This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Canada-U.S. Tax Comparisons

Volume Author/Editor: John B. Shoven and John Whalley, editors

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-75483-9

Volume URL: http://www.nber.org/books/shov92-1

Conference Date: July 26-27, 1990

Publication Date: January 1992

Chapter Title: The Impact of U.S. Tax Reform on Canadian Stock Prices

Chapter Author: Joel B. Slemrod

Chapter URL: http://www.nber.org/chapters/c7484

Chapter pages in book: (p. 237 - 254)

7 The Impact of U.S. Tax Reform on Canadian Stock Prices

Joel Slemrod

The international spillover effects of taxation have been widely reflected upon but sparsely documented.[1] Tax reform in one country, particularly a large country like the United States, potentially can affect economic activity in other countries, through macroeconomic channels such as the level of interest rates and through effects on the relative attractiveness of locales for production, incorporation, and the reporting of taxable income. Because of the high degree of integration between the U.S. and Canadian economies, these countries are a natural place to look for empirical evidence of spillover effects.

The goal of this paper is to begin a quantitative assessment of how tax reform in the United States has affected Canadian business. The proposed methodology is an event study of the impact of the Tax Reform Act of 1986 on the abnormal stock market returns to publicly traded Canadian corporations. It is based on the presumption that changes in the prospects for Canadian enterprises induced by the tax reform were reflected in the stock market valuation of the firms' shares.

Section 7.1 of the paper briefly discusses some other recent research on the stock price impact of U.S. tax reform. In section 7.2, I outline some potential avenues of influence of U.S. tax reform on Canadian business, and in section 7.3 introduce a model in which these effects are present. Section 7.4 discusses the methodology employed to assess empirically how important these potential effects actually were for the Tax Reform Act of 1986. In section 7.5, I

1. A notable exception is McLure (1990), which documents several examples of international spillovers.

237

present and discuss the results of these investigations. I find that during tax reform events there was an extraordinary inverse relationship across industries between the returns on U.S. and Canadian stocks. This relationship is consistent with a story that Canadian firms are helped by whatever hurts their U.S. competitors. However, I am unable to relate the strength of this inverse relationship to industry characteristics that proxy for the likely cross-industry impact of tax reform.

7.1   Previous Research

Previous event studies of the effect of the Tax Reform Act of 1986 on U.S. stock prices have not been particularly successful in documenting a quantitatively significant response. Cutler (1988), in a study of the effect of TRA86 on U.S. stock prices, found only a very small aggregate market reaction and concluded that tax reform news is indistinguishable from normal market noise. Among his negative findings was that the correlation of returns across positive tax reform events was only 0.036, with a t-statistic of 0.057. Cutler offers two potential explanations for the small reaction to tax reform news: that the events may have been largely anticipated, or that any tax reform enacted was perceived to be temporary and therefore not important in a present-value sense.

A few other studies have investigated the effect on U.S. stock prices of other recent changes in U.S. tax laws. Downs and Tehranian (1988) found "moderate support" for a valuation model in predicting the effect of the Economic Recovery Tax Act of 1981 on three industry groups. Lyon (1989b) found substantial evidence that previous increases in the investment tax credit positively affected stock value for firms that had relatively high expected investment, but little evidence that existing assets fell in value. Lyon (1989a), studying the stock price impact of the introduction of the accelerated cost recovery system, also failed to support any wealth effect on existing assets, but found less strong evidence that firms that are expected to invest in capital goods favored by the depreciation provisions increase in value relative to other firms.

There is no existing study that I am aware of that attempts to measure the cross-border effects of tax changes in the way proposed here. Because of the potential importance of the international spillover effects of taxation, I believe it is worthwhile to begin an assessment of this issue.

7.2   Three Stories About the Impact of U.S. Tax Reform
        on Canadian Business

The Tax Reform Act of 1986 had a significant impact on the overall (average and marginal) rate of taxation applied to U.S. corporations and on the relative burden of taxation on corporations. TRA86 lowered the statutory rate

of corporation tax applying to most income from 46% to 34%, eliminated the investment tax credit, and accelerated depreciation for equipment but decelerated it for structures. On balance, the change in a corporation's average tax rate depended inversely on its capital intensity and on its debt-capital ratio. Note that these tax changes applied equally to U.S. corporations that are subsidiaries of foreign-incorporated parent companies.

How would these major changes in U.S. taxation of corporations be expected to affect Canadian corporations? In what follows, I develop three avenues of impact. Then, in section 7.3, I present a formal model of U.S.-Canadian competition in which these avenues are made explicit.

7.2.1   "My enemy's enemy is my friend"

An increased tax burden on U.S. firms, by raising their costs, reduces the ability of the U.S. firms to compete with Canadian firms. Thus, if tax reform affects U.S. firms adversely it will be a boon to Canadian firms in competition with U.S. firms, and vice versa. For example, if tax reform increases the tax burden of U.S. beverage firms, it will help Canadian beverage firms.

There are a number of provisos that must be attached to this scenario. First, if a U.S. industry is hurt by tax reform because its customers are likely to be adversely affected, Canadian firms in the same industry will be hurt to the extent they have U.S.-based customers. Second, it may be important to distinguish the effect of tax reform on the valuation of "old" capital and on the present value of "new" capital. It is well known that a tax change such as eliminating the investment tax credit may tend to increase the former at the same time it decreases the latter. But only the latter will affect the tilt of the playing field between U.S. and Canadian firms. The former represents a windfall to the owners of existing capital that must compete with the now more expensive new capital. This effect would tend to increase the stock value of both U.S. and Canadian firms.

7.2.2   "As the U.S. goes, so goes Canada"

The Canadian government was contemplating fundamental reform of its corporate tax system even before the U.S. tax reform debate began in earnest. Nevertheless, the U.S. tax reform movement arguably increased the likelihood in Canada of a rate-reducing, base-broadening reform designed to reduce interindustry and interasset divergences in taxation. This argument relies principally on economic pressures for the two countries' tax systems to be harmonized.[2] A lower statutory corporate tax rate in the U.S. would probably cost the Canadian Treasury revenues, and a lower U.S. effective tax on new investment would induce real investment to locate in the U.S., costing Canada

---

2. The U.S. tax reform movement may have provided an intellectual impetus to Canadian tax reform, as well as strengthened the political case for fundamental tax restructuring. See Whalley (1990) for an assessment of the relative importance for Canadian reform of the economic pressures for harmonization and intellectual cross-fertilization.

jobs and tax revenues, at least in the short run. Thus, any change in the U.S. corporate tax law causes pressure on Canada to enact similar changes in its tax law. This argument suggests that any competitive advantage or disadvantage to U.S. firms caused by U.S. tax reform is bound to be short-lived, and therefore the present value of the gain or loss will be much less than if the first scenario were the only consideration.

7.2.3 "But I'm half American"

Income earned in the U.S. by U.S. subsidiaries of Canadian multinationals is essentially exempt from Canadian taxation. For this income, it is the U.S. tax law that applies. Thus, to the extent that a Canadian parent has income from U.S. subsidiaries, it should react to U.S. tax reform more like a U.S. firm than a Canadian firm. This argument suggests that the effect of tax reform on abnormal returns will look similar for U.S. firms and Canadian firms with significant operations in the U.S.

The three stories have strikingly different implications for the effect of U.S. tax reform on Canadian business. According to the first, there should have been an inverse relationship between what kind of U.S. firms gained and what kind of Canadian firms gained. The second story suggests that the relative competitive position of the two countries' firms is not important, and that U.S. tax reform affects Canadian firms in much the same way as Canadian tax reform, but with less punch due to the lag in the enactment of imitative Canadian tax reform. The final story also suggests that Canadian firms will be affected much like U.S. firms, but only to the extent that they are multinationals with U.S.-source income.

These three stories do not exhaust the possible avenues of impact of U.S. tax reform upon Canadian business. For example, I do not pursue how changes in the individual income tax, such as the increased tax on realized long-term capital gains and the decreased tax on dividends and interest, would affect the market for Canadian and U.S. shares. These are potentially confounding factors, which deserve attention in future research on this topic.

7.3   A Simple Model of How U.S. Tax Reform Affects a Canadian Firm

In what follows I present a simple model in which all three transmission mechanisms discussed above are present. The model builds on the one presented in Dixit (1983).

Consider a homogeneous product oligopoly featuring firms from two countries. Firms do not incur any transport costs in supplying either market, but third-party arbitragers are unable to take advantage of any price differential. The demand curves in the two markets are independent. Each firm assumes that the quantities supplied by all other firms are fixed (the Cournot equilibrium concept). Each firm has a fixed cost of production and a constant marginal cost.

I follow Dixit's notation, where f is the fixed cost and c is the constant marginal cost of each firm. The variable y represents sales of each firm in its domestic market, and x is export sales. The corresponding variables in the foreign country are denoted by corresponding upper-case letters. Thus, total sales in the home country's market are $q = ny + NX$, where n and N represent the (assumed to be constant) number of firms in the home and foreign market, respectively. The inverse demand functions are $p = p(q)$ in the home country and $P = P(Q)$ in the foreign country.

Rather than introducing capital income taxes explicitly, I investigate the effect on firms' profits of a production tax at rate T imposed in the foreign country. The home country production tax is denoted t. (Recall that by assumption each firm produces only in its home country.) The maximands of the typical home firm and foreign country firm are then

(1a) $\pi = py + Px - [c(y + x) + t(y + x) + f]$

(1b) $\Pi = PY + pX - [C(Y + X) + T(Y + X) + F]$

and the first-order conditions are

(2a) $y: p + yp' = c + t$

and

(3a) $x: P + xP' = c + t$

for the home firm and

(2b) $Y: P + YP' = C + T$

and

(3b) $X: p + Xp' = C + T$

for the foreign firm.

In order to determine the impact of a change in T on firms' profits, a necessary first step is to calculate its impact on the market equilibrium. I totally differentiate the home market equations (2a) and (3b) and assume linear demand curves to obtain

(4) $\begin{bmatrix} (n + 1)p' & Np' \\ np' & (N + 1)p' \end{bmatrix} \begin{bmatrix} dy \\ dX \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} dt \\ dT \end{bmatrix}$

with the solution

(5) $\begin{bmatrix} dy \\ dX \end{bmatrix} = \frac{-1}{(n + N + 1)p'} \begin{bmatrix} -(N + 1) & N \\ n & -(n + 1) \end{bmatrix} \begin{bmatrix} dt \\ dT \end{bmatrix}.$

From the foreign market equations (3a) and (2b) one can obtain similarly

(6) $\begin{bmatrix} dY \\ dx \end{bmatrix} = \frac{-1}{(n + N + 1)P'} \begin{bmatrix} -(n + 1) & n \\ N & -(N + 1) \end{bmatrix} \begin{bmatrix} dT \\ dt \end{bmatrix}.$

Note that the assumption of constant marginal costs allows the home market and foreign market analysis to be segmented, so that taxes that apply to one market do not affect the equilibrium in the other.

Using (5) and (6), one can express the equilibrium change in prices as a function of tax changes, as follows:

$$(7a) \qquad dp = (1/(n + N + 1)) \, (ndt + NdT)$$

and

$$(7b) \qquad dP = (1/(n + N + 1)) \, (ndt + NdT).$$

After-tax profits of a typical firm are given by expressions (1a) and (1b) which, in differential form, are

$$(4a) \qquad d\pi = \begin{array}{l} ydp + xdP + (p - c - t)dy \\ + \ (P - c - t)dx - (y + x)dt \end{array}$$

and

$$(4b) \qquad d\Pi = \begin{array}{l} YdP + Xdp + (P - C - T)dY \\ + \ (p - C - T)dX - (Y + X)dT. \end{array}$$

Substituting for dp and dP using (7a) and (7b), and for dy, dY, dx, and dX using (5) and (6), yields

$$(8a) \qquad d\pi = \frac{2}{n + N + 1} \left[N(y + x)dT - (N + 1) \, (y + x)dt \right]$$

$$(8b) \qquad d\Pi = \frac{2}{n + N + 1} \left[n(Y + X)dt - (n + 1) \, (Y + X)dT \right].$$

Using (8a) and (8b), we can now calculate how a change in the foreign country's tax rate will affect profits of the typical firm in the home country and foreign country:

$$(9a) \qquad \frac{d\pi}{dT} = \frac{2N(y + x)}{n + N + 1} - \left(\frac{2(N + 1) \, (y + x)}{n + N + 1} \right) \left(\frac{dt}{dT} \right)$$

$$(9b) \qquad \frac{d\Pi}{dT} = - \frac{2(n + 1)(Y + X)}{n + N + 1}.$$

Expression (9a) allows for the possibility that the home country tax rate will react to a change in the tax policy of the foreign country. Whether the typical home country firm's profits will rise or fall when T increases depends on the value of $\dfrac{dt}{dT}$, the responsiveness of the home country's tax rate. If there is no response at all $\left(\dfrac{dt}{dT} = 0 \right)$, then home country profits rise. This is the pure version of the "my enemy's enemy is my friend" scenario. If the home country

tax rate rises in step with the foreign country's tax rate $\left(\dfrac{dt}{dT} = 1\right)$, then $\dfrac{d\pi}{dT}$ reduces to $-2(y + x)/(n + N + 1)$, which is always negative. In this case the "as U.S. goes, so goes Canada" scenario dominates. In general, the typical home country firm's profits increase when T increases as long as $\dfrac{dt}{dT}$ is less than $N/(N + 1)$.

The ratio of the change in profits of the two countries' firms is, using $q = x + y$ and $Q = X + Y$,

$$(10) \qquad \frac{\dfrac{d\pi}{dT}}{\dfrac{d\Pi}{dT}} = \frac{q\left(N - (N + 1)\dfrac{dt}{dT}\right)}{Q(n + 1)}.$$

7.3.1   Extending the Model to Include Multinational Production

The model analyzed above assumes that all production is carried out in the home country. In fact, there is substantial production by Canadian firms in the U.S., and by U.S. firms in Canada. The rationale for multinational production, and how the location of production responds to taxation, is a complicated matter and one that has not been well integrated into analytical models of taxation. A simple way to take account of multinational production is to assume that each firm produces a fixed fraction of its exports in the foreign country. Letting that fraction be a for the domestic firm and A for the foreign firm, after-tax profits become

$$(11a) \qquad \pi = py + Px - [c(y + x) + t(y + (1 - a)x)$$
$$+ (T + b(t - T))ax + f]$$

$$(11b) \qquad \Pi = PY + pX - [C(Y + X) + T(Y + (1 - A)X)$$
$$+ (t + B(T - t))AX + F].$$

This formulation reflects the fact that, for the home firm, home production of $y + (1 - a)x$ is taxed at the home country rate of t. Production in the foreign country of ax is taxed first at the home country rate of T, and then may face a residual tax of $b(t - T)$ assessed by the home country. In fact, by treaty Canada effectively imposes no residual tax on the income earned in the U.S. by its multinationals, so that b is zero. The U.S., on the other hand, may impose some residual tax, so that B is positive but less than one.

The analysis of section 7.3 can then be repeated, yielding the following expressions for the response of profits to tax policy:

$$(12) \qquad \frac{d\pi}{dT} = \frac{2}{n + N + 1}\left[\begin{array}{c} N(1 - A - AB)y - (N + 1) \\ a(1 - b)x + Nx \end{array}\right]$$

$$
-\frac{2}{n+N+1}\left[\begin{array}{l}(N+1)y - NA(1-B)y \\ + (N+1)(1-a+ab)x\end{array}\right]\frac{dt}{dT}
$$

$$
(13)\quad \frac{d\Pi}{dT} = -\frac{2}{n+N+1}\left[\begin{array}{l}(n+1)Y - na(1-b)Y \\ + (n+1)(1-A+AB)X\end{array}\right]
$$

$$
(14)\quad \frac{\dfrac{d\pi}{dT}}{\dfrac{d\Pi}{dT}} = \frac{\left[\begin{array}{l}N(1-A-AB)y - (N+1) \\ a(1-b)x + Nx\end{array}\right] - \left[\begin{array}{l}(N+1)y - NA(1-B)y \\ + (N+1)(1-a+ab)x\end{array}\right]\dfrac{dt}{dT}}{\left[\begin{array}{l}(n+1)Y - na(1-b)Y \\ + (n+1)(1-A+AB)X\end{array}\right]}.
$$

Unsurprisingly, the greater is a (the fraction of each home firm's exports produced and taxed abroad), the more likely is there to be a direct negative impact of the foreign country's tax system on home country profits. Or, using the terminology of section 7.2, the strength of the "but I'm half American" effect depends on the extent of the home firm's production in the foreign country.

The objective of what follows is to assess whether the response of Canadian stock prices to news about the U.S. tax reform followed the patterns suggested by equations (12) and (14). Equation (12) implies that the stock price response depends in a nonlinear way on the relative number of firms from each country, each country's system of taxing foreign-source income, the extent of each country's foreign production, and the expected response of the Canadian tax system to U.S. reform. Keep in mind also that equation (12) is derived from a very simple model of the economic environment, which ignores such factors as firms from third countries, product differentiation, and the endogeneity of foreign direct investment. Thus, equation (12) is useful primarily as a guide to understanding the response of Canadian stock prices to news about U.S. tax reform. It does support the plausibility of each of the three avenues of impact discussed in section 7.2 in particular that

$$
(i)\quad \left.\frac{d\left(\dfrac{d\pi}{dT}\right)}{dN}\right|_{\frac{dt}{dT}=0} > 0 \qquad\qquad (ii)\quad \frac{d\left(\dfrac{d\pi}{dT}\right)}{d\left(\dfrac{dt}{dT}\right)} < 0
$$

$$
(iii)\quad \left.\frac{d\left(\dfrac{d\pi}{dT}\right)}{da}\right|_{\frac{dt}{dT}=0} < 0.
$$

Equation (14) characterizes the relationship between how a typical home firm's profits react to a change in the foreign tax rate and how a typical foreign country's profits react. This ratio is different from the one that would apply if

the source of profit changes were some other kind of shock to the economic environment. Thus, it would be interesting to assess not only whether the response of Canadian firms' profits to news about U.S. tax reform followed the patterns described above, but also whether the *relationship* of Canadian firms' abnormal profits to U.S. firms' abnormal profits during tax reform events was different than at other times.

7.4   Methodology and Data

In order to measure the change in stock prices caused by news about tax law changes, a model of the stock returns in the absence of news is required. I will assume, as is standard in event studies, that equity is priced to yield a normal expected return that is adjusted for its risk characteristics. In particular, I first estimate models of the following form:

$$(15) \qquad r_{cit} = \alpha_i + \beta_i r_{mt} + \lambda_i r_{uit} + \delta_{ie} D_{et} + \varepsilon_{it},$$

where r_{cit} = the return on Canadian industry i at time t; r_{mt} = the return on the U.S. market portfolio at time t; r_{uit} = the return on U.S. industry i at time t; D_{et} = a dummy variable equal to 1 on days in "event-window" e (when news about tax reform is revealed) and equal to 0 otherwise; and ε_{it} = a serially uncorrelated random-error term. The estimated coefficient of the event dummy, δ_{ie}, measures the effect of news on the return of industry i during dummy event-window e and is referred to as an "abnormal" return. This equation is estimated over a three-year period that precedes and includes the event windows.

The value of δ_{ie} for a given industry is presumed to depend on certain industry characteristics that influence how tax reform affects the value of Canadian firms. The model in section 7.3 suggests that the abnormal return will depend on, inter alia, the following three factors: the degree of penetration of U.S. firms in the Canadian firms' market (USPEN), the likely consequences for the Canadian firm of induced Canadian tax reform (CATAX), and the fraction of the Canadian industry's income that is earned in the U.S. (CAUSI). In terms of a regression line, each of these factors could affect both the intercept term and the slope of the relationship between the countries' returns. Prior expectations of the signs of these terms are listed in figure 7.1.

In the next step of the analysis, I estimate over fifteen manufacturing sectors the following equation:[3]

$$(16) \quad \delta_{ie} = a_{e0} + a_{e1} \text{ USPEN}_i + a_{e2} \text{ CATAX}_i + a_{e3} \text{ CAUSI}_i$$

$$+ r_{uit} \cdot (b_{e0} + b_{e1} \text{ USPEN}_i + b_{e2} \text{ CATAX}_i + b_{e3} \text{ CAUSI}_i) + u_{ie}.$$

---

3. The sectors are chemicals, electrical equipment, fabricated metal, food, furniture, lumber, machinery, nonmetallic mineral products, paper primary metals, printing, rubber, textiles, tobacco, and transportation products. Industry portfolios are formed by weighting each firm by its stock market value at the beginning of the estimation period.

Variable	Intercept	Slope
1. Degree of penetration of U.S. firms in Canadian market (USPEN)	0	–
2. Likely impact of Canadian tax reform (CATAX)	+	0
3. Extent of Canadian industry's income earned in U.S. (CAUSI)	0	+

Fig. 7.1.   Expected signs on industry characteristics variables

These analyses are done separately for each event, and also for all events together, assuming $a_{11} = a_{21} = a_{31} = a_{41}$, etc.[4]

Stock return data for U.S. and Canadian firms are drawn from the daily return files compiled by the Center for Research on Security Prices (CRSP) and the Toronto Stock Exchange/University of Western Ontario, respectively.[5]

I study four separate events associated with TRA86. The first event is the release of the Treasury Department's initial proposal for tax reform in November 1984. The second event is the May 1985 release of the president's own tax reform proposal. The third and fourth events correspond to critical moments in the legislative history, when the probability that tax reform would be passed dramatically increased. They are the passage of a tax reform bill by the House of Representatives at 11 P.M. on 17 December 1985, and the passage of a bill by the Senate Finance Committee at 12:30 A.M. on 7 May 1986. Neither of these events was widely anticipated, and each arguably increased the probability of tax reform in a discrete way.

Note that in the nearly two years between the Treasury's initial proposal and the president's signing the law on 22 October 1986, the details of the proposal being considered changed substantially. Thus, even if each of the four events discretely increased the probability of tax reform, they increased the probability of *different* tax reforms happening. For example, while the Treasury's pro-

4. One alternative to the empirical model outlined here was pursued. In it, the value of r_{uit} in equation (16) was taken to be the abnormal return of the U.S. industry, estimated using equation (15). This change did not affect the principal qualitative results discussed in the text, although the details are altered. Further information about the alternative specification is available upon request from the author.

5. The sample of firms is defined as those firms that were traded during the entire three-year sample period. A few firms were deleted from the sample due to a large number of missing observations. To create industry portfolios, firms are classified according to the two-digit Standard Industrial Classification (SIC) code assigned to them by Dunn and Bradstreet's *Canadian Key Business Directory.* Firms not listed in this directory are classified according to their annual reports or the "nature of business" assigned to them by the Toronto Stock Exchange. Value-weighted portfolios are then created based on the price data and the number of shares outstanding found in the *Toronto Stock Exchange Review* at the beginning of the sample period. (For a few firms the necessary data was not available for this time period. For these firms, weights were computed based on deflated values at later dates.) U.S. industry value-weighted portfolios are created according to the two-digit SIC code listed for each security on the CRSP tape. There were days in which one exchange was open and the other was closed due to different holidays in the U.S. and Canada. These observations, as well as the observations following the holidays, are excluded from the sample.

posal treated the oil and gas industry fairly harshly, the president's proposal was relatively generous toward that sector. Thus, it is possible that a given industry's response was not entirely consistent across events. This possibility could explain Cutler's (1988) finding of a near-zero correlation of sectoral abnormal returns across tax reform events.

In the empirical research, two versions of the length of the four event windows are examined: "short windows," which consist of the trading day of the announcement, or, for the nighttime legislative breakthroughs, the trading day immediately following; and "long windows," which, for the first two events, include a week before and a week after the public unveiling of the proposal, and for the third and fourth events, a week after the legislative breakthrough. The long windows allow for the effect of the leaking of parts of the proposal (for the first two windows only) and for the gradual assimilation of the impact of complicated tax packages subsequent to their announcement.

7.5 Results

7.5.1 Country Aggregates

Before proceeding to the analysis that is disaggregated by industry, it is worthwhile to inspect the behavior of the overall U.S. and Canadian stock markets during the U.S. tax reform event windows. This information is presented in table 7.1.[6]

For both the short- and long-window event definitions, the return on U.S. stocks was generally negative, except for a positive return for the first event using the short window and for the second event using the long window. The pattern of Canadian returns was somewhat different. The short-window return for all events was negative, but the long-window return was positive for the second and fourth events. On balance, then, the Canadian stock market performed worse than usual during the U.S. tax reform events.

Was the relationship between the U.S. and Canadian returns during the tax reform windows unusual, or did it follow the usual pattern? To investigate that issue, I estimated a regression model explaining the Canadian daily rate of return as a linear function of the U.S. daily return over the period 1981–84. The estimated regression line is plotted in figure 7.2. Also plotted in figure 7.2 are the eight pairs of aggregate returns for the eight event windows, where an S after the event number denotes the short window and an L denotes the long window. Figure 7.2 shows that, in six of eight cases, the actual return to the Canadian stock portfolio was lower than what was predicted by the regression equation. Also of interest is whether the relationship between the U.S. and Canadian returns during the tax reform windows looks any different than

---

6. The overall return for the U.S. and Canadian stock markets is the value-weighted return of all the securities included in the CRSP and TSE/Western databases, respectively.

Table 7.1   **Returns to Overall U.S. and Canadian Stock Portfolios and
                        Abnormal Canadian Returns**

	Overall Returns (%)		Abnormal Return (%)
	U.S.	Canada	Canada
Event 1			
One-Day Window	0.478	-0.203	-0.474
			(0.358)
Two-Week Window	-0.132	-0.184	-0.134
			(0.120)
Event 2			
One-Day Window	-0.064	-0.137	-0.122
			(0.358)
Two-Week Window	0.113	-0.056	-0.135
			(0.114)
Event 3			
One-Day Window	-0.418	-0.268	-0.065
			(0.359)
One-Week Window	-0.294	-0.020	0.116
			(0.161)
Event 4			
One-Day Window	-0.426	-0.440	-0.233
			(0.359)
One-Week Window	-0.012	0.071	0.058
			(0.161)

Notes: Figures for long windows refer to average daily returns over the period. Abnormal return is calculated as the residual of the equation $r_c = 0.019 + 0.529 \cdot r_u$. The figures in parentheses refer to the forecast error of the estimating equation.

usual. This is impossible to pin down, given only four independent observations, but my own eyeballing of figure 7.1 suggests that the slope of a line that fits the event-window points is not different from the regression line that fits the pre–tax reform period.

7.5.2   Industry Analysis

In this section, I take advantage of information that is disaggregated by industry to further investigate the impact of U.S. tax reform on Canadian stock prices. In all its versions, tax reform had a differential impact by industry. Broadly speaking, a reduced rate on corporate income combined with elimination of the investment tax credit and scaled-back depreciation allowances would hurt relatively those industries that benefited relatively from the ITC and accelerated depreciation. Industries also differ in the likely cross-border impact of U.S. tax reform, depending on the factors discussed in sections 7.2 and 7.3. Note, though, that the tax reform package under active consideration changed considerably between the time of the release of the Treasury proposal in 1984 and Congressional passage of tax reform in 1986.
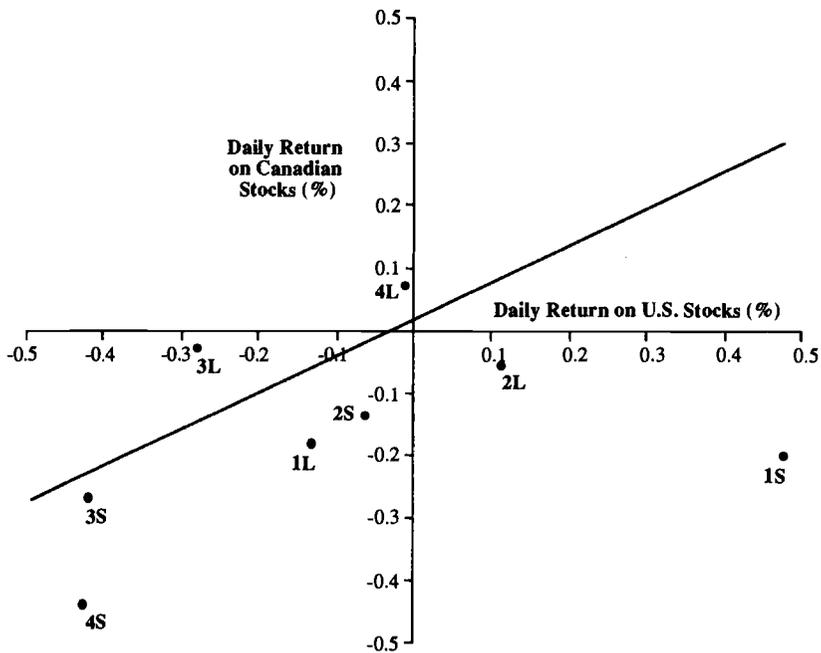
Fig. 7.2 Relationship between overall Canadian and U.S. stock market returns during tax reform events

For this reason, one should not assume that the relative impact on industry of tax reform news would be uniform across the four events being studied here.

Before proceeding to the multivariate analysis of cross-industry abnormal returns, I begin with a simple test of whether stock prices displayed any unusual behavior during the event windows. I regress the Canadian abnormal returns against a constant and the U.S. industry return. This is equivalent to estimating equation (16) assuming that a_{e1}, a_{e2}, a_{e3}, b_{e1}, b_{e2}, and b_{e3} are all zero. Table 7.2 shows that, for the short-window event definitions, the relationship between the Canadian and U.S. returns is consistently more negative during tax reform events than at other times. This effect is statistically significantly different from zero for events 2 and 4 and for all events combined. The extraordinary negative relationship is also partly evident using the long-window event definitions for events 2 and 4, as well as for all events combined. These results suggest that there may have been an unusual inverse relationship between the U.S. and Canadian counterpart industry returns during the tax reform events. This pattern is consistent with the predominance of the "my enemy's enemy is my friend" scenario, which implies that whatever hurts the U.S. industry will help the competing Canadian industry. In what follows, I pursue this finding to see if it can be related to the characteristics of the industries.

Table 7.2   **Results of Further Analyses Explaining Abnormal Returns of**
                       Canadian Industries during U.S. Tax Reform Events

Independent Variable	Event 1	Event 2	Event 3	Event 4	All
			Long Windows		
Constant	0.0023	0.0017	0.0074	0.0017	0.0026
	(0.0021)	(0.0017)	(0.0020)	(0.0017)	(0.0013)
r_{uit}	0.0672	−0.5738	0.8405	−1.0128	−0.4285
	(0.9755)	(0.6587)	(0.6112)	(0.5286)	(0.3016)
			Short Windows		
Constant	0.0027	0.0057	−0.0010	−0.0062	0.0015
	(0.0035)	(0.0024)	(0.0040)	(0.0031)	(0.0013)
r_{uit}	−0.1976	−1.1938	−0.3381	−1.2906	−0.3926
	(0.3910)	(0.3991)	(0.6021)	(0.4693)	(0.1856)

Note: Standard errors in parentheses.

As always, it is difficult to obtain appropriate empirical counterparts to the conceptual variables that appear in the theoretical model. USPEN$_i$, the degree of penetration of U.S. firms in the market, is measured by the fraction of sales in Canada for industry i accounted for by U.S. imports. CATAX$_i$, the likely direction of an imitative Canadian tax reform, is measured by the difference between industry i's average tax rate in 1984–85 and the mean of the fifteen average tax rates.[7] The motivation underlying this measure is that, because the spirit of the U.S. corporate tax reform was a leveling of the playing field, an imitative Canadian tax reform would penalize those sectors with a relatively low average tax rate and help those sectors with a relatively high average tax rate. CAUSI$_i$, the extent of Canadian firms' income earned in the U.S., is measured by the value-weighted proportion of Canadian firms in industry i that has U.S. subsidiaries.

The results of these regression analyses using the short-window event-window definitions are presented in table 7.3, and table 7.4 shows the results

7. The average tax rate is measured as the ratio of taxes paid to book income adjusted for capital gains and intercorporate dividends, for profitable corporations only. These data were graciously provided by Statistics Canada.

Because reform of the Canadian tax system was proceeding during the period of the four events studied here, it is especially problematic to capture with a single variable the likely industry impact of Canadian tax reform induced by the U.S. reform. The Canadian budget of May 23, 1985, released a discussion paper that offered an "illustrative proposal [that] would broaden the corporate tax base and lower corporate rates" within a revenue-neutral framework. The budget of February 26, 1986, proposed to reduce the basic federal corporate tax rate from 36% to 33% in 1989 (by 1% per year), reduce the rate on manufacturing profits from 30% to 26% in 1989, phase out the general investment tax credit and eliminate the 3% inventory allowance. Further corporate income tax reform was promised for the future.

Table 7.3   **Results of "Short-Window" Regression Analyses Explaining Abnormal Returns of Canadian Industries during U.S. Tax Reform Events**

Independent Variable	Event 1	Event 2	Event 3	Event 4	All
Constant	.0082	.013	.0029	−.0094	.0026
	(.0145)	(.0154)	(.0117)	(.0157)	(.0032)
$USPEN_i$	−.0018	−.0138	.0026	.0174	.0055
	(.0514)	(.0173)	(.029)	(.0197)	(.0071)
$CATAX_i$	−.236	.0707	.0217	.0016	−.056
	(.2193)	(.276)	(.1745)	(.3187)	(.0443)
$CAUSI_i$	−.013	−.0102	−.0067	−.0027	−.004
	(.0159)	(.019)	(.0149)	(.0214)	(.004)
r_{uit}	−.1745	−2.0935	.1953	−1.5198	−.4982
	(1.3517)	(1.0544)	(2.9087)	(1.72)	(.4301)
$USPEN_i \cdot r_{uit}$	−.8116	3.5307	−.2783	−.2671	−.0729
	(4.892)	(2.5948)	(4.8803)	(2.7948)	(.9519)
$CATAX_i \cdot r_{uit}$	21.5798	.2043	18.5144	−9.854	3.8028
	(24.0374)	(32.2833)	(25.8221)	(48.5951)	(6.1892)
$CAUSI_i \cdot r_{uit}$	1.4504	−.4762	−.3381	−.4165	.4889
	(1.5165)	(2.0096)	(3.2603)	(2.1545)	(.5181)

Note: Standard errors in parentheses.

Table 7.4   **Results of "Long-Window" Regression Analyses Explaining Abnormal Returns of Canadian Industries during U.S. Tax Reform Events**

Independent Variable	Event 1	Event 2	Event 3	Event 4	All
Constant	−.0118	.0105	.0093	.0024	.0044
	(.0165)	(.0049)	(.0054)	(.0091)	(.0022)
$USPEN_i$	.0121	−.0026	−.0138	−.0378	.0001
	(.0402)	(.0124)	(.0162)	(.0497)	(.0056)
$CATAX_i$	−.1267	−.0639	−.0159	.1118	−.0639
	(.1598)	(.0671)	(.0863)	(.1263)	(.0324)
$CAUSI_i$	−.0183	−.0126	.0002	.0065	−.0024
	(.0208)	(.0061)	(.0063)	(.0084)	(.0028)
r_{uit}	−8.8823	−.0202	−.7253	−1.8705	−.4815
	(10.283)	(1.8843)	(2.4497)	(2.9535)	(.7159)
$USPEN_i \cdot r_{uit}$	7.9331	.1781	−.2815	−7.1965	1.16
	(19.3755)	(3.4399)	(4.0798)	(13.2475)	(1.6071)
$CATAX_i \cdot r_{uit}$	−36.8866	−50.7429	31.2024	−21.7592	−11.9968
	(98.2421)	(41.8461)	(37.9002)	(43.7236)	(10.8054)
$CAUSI_i \cdot r_{uit}$	10.472	−.3173	2.3138	−2.9507	.2965
	(12.1859)	(2.6349)	(3.1052)	(3.2517)	(.9642)

Note: Standard errors in parentheses.

using the long-window event-window definitions. In neither case are the results particularly supportive of the hypotheses offered in this paper and summarized in figure 7.1. The prereform average tax rate of the Canadian industry is not positively related to its abnormal return in a consistent way. The relationship between the Canadian industry abnormal return and the U.S. industry return is not related in a consistent way to either the extent of U.S. import penetration or the extent of U.S. activity by the Canadian firms.

That a consistent pattern of abnormal returns fails to appear may be the result of any of a number of factors. It may be simply because the impact of U.S. tax reform on the prospects of Canadian firms was too small to be distinguished from the normal daily fluctuations of Canadian stock prices. It may be that the indicators of industry characteristics are too flawed to pick up the differences in the response of Canadian stock prices. It may be that the probability that tax reform would happen did not change during the event windows in a quantitatively significant way. My own guess is that each of these explanations is partly behind the failure of a significant pattern of response to appear. Recall that prior work has failed to establish clear patterns of response of U.S. stock prices to U.S. tax reform, so it is perhaps not too surprising that the identification of cross-border effects, which are bound to be of smaller magnitude than domestic effects, is not easy.

7.6   Conclusions

Events that changed the probability of fundamental U.S. tax reform had little noticeable impact on the U.S. stock market, either in terms of its aggregate movement or in the cross-industry pattern of stock price movements. Given this, it is perhaps too much to ask that analysis uncover systematic cross-border stock price effects of tax policy. Yet some weak evidence of systematic response is present. The cross-industry correlation of abnormal Canadian and U.S. returns is negative during some of the event periods, suggesting that because Canadian firms compete with U.S. firms, what is good for the latter is bad for the former, and vice versa. There is no evidence, though, that this "my enemy's enemy is my friend" effect is stronger in industries that have a high degree of U.S. firms' sales in the Canadian market (a rough indicator of the competitiveness of U.S. and Canadian firms).

This paper does not definitively establish the presence of cross-border spillover effects of tax policy. More research is needed. If the finding of negative cross-industry correlations of abnormal returns stands up to future testing, it suggests that the profitability of industry A in country B can be affected (inversely) by how favorable the tax treatment of industry A is in country C. This finding does not, however, necessarily imply that country C should respond by matching the policy of country B. The normative question of how one country's policy ought to react to another's depends on such things as the nature of the strategic interaction among firms. Theoretical research on this

question is in an early stage of development,[8] and should be accompanied by empirical work of the kind begun in this paper.

References

Cutler, David M. 1988. Tax Reform and the Stock Market: An Asset Price Approach. *American Economic Review* 78(December): 1107–17.

Dixit, Avinash. 1983. International Trade Policy for Oligopolistic Industries. *Economic Journal* 94(supp.): 1–16.

Downs, Thomas W., and Hassan Tehranian. 1988. Predicting Stock Price Responses to Tax Policy Changes. *American Economic Review* 78(December): 1118–30.

Levinsohn, James, and Joel Slemrod. 1990. Taxes, Tariffs and the Global Corporation. NBER Working Paper no. 3500. Cambridge MA: National Bureau of Economic Research.

Lyon, Andrew B. 1989a. Did ACRS Really Cause Stock Prices to Fall? NBER Working Paper no. 2990 (May). Cambridge MA: National Bureau of Economic Research.

Lyon, Andrew B. 1989b. The Effect of the Investment Tax Credit on the Value of the Firm. *Journal of Public Economics* 38(2): 227–47.

McLure, Charles E., Jr. 1990. International Aspects of Tax Policy for the 21st Century. In *International Tax Policy: Agenda for the Nineties* (Proceedings of Conference, American College of Tax Counsel, ALI-ABA Committee on Continuing Professional Education, and National Tax Association. Washington, D.C., April 20–21).

Thompson, Aileen. 1990. Trade Liberalization, Comparative Advantage, and Stock Prices: An Event Study Analysis of the U.S.-Canadian Free Trade Agreement. University of Michigan.

Whalley, John. 1990. Foreign Responses to U.S. Tax Reform. In *Do Taxes Matter? The Impact of the Tax Reform Act of 1986*, ed. J. Slemrod. Cambridge MA: MIT Press.

8. For an example, see Levinsohn and Slemrod (1990).

This Page Intentionally Left Blank