 15	-52.00 (116.77)	95.40 (120.53)	-263.66 (113.18)	122.03 (86.55)
Cohort 16	-214.63 (138.14)	-138.28 (138.88)	-391.80 (133.68)	112.94 (102.43)
Cohort 17	-237.42 (108.66)	-106.59 (111.84)	-477.36 (105.47)	66.89 (80.60)
Cohort 18	-392.19 (101.56)	-365.43 (101.64)	-562.08 (98.39)	26.18 (75.43)
Cohort 19	-236.69 (100.23)	-206.69 (100.33)	-425.83 (97.17)	105.53 (74.39)
Cohort 20	-299.80 (106.78)	-306.49 (106.71)	-402.33 (103.27)	-24.39 (79.20)

Model 3 is with the entry year unemployment rate controlled, model 4 with the productivity controlled, and model 5 with the job-level controlled. Standard errors are in the parentheses.

Table 4.6
Productivity Regressions with the Unemployment Rate or Job-level Controlled

	Regression				
	(i)	(ii)	(iii)	(iv)	(v)
Tenure	16.8050** (0.6254)	17.3294** (1.4212)	18.0080** (1.4294)	9.6493** (1.4304)	10.2993** (1.4383)
(Tenure) ²	-0.6619** (0.0373)	-0.4969** (0.0765)	-0.5084** (0.0765)	-0.2706** (0.0752)	-0.2822** (0.0753)
Education	-0.2689 (0.6156)	-0.1667 (0.6105)	-0.2735 (0.6108)	-0.9046 (0.5956)	-0.9919* (0.5958)
Marital (Married=1)	0.1673 (1.9610)	0.5232 (1.9508)	0.4072 (1.9520)	-1.5267 (1.9023)	-1.7192 (1.9036)
Gender (Female=1)	8.4277** (3.5725)	8.8079** (3.5489)	9.7634** (3.5526)	7.6211** (3.4568)	8.5681** (3.4601)
Unemployment rate			-4.2182** (1.2394)		-3.3439** (1.2077)
Job-level				26.5177** (1.2468)	26.5529** (1.2469)
Time dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes
Cohort dummies	No	Yes	Yes	Yes	Yes
R-squared	0.2248	0.2444	0.2462	0.2834	0.2852
<i>n</i>	8,385	8,385	8,378	8,385	8,378

** indicates being significant at 5% level, and * at 10% level. Standard errors are in the parentheses.

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Chapter 5

Conclusion

With revolutionary progress in life science, expected human life span continues to extend rapidly. The world will bear witness to increased importance of retirement preparation as the time period after retirement becomes longer. The role of financial service industry is crucial for individuals' retirement planning. In addition to this, development of well-functioning financial market will be an essential factor for the US to maintain its international competitiveness in the world economy. Understanding economic issues in financial sector should be a priority of contemporary research in order to ameliorate future policy and business practices.

My dissertation advances our knowledge of firm behavior in financial industry on two fronts. First, I analyze the effect of tax policy, and second, I investigate compensation structure in a financial service firm for reasons why the cohort effect is observed. In the first two chapters of the dissertation, I analyze the impact of tax policy changes on American firms' profitability and strategic positioning by examining the banking industry. Recent trend of globalization and economic integration increase the importance of strategic development of human resources, and employee compensation regime would have a core role in maintaining competitiveness of work force. The last chapter of the dissertation is devoted to explain a stylized fact called the cohort effect in firms' wage determination.

Chapter 2 relies on event-study methodology to examine the effect of "Subpart F exemption on active financing income" on the expected profitability of banks and bank holding companies(BHC). The central argument is that a favorable tax law change may enhance banks' expected profitability, thus push the share prices upward under the efficient market hypothesis. Empirical tests are conducted over the data collected from CRSP. I find strong positive response to the tax policy change. Banks with sizable foreign operation show significantly higher abnormal returns than banks without foreign operation as the exemption rule allows tax deferral on foreign source incomes.

Given the fact that tax planning is an important decision factor for a firm, the tax policies might also play an important role in international economic activities. Chapter 3 examines different responses on corporate taxation between manufacturing and banking

FDI. Empirical test is conducted with a difference equation on MNC's investment decision using the data on outgoing FDI and foreign income tax rates across countries. Two main findings result. First, tax rates negatively affect FDI decision for both banking and manufacturing sector. Second, when compared, banking FDI is more sensitive to variations in corporate tax rates across countries than manufacturing FDI.

Chapter 4 departs from the topic of taxation, investigating the reasons why the cohort effect is observed in the labor market. I test different theoretical implications to identify driving factors of the cohort effect. Personnel records from a large US insurance company are analyzed to examine the firm's wage cohort effect. From a long-term contract model and a human-capital accumulation model, I derive implications on the driving factors of the wage cohort effect. Three main findings result. First, the cohort effect is mainly driven through promotion. Second, the entry-year unemployment rates partially explain the cohort effect. Lastly, productivity is not observed to explain the cohort effect, contrary to the human-capital accumulation model's expectation.