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Trade Liberalization and Stock Prices: Evidence from the Canada-United States Free Trade Agreement

by

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Trade Liberalization, International Competitiveness, and Stock Prices: Evidence from the Canada-United States Free Trade Agreement

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1 Introduction

The Canada-United States Free Trade Agreement (FTA) provides an excellent opportunity to analyze the effects of a comprehensive trade liberalization. It is too soon to estimate the actual impact of the FTA. Instead, a stock market event study is employed to investigate the market's expectations about the consequences of the FTA for Canadian manufacturing firms. These market predictions are then related to industry characteristics suggested by international trade theory.

A central proposition of international trade theory is the Heckscher-Ohlin (H-O) hypothesis, which predicts that a country will have a comparative advantage in the production of those commodities that use relatively intensively its relatively abundant (or inexpensive) factor. Presumably, if trade between the United States and Canada is based on comparative advantage and if the H-O hypothesis, in turn, provides an appropriate description of the determinants of comparative advantage, then Canadian industries that use intensively Canada's relatively inexpensive factors should benefit from the FTA.

During the free trade debates in Canada, a great deal of emphasis was placed on the potential gains achieved through the realization of economies of scale. It has been argued that trade protection encourages suboptimal scales of production. For example, Eastman and Stykolt (1967) posit that trade protection in concentrated industries enables firms to collude and set prices above average cost. The profits attract new firms, resulting in a market structure characterized by a large number of firms producing output levels below minimum efficient scale. Similarly, Horstmann and Markusen (1986) find that trade protection may lead to the "inefficient entry"of firms. It follows that the removal of trade protection should lead to the rationalization of production facilities: some domestic firms will exit the industry, output per firm will rise and average production costs will fall. Although some firms expand as a result of rationalization, it is likely that all firms in the industry will experience short run losses until some firms exit the industry.

Predictions based on economies of scale are not necessarily inconsistent with the interindustry

adjustments predicted by the theory of comparative advantage. For example, in the two-sector model developed by Helpman and Krugman (1985), intraindustry specialization occurs within the increasing returns to scale sector enabling the realization of scale economies, but net imports and exports are determined by comparative advantage based on factor endowments. Computable general equilibrium studies of bilateral free trade between Canada and the United States, such as Brown and Stern (1988) and Cox and Harris (1984), suggest that both industry rationalization and interindustry specialization may be important features of the adjustment to bilateral free trade between Canada and the United States.

Two primary questions will be addressed in this paper. The first is whether investors' expectations of the consequences of the FTA were consistent with the price version of the H-O hypothesis. In other words, did relative factor prices play a role in determining investors' perceptions of comparative advantage? The second question is whether firms operating in industries where the average plant scale is small relative to the corresponding U.S. industries were expected to experience losses as a result of the FTA. This may be interpreted as a sign that the industry was expected to rationalize.

A theoretical framework is developed that incorporates elements of both the traditional H-O model and the economies of scale models. In addition, capital is assumed to be sector-specific in the short run. Thus, the real return to capital rises in sectors that are positively affected by trade policy and falls in sectors that are negatively affected by trade policy.[1] This is in contrast to the Stolper-Samuelson (1941) theorem which, under the assumption of perfectly mobile capital, predicts that the real return to capital will either rise in all sectors or fall in all sectors depending on the country's factor endowments. Within this framework, the impact of the FTA on the value of capital employed by an individual firm is a function of relative factor prices, relative factor shares, and the plant scale of domestic firms relative to their foreign competitors. With efficient capital markets, the impact of the FTA is reflected in stock market prices at the time new information is

[1]See Mussa (1974) and Neary (1978) for a discussion of the specific-factors model.

learned about the agreement.

The implications of this model are tested using a stock market event study. Event studies measure the effects of a particular event or series of events on security prices by estimating the "abnormal" returns that correspond to the event date or dates.[2] Two previous studies have analyzed the relationship between the FTA and stock prices. Employing an approach similar to an event study, Brander (1991) finds that the public opinion polls published during the 1988 Canadian General Election campaign (during which the FTA was the primary issue) had a positive and statistically significant effect on the Toronto Stock Exchange index (TSE 300). Thompson (1991a) estimates industry-level abnormal returns corresponding to events (including the General Election) that are believed to have altered the perceived probability that the agreement would be implemented. Using statistical analysis, it is determined that these abnormal returns contain information about the anticipated impact of the FTA.

In this paper, abnormal returns corresponding to three sets of events are estimated for individual Canadian manufacturing firms. Each set of events contains two individual events: an unexpected setback to the agreement followed by a recovery. The abnormal returns are related to the factor shares of natural resources and labor relative to capital, and a variable capturing the industry-level scale advantage or disadvantage of Canadian firms relative to U.S. firms. The results indicate that both the H-O hypothesis and the economies of scale hypothesis play a role in determining investors' perceptions of the impact of the FTA on Canadian firms.

2 Theoretical Foundation

In this section a theoretical framework is developed that links the effect of the FTA on the market value of a firm's capital to the relative factor shares employed by the firm and the relative plant

[2]See Hartigan, Perry and Kamma (1986), and Ries (1990) for examples of applications of this method in the field of international trade. In addition, Grossman and Levinsohn (1989) and Brander (1991) employ techniques similar to an event study to analyze international trade issues.

scale advantage (or disadvantage) of the industry in which the firm operates. The change in the market value of capital is then translated into the change in the market value of equity to permit empirical investigation based on stock market returns.

The value of firm i's capital is defined to be the expected discounted value of the future net cash flows to the firm. To derive a relationship between cash flows and factor shares and relative plant scale, a simple three-factor model is employed. Each country is endowed with fixed quantities of capital, labor, and natural resources which are immobile between countries. Capital is specific to the sector in which it is employed in the short run, while labor and natural resources are perfectly mobile between sectors within a country. Furthermore, it is assumed that both countries have access to identical increasing returns to scale technologies and that firms may freely enter and exit all industries in the long run. As a consequence, long run economic profits are equal to zero in all industries. In this three factor model, the value of firm i's capital at time t is equal to

$$V_{it} = \sum_{\tau=t+1}^{\infty} \left(\frac{1}{1+r}\right)^{\tau-t} E[C_{i\tau} \mid I_t], \tag{1}$$

where r is the risk-free rate of interest and I_t represents the information set at time t. The term C_{it} represents net cash flows and is defined as

$$C_{i\tau} = P_{i\tau}Q_{i\tau} - w_\tau L_{i\tau} - w_{n\tau}NR_{i\tau} - k_\tau, \tag{2}$$

where $P_{i\tau}$ is the price of the output at time τ, $Q_{i\tau}$ is the output level at time τ, w_τ is the wage rate at time τ, $w_{n\tau}$ is the price of natural resources at time τ, $L_{i\tau}$ and $NR_{i\tau}$ are the amounts of labor and natural resources employed by firm i at time τ, and $k_{i\tau}$ is investment at time τ.

Let T represent the time at which the FTA will go into effect if implemented. For simplicity, let one unit of time be the short-run adjustment period during which capital is sector-specific, so that $k_T = 0$.[3] Short run economic profits and losses exist among different industries until capital

[3]In reality, it is likely that this adjustment process began when the agreement was anticipated. It was not known with certainty, however, that the agreement would be implemented until six weeks before the actual implementation.

is reallocated in response to the new trading environment. This reallocation is completed at the beginning of period $T+1$, at which time expected economic profits return to zero.

At time t, the expected value of net cash flows of firm i at time T may be expressed as a weighted average of the expected net cash flows with and without the FTA,

$$E[C_{iT}|I_\tau] = \varrho_t C_{iT}^{fta} + (1-\varrho_t)C_{iT}^{\sim fta}, \tag{3}$$

where ϱ_t represents the perceived probability that the agreement will be implemented, and C_{iT}^{fta} and $C_{iT}^{\sim fta}$ represent the expected value of net cash flows at time T with and without the FTA, respectively. With efficient capital markets, the effect of new information on the expected value of a firm's cash flows is reflected in the market value of the firm's capital as soon as the information is learned. Suppose new information is learned at time t that alters ϱ. The change in the value of the capital of firm i at time t is

$$dV_{it} = \left(\frac{1}{1+r}\right)^{T-t} \rho_t (C_{iT}^{fta} - C_{iT}^{\sim fta}) \tag{4}$$

where ρ_t equals the change in ϱ at time t. Proportionally differentiating the expression for net cash flows and equating the price of a given factor to the value of its marginal product, the proportional change in the market value of firm i at time t may be expressed as

$$\hat{V}_{it} = \rho_t \left(\frac{1}{1+r}\right)^{T-t} \left[\frac{1}{\theta_{ik}}(\hat{P}_i^{fta} - \theta_{il}\hat{w}^{fta} - \theta_{in}\hat{w}_n^{fta})\right], \tag{5}$$

where θ_{ij} denotes the distributive share of factor j in sector i, $\hat{P}_i^{fta}$ represents the expected proportional effect of the FTA on the price of good i at time T, and $\hat{w}^{fta}$ and $\hat{w}_n^{fta}$ represent the expected proportional effects of the FTA on the wage and price of natural resources at time T.

To determine the effect of the agreement on the value of the firm, it is necessary first to determine its effect on commodity prices and variable factor prices. In the absence of free trade, the difference

It is therefore reasonable to assume that capital had not adjusted (completely) to the agreement prior to the beginning of period T.

between the expected price of a good in Canada and the United States at time T is equal to the expected tariff level and/or the tariff equivalent of a non-tariff barrier. Thus,

$$E(P_{iT}^{us} - P_{iT}^{c} \mid I_t) = E(\text{tariff}_T \mid I_t), \tag{6}$$

where P_i^c and P_i^{us} are the non-FTA prices of good i in Canada and the United States, respectively. Canada is assumed to be small enough to take prices as given in a free trade equilibrium. In other words, the FTA is assumed to have no effect on prices in the United States. Thus, the expected proportional change in the Canadian price of good i as a result of the agreement will be equal to the proportional difference between the non-FTA prices in the United States and Canada,

$$\hat{P}_i^{fta} = \hat{P}_i^{us-c} = \frac{P_i^{us} - P_i^{c}}{P_i^{c}}. \tag{7}$$

With free entry and exit of firms, the price of good i must equal the unit cost of a firm in sector i in the non-FTA equilibrium. To introduce increasing returns to scale in a simple way, it is assumed that production in industry i requires a fixed amount of capital f_i as well as a variable amount of capital. The price of good i is therefore equal to

$$P_i = wa_{il} + w_n a_{in} + ra_{iv} + \frac{rf_i}{q_i}, \tag{8}$$

where a_{ij} is the quantity of factor j required to produce one unit of good i, the subscript v denotes variable capital, and q_i is the output of an individual firm in industry i. Thus, the proportional change in the price of good i can be expressed as a function of the non-FTA factor prices and output levels:

$$\hat{P}_i^{fta} = \hat{P}_i^{us-c} = \theta_{il}\hat{w}^{us-c} + \theta_{in}\hat{w}_n^{us-c} + \theta_{ik}\hat{r}^{us-c} - \theta_{if}\hat{q}_i^{us-c} \tag{9}$$

where the subscript f denotes fixed capital and the caret along with the superscript, (us-c), indicates the proportional difference between U.S. and Canadian non-FTA levels. In other words,

$$\hat{w}^{us-c} \equiv \frac{w^{us} - w^{c}}{w^{c}},$$

$$\hat{w}_n^{us-c} \equiv \frac{w_n^{us} - w^c}{w_n^c},$$
$$\hat{r}^{us-c} \equiv \frac{r^{us} - r^c}{r^c},$$
$$\hat{q}_i^{us-c} \equiv \frac{q_i^{us} - q_i^c}{q_i^c}. \tag{10}$$

Positive values of $\hat{w}^{us-c}$, $\hat{w}_n^{us-c}$, and $\hat{r}^{us-c}$ indicate that these prices are higher in the United States than in Canada and may be interpreted as revealing Canadian factor price advantages. Positive values of $\hat{q}_i$ indicate that Canadian firms' production levels in industry i are lower than those of their U.S. counterparts. All other things equal, this implies that average costs in this industry are higher in Canada. Thus, a positive value of $\hat{q}_i$ reflects a Canadian plant scale disadvantage. Although industry rationalization is not explicitly modeled here, a plant scale disadvantage serves as an indication that the industry may be forced to rationalize as a result of the FTA.

The change in relative output prices alters the value of the marginal products of all three factors employed in each sector. In period T capital is fixed and labor and natural resources are reallocated between sectors until the values of their marginal products are equal among sectors. Full employment in the variable factor markets is maintained. The equilibrium conditions are

$$\sum_{i=1}^{S} L_i(w, w_n, P_i, \bar{k}_i) = \bar{L}, \tag{11}$$

and

$$\sum_{i=1}^{S} NR_i(w, w_n, P_i, \bar{k}_i) = \bar{NR}, \tag{12}$$

where S represents the number of sectors, and $\bar{L}$ and $\bar{NR}$ represent the fixed supplies of labor and natural resources. Extending the analysis of Mussa (1974) to consider the case of S specific factors and two variable factors, differentiation of these two condition yields:

$$\hat{w}^{fta} = \sum_{i=1}^{S} \mu_{il} \hat{P}_i^{fta}, \tag{13}$$

and

$$\hat{w}_n^{fta} = \sum_{i=1}^{S} \mu_{in} \hat{P}_i^{fta}, \tag{14}$$

where μ_{ij} is the elasticity of the demand for factor j with respect to the price of good i:

$$\mu_{il} \equiv \frac{(\sum_{s=1}^{S} \lambda_{sn}\zeta_{sn})\lambda_{il}(\zeta_{il}+\zeta_{iln}) - (\sum_{s=1}^{S} \lambda_{sl}\zeta_{sln})\lambda_{in}(\zeta_{in}+\zeta_{inl})}{\sum_{s=1}^{S} \lambda_{sn}\zeta_{sn} \sum_{s=1}^{S} \lambda_{sl}\zeta_{sl} - \sum_{s=1}^{S} \lambda_{sn}\zeta_{snl} \sum_{s=1}^{S} \lambda_{sl}\zeta_{sln}}$$

and

$$\mu_{in} \equiv \frac{(\sum_{s=1}^{S} \lambda_{sl}\zeta_{sl})\lambda_{in}(\zeta_{in}+\zeta_{inl}) - (\sum_{s=1}^{S} \lambda_{sn}\zeta_{snl})\lambda_{il}(\zeta_{il}+\zeta_{iln})}{\sum_{s=1}^{S} \lambda_{sn}\zeta_{sn} \sum_{s=1}^{S} \lambda_{sl}\zeta_{sl} - \sum_{s=1}^{S} \lambda_{sn}\zeta_{snl} \sum_{s=1}^{S} \lambda_{sl}\zeta_{sln}}.$$

The term, λ_{ij}, represents the fraction of variable factor j that is employed in sector i, ζ_{ij} is the elasticity of demand for factor j with respect to its own price in sector i, and ζ_{ijm} is the elasticity of demand for factor j with respect to the price of factor m. Notice that $\sum_{i=1}^{S} \mu_{il} = \sum_{i=1}^{S} \mu_{in} = 1$. The proportionate changes in the variable factor prices are therefore weighted averages of the proportionate changes in output prices.

Substituting equation 13 for $\hat{w}^{fta}$, equation 14 for $\hat{w}_n^{fta}$, and equation 9 for $\hat{P}_i^{fta}$ into equation 5 yields:

$$\hat{V}_{it} = \rho_t \left(\frac{1}{1+r}\right)^{T-t} \left(\hat{r}^{us-c} + \delta_1 \frac{\theta_{il}}{\theta_{ik}} + \delta_2 \frac{\theta_{in}}{\theta_{ik}} - \frac{\theta_{if}}{\theta_{ik}} \hat{q}_i^{us-c}\right), \tag{15}$$

where

$$\delta_1 = b_{lk}(\hat{w}^{us-c} - \hat{r}^{us-c}) + b_{ln}(\hat{w}^{us-c} - \hat{w}_n^{us-c}) + \sum_{i=1}^{S} \mu_{il}\theta_{if}\hat{q}_i^{us-c},$$

$$\delta_2 = b_{nk}(\hat{w}_n^{us-c} - \hat{r}^{us-c}) + b_{nl}(\hat{w}_n^{us-c} - \hat{w}^{us-c}) + \sum_{i=1}^{S} \mu_{in}\theta_{if}\hat{q}_i^{us-c},$$

$$b_{lj} = \sum_{i=1}^{S} \mu_{il}\theta_{ij} > 0,$$

and

$$b_{nj} = \sum_{i=1}^{S} \mu_{in}\theta_{ij} > 0.$$

Thus, the impact of the FTA on the value of a firm's capital is a function of relative factor prices, relative factor shares and relative plant scales. To facilitate interpretation of this equation, consider first the case where factor prices are the same in Canada and the United States and competitive

advantage is determined solely by relative plant scale. In this case, equation 15 simplifies to

$$\hat{V}_{it} = \rho_t \left(\frac{1}{1+r}\right)^{T-t} \left(\frac{\theta_{il}}{\theta_{ik}}\left(\sum_{i=1}^{S} \mu_{il}\theta_{if}\hat{q}_i^{us-c}\right) + \frac{\theta_{in}}{\theta_{ik}}\left(\sum_{i=1}^{S} \mu_{in}\theta_{if}\hat{q}_i^{us-c}\right) - \frac{\theta_{if}}{\theta_{ik}}\hat{q}_i^{us-c}\right). \tag{16}$$

Thus, the change in the capital value of firm i is negatively related to the plant scale disadvantage of Canadian firms in sector i relative to U.S. firms. If firms in sector i are small relative to their U.S. counterparts, then prices will fall in that sector as a result of the FTA, resulting in short run losses. In addition, under this scenario, the relationship between the value of a firm's capital and the factor shares of labor and natural resources depends on the anticipated impact of the FTA on factor prices. The coefficient of the labor share variable, for example, represents the expected impact of the FTA on the wage rate; it is a weighted average of the impact of the relative plant scale disadvantages on prices of individual goods ($-\theta_{if}\hat{q}_i$) where the weights are equal to the elasticities of the wage with respect to output prices (μ_{il}).

Consider now the case where Canadian and U.S. plants are of the same size and factor price differences between countries determine comparative advantage. Equation 15 now simplifies to

$$\hat{V}_{it} = \rho_t \left(\frac{1}{1+r}\right)^{T-t} \left(\hat{r}^{us-c} + \delta_1 \frac{\theta_{il}}{\theta_{ik}} + \delta_2 \frac{\theta_{in}}{\theta_{ik}}\right), \tag{17}$$

where

$$\delta_1 = b_{lk}(\hat{w}^{us-c} - \hat{r}^{us-c}) + b_{ln}(\hat{w}^{us-c} - \hat{w}_n^{us-c}),$$

and

$$\delta_2 = b_{nk}(\hat{w}_n^{us-c} - \hat{r}^{us-c}) + b_{nl}(\hat{w}_n^{us-c} - \hat{w}^{us-c}).$$

Under this scenario, the change in the capital value of firm i is a linear function of the factor shares of labor and natural resources relative to the share of capital. The coefficients of these relative factor shares are, in turn, functions of the factor price differentials. The relationship between factor price differentials and the predicted signs of δ_1 and δ_2 is summarized in Table 1. These coefficients reveal the sources of Canada's greatest comparative factor price advantage and/or disadvantage. For example, if natural resources represent Canada's greatest factor price advantage

Table 1: Relationship between Factor Price Differences and Predicted Signs of Parameter Estimates Under the Comparative Advantage Scenario

Ranking of Factor Price Differences	Predicted Sign of δ_1	Predicted Sign of δ_2
$\hat{w}_n^{us-c} > \hat{w}^{us-c} > \hat{r}^{us-c}$	?	> 0
$\hat{w}_n^{us-c} > \hat{r}^{us-c} > \hat{w}^{us-c}$	< 0	> 0
$\hat{w}^{us-c} > \hat{w}_n^{us-c} > \hat{r}^{us-c}$	> 0	?
$\hat{w}^{us-c} > \hat{r}^{us-c} > \hat{w}_n^{us-c}$	> 0	< 0
$\hat{r}^{us-c} > \hat{w}_n^{us-c} > \hat{w}^{us-c}$	< 0	?
$\hat{r}^{us-c} > \hat{w}^{us-c} > \hat{w}_n^{us-c}$	?	< 0

and labor represents Canada's greatest factor price disadvantage, then $\hat{w}_n^{us-c} > \hat{r}^{us-c} > \hat{w}^{us-c}$ and the predicted signs of δ_1 and δ_2 are negative and positive, respectively. When capital represents the greatest advantage or disadvantage, however, the sign of the coefficient corresponding to the "middle" factor is indeterminate.

It is difficult to calculate reliable estimates of factor price differences between countries due to differences in reporting practices as well as conceptual difficulties involved in the measurement and definition of capital. Nonetheless, data on Canadian and U.S. labor compensation and real interest rates provides a general idea of labor and capital costs in the two countries. These data are presented in Table 3. The wage rate is defined to be the average hourly compensation for production workers in manufacturing industries in terms of U.S. dollars. The real interest rate is defined to be the rate of return on three month Treasury Bills minus the rate of inflation as measured by changes in the Consumer Price Index. These data indicate that labor costs in the manufacturing sector in Canada have been lower than in the United States, both absolutely and relative to the cost of capital, although the gap has been closing. Due to the abundance of natural resources in

Table 2: Predicted Signs of Parameter Estimates

Variable	Comparative Advantage	Economies of Scale	Both
Natural Resources	> 0	> 0 if $\hat{w}_n^{fta} < 0$ < 0 if $\hat{w}_n^{fta} > 0$	> 0 ?
Labor	?	> 0 if $\hat{w}^{fta} < 0$ < 0 if $\hat{w}^{fta} > 0$	? ?
Scale	0	< 0	< 0

Canada, it is hypothesized that natural resource prices are lower in Canada than in the United States both absolutely and relative to labor and capital costs. Therefore, it is hypothesized that $\hat{w}_n^{us-c} > \hat{w}^{us-c} > \hat{r}^{us-c}$. The predicted sign of δ_2 is therefore positive and the predicted sign of δ_1 is indeterminate. These predictions are consistent with the finding of Baldwin and Hilton (1984) that, relative to the United States, Canada has the greatest factor price advantage in natural resources and the greatest factor price disadvantage in physical capital.

When both plant scale and factor prices play a role in determining the impact of the FTA on Canadian firms, the coefficients of the independent variables become more difficult to interpret. For example, a positive coefficient of the natural resource intensity variable may reflect a comparative advantage in natural resource intensive goods, an expected decrease in the price of natural resources, or both. The predictions of the full model are summarized in Table 2.

The final step in this section is to translate this change in the value of firm i's capital to the change in the market value of its equity. The market value of a firm's equity is equal to the market value of its capital minus the market value of its debt:

$$S_{it} = V_{it} - D_{it}, \tag{18}$$

where S_{it} equals the market value of firm i's equity at time t and D_{it} equals the market value of

firm i's debt at time t. Proportionate differentiation yields

$$\hat{S}_{it} = \left(\frac{V}{S}\right)_{it} \hat{V}_{it} - \left(\frac{D}{S}\right)_{it} \hat{D}_{it}. \tag{19}$$

It is assumed that the market values of debt and equity were affected by news concerning the FTA in the same proportionate amount.[4] This implies that

$$\hat{S}_{it} = \hat{V}_{it} = \rho_t \left(\frac{1}{1+r}\right)^{T-t} \left(\hat{r}^{us-c} + \delta_1 \frac{\theta_{il}}{\theta_{ik}} + \delta_2 \frac{\theta_{in}}{\theta_{ik}} - \frac{\theta_{if}}{\theta_{ik}} \hat{q}_i^{us-c}\right). \tag{20}$$

3 Method of Study

In this section, the above theoretical model is incorporated into an empirical framework to analyze the impact of news about the FTA on equity values. The theoretical model focuses on the firm-specific effects of the FTA resulting from trade liberalization. The goal here is to empirically isolate these firm-specific effects from changes in expectations due to either 1) the expected marketwide effects of the FTA, or 2) other marketwide fluctuations due to non-FTA related information learned at time t. Following the event study literature,[5] abnormal stock market returns are estimated as the residuals of the Capital Asset Pricing Model (CAPM),

$$r_{it} = \alpha_i + \beta_i r_{mt} + e_{it}. \tag{21}$$

where r_{it} is the return to security i at time t, β_i is the systematic risk of security i, r_{mt} is the return to the market portfolio, and e_{it} is a stochastic error term, assumed to have a zero mean and a constant variance σ^2. The market portfolio is defined to be the portfolio of all the securities traded on the Canadian market. Thus, the return to this portfolio reflects marketwide fluctuations in the Canadian economy including those due to news about the agreement, and the abnormal returns

[4] It is determined in Thompson (1991b) that this assumption cannot be rejected.

[5] See Brown and Warner (1980), Schwert (1981), Brown and Warner (1985) and Salinger (1988) for a discussion of the event study methodology.

represent estimates of the changes in the market value of equity net of any anticipated marketwide effects.

Abnormal returns are estimated for each observation during each of the six event windows.[6] Cumulative abnormal returns are then calculated for each event by summing the observations over the event window,

$$car_{ie} = \sum_{t=1}^{T_e} ar_{it} \tag{22}$$

where car_{ie} is the cumulative abnormal return to security i during event window e, T_e is the number of observations within event window e, and ar_{it} is the abnormal return to security i at time t. The variance of an individual cumulative abnormal return is equal to the sum of the variances of the individual abnormal returns plus twice the sum of their covariances. As discussed by Salinger (1988), these covariances will be non-zero due to sampling error that is common to the individual abnormal returns.[7]

The next step is to estimate the relationship between the cumulative abnormal returns and the factor share ratios and relative plant scales across firms. Equation 20 may be incorporated into an estimation equation of the form:

$$car_{ie} = \gamma_e \left(\delta_0 + \delta_1 \frac{\theta_{il}}{\theta_{ik}} + \delta_2 \frac{\theta_{in}}{\theta_{ik}} + \delta_3 \hat{q}_i \right) + \epsilon_{ie}, \tag{23}$$

where γ_t is equal to $\rho_t \left[\frac{1}{1+r}\right]^{T-t}$, δ_0 is a constant term, the terms δ_1, δ_2 and δ_3 have been defined previously, and ϵ_{ie} is a stochastic error term. The error terms of this equation may be contemporaneously correlated due to unobserved shocks during event window e that are common to manufacturing firms. To control for this correlation, a fixed effects model is employed: a dummy

[6]The market model parameters are estimated separately for each set of events following the procedure described in Thompson (1991a). A one year estimation period is used that ends two weeks before the beginning of the first event window in the set. There is no overlap between estimation periods.

[7]The variances of the cumulative abnormal returns are estimated using the methodology presented in Thompson (1991a).

variable for each event is used to capture the portion of the error term that is common to all firms.[8] [9] In addition, one more adjustment is made. Because the variances of the cumulative abnormal returns differ across firms, the cumulative abnormal returns are standardized by dividing them by their estimated standard errors. The estimation equation is then:

$$sar_{ie} = f_e + \gamma_e \left(\delta_1 \frac{\theta_{il}}{\theta_{ik}} + \delta_2 \frac{\theta_{in}}{\theta_{ik}} + \delta_3 \hat{q}_i \right) + \epsilon_{ie}, \tag{24}$$

where sar_{ie} is the standardized cumulative abnormal return to security i for event e, and f_e is the fixed effects dummy variable for event e. Note that f_e includes the constant term for event e in equation 24, $\gamma_e \delta_0$, as well as the unobserved shocks during event window e that are common to firms in the sample. This equation is estimated using non-linear least squares. The coefficients, δ_1, δ_2, and δ_3 are constrained to be the same across events. In the initial estimation of equation 24, γ_e is permitted to vary across events.[10]

[8] An alternative procedure is to estimate the parameters of the market model and the cross-sectional model in one step by estimating a system of seemingly unrelated regressions (See Rose (1985) and Smith, Bradley and Jarrell (1986)). The disadvantage of this approach is that the parameter estimates will be inconsistent if the events affect the market index (See Levinsohn and MacKie-Mason (1989).

[9] The cumulative abnormal returns of a given firm for events in the same "set" will be correlated due to sampling error that is common to the abnormal returns that are estimated from the same prediction equation. It is believed, however, that this sampling error will have a negligible impact on the cross-sectional analysis.

[10] In subsequent estimation, these parameters are restricted to have the same absolute value to permit more efficient estimation of the remaining coefficients.

4 Data

4.1 Description of Events

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Studies by Brown and Warner (1980) and Binder (1985) indicate that the ability of an event study to detect abnormal returns is substantially weakened when it is not known precisely when market expectations changed. It is therefore important to determine as accurately as possible the timing of events. The following chronology was compiled by searching the *Wall Street Journal Index* and the *Canadian News Index* for any mention of the FTA. Although the long negotiating process that led to the eventual implementation of the FTA will unfortunately obscure many of the events, there are three sets of events that can be considered good candidates for an event study. Each set of events involves an unexpected setback during the negotiations followed by a recovery.

On March 17, 1985, Prime Minister Mulroney met with President Reagan for the "Shamrock Summit" where they made a commitment to explore the possibilities of eliminating trade barriers between the two countries. In September, Mulroney invited Reagan to enter negotiations. Shortly thereafter, Reagan informed the U.S. Congress of his intent to begin negotiations with Canada under the fast-track provision of the Trade Act of 1974. This provision would commit Congress to reject or enact the implementing legislation of the agreement without amendment. Thus an item-by-item Congressional review would be avoided.

The first important setback to the FTA negotiations occurred when the U.S. Senate Finance Committee announced unexpectedly on April 11, 1986 that it was prepared to deny authorization of fast-track consideration of the FTA. Canadian officials warned that the offer to negotiate might be withdrawn if fast-track consideration could not be guaranteed. After much lobbying on the part of the Reagan Administration, the final vote was a tie after one senator changed his vote within hours of the deadline. Fast-track authorization was then granted and negotiations began on June

[11] This section is taken directly from Thompson (1991a).

17, 1986.

The second important setback occurred when the negotiations were broken off in September, 1987. Under the fast-track provision, the deadline for submitting the completed agreement to the U.S. Congress was October 3, 1987. As was to be expected, negotiations were difficult. Talks were deadlocked in September and were broken off on September 23, just ten days before the deadline.[12] It was announced at midnight on September 30 that the negotiations would be resumed. On Saturday, October 3, an agreement was reached within one hour of the midnight deadline. The final version of the agreement was submitted on December 11, and it was signed by Reagan and Mulroney on January 2, 1988.

The implementing legislation was passed by the U.S. House of Representatives on August 10, and by the U.S. Senate on September 20. However, there was much opposition to overcome in Canada. The Liberal Party in the Senate announced on July 21 that it would block the agreement until after the General Election. Both of the opposition parties vowed to abrogate the agreement if elected. It was clear that the Progressive Conservative Party would need to win by a majority to ensure passage of the Free Trade Agreement. When Mulroney called the election (October 1, 1988) to be held on November 21, it was assumed by many that the Conservatives would win. The public opinion polls published within the first few weeks of the campaign confirmed this belief. The turning point of the election occurred after the set of televised debates on October 24th and 25th. Turner, the leader of the Liberal Party, emerged as the winner. Public opinion polls taken after the debates indicated that the Liberal and Conservative parties were virtually tied (Angus Reid, October 29, 1988), that the Liberals had pulled ahead (Globe and Mail Environomics Poll, November 1, 1988) and then, most dramatically, that the Liberals had a ten percentage point lead over the Conservatives (Gallup Poll, November 7, 1988).

According to the *Globe and Mail* (November 16, 1988 and November 17, 1988) there were

[12]This breakdown in negotiations was viewed with some skepticism, however. It was considered by some to be merely a negotiating tactic. (*Globe and Mail*, September 24, 1987, p. B1.)

unconfirmed reports of increasing Conservative support during the week before the election. Three national public opinion polls, released on Saturday November 19, indicated a surge of support for Mulroney and the Conservatives (*Wall Street Journal*, November 21, 1988). When the stock market opened on Election Day (Monday, November 21), it was anticipated (correctly) that the Conservative Party would win the election and that the FTA would be implemented.

To summarize, the events that appear to have contained new information are: 1) the Senate Finance Committee's announcement that it planned to reject the request for fast-track authorization; 2) the subsequent approval of the fast-track procedure; 3) the breakdown of the Canada-United States negotiations; 4) the resumption of negotiations and the subsequent agreement; 5) the televised debate during the Canadian General Election campaign and period during which public opinion polls were released indicating that the Turner was gaining in popularity; and 6) the election. The last three of these events are likely to be the most important. At the time of the first two events, there was still much uncertainty about whether an agreement would be reached and the form that it would take. The breakdown in negotiations (September 23, 1987) occurred in the midst of a difficult negotiating process. It therefore was not entirely unexpected. Moreover, as mentioned above, some viewed this as a negotiating tactic. For completeness, abnormal returns are estimated for all six events. Special attention, however, is paid to the final three events.

The precise dates of the event windows are described in Appendix A. Information from sources such as public opinion polls and press interviews was used to determine more precisely if and when the events were anticipated. The event windows extend two days past the day the event was published in the newspapers.

4.2 Description of Data

The stock market data are drawn from the Toronto Stock Exchange/University of Western Ontario database. The sample of firms is restricted to manufacturing firms that were listed during the period encompassing the estimation and event periods for all six events. In addition, the firms

must be listed in Moody's *International Manual.* This leaves a total of 76 firms.

The measure of the relative labor intensity of firm i in equation 24, θ_{il}/θ_{ik}, is defined to be the share of income earned by labor divided by the share of income earned by capital (i.e., wL/rK). The construction of this variable is complicated by the difficulty of estimating the income earned by capital-owners. In particular, the cumulated compounded return earned by stockholders of some firms in the sample was negative during 1988. To avoid complications, the relative labor intensity of a firm is estimated by dividing the number of employees by an estimate of the value of the firm's capital stock.[13] Previous researchers of comparative advantage have measured capital stock as the book value of fixed assets.[14] In the above theoretical model, however, the value of a firm's capital is defined to be equal to the sum of its debt and equity. This represents the value of the firm's total assets including intangible assets. This is estimated here by calculating the stock market value of the firm's equity and adding it to the book value of long-term debt.[15] Data on the number of employees and the book value of long-term debt are found in Moody's *International Manual.* The calculated stock market value of the firm is based on the outstanding share and price data of the *Toronto Stock Exchange Review*, September 1988.

The natural resource content of the firm's output is not available at the firm-level. Instead this variable is based on that of the 2-digit Standard Industrial Classification (SIC) code assigned to the firm by Dun and Bradstreet's *Canadian Key Business Directory.*[16] It is calculated as the percentage of the industry's inputs arising from the primary sectors of the economy. This computation is based on the 1985 input-output table of the Canadian economy published by Statistics Canada. The natural resource content of the industry is then divided by an estimate of the share of capital in the

[13]This is equivalent to assuming that wages and the return to capital are constant among industries.

[14]See, for example, Stern and Maskus (1981) and Bowen, Leamer, and Sveikauskas (1987).

[15]Ideally, one would want to use the market value of debt. Unfortunately, market values are not readily available. It is hoped, however, that the book value will provide a good approximation to the market value.

[16]Firms that are 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.

industry, θ_{ik}. This estimate is based on calculations made by Denny, Bernstein, Fuss, Waverman, and Nakamura (1990).

To create the relative plant scale variable, firms are classified according to the 4-digit SIC code assigned to them by the *Canadian Key Business Directory*. The plant size for a given industry is estimated by dividing the value of shipments of the industry by the number of establishments operating in the industry. These data are found in the Statistics Canada 1986 publication of *Manufacturing Industries of Canada: National and Provincial Areas* and the 1987 U.S. Department of Commerce, *Census of Manufactures*.

5 Results

The results are presented in Table 4. Equation 24 is estimated over two different samples of events. The first sample includes all six events; the second sample includes only the last three events. The value of γ_6 is normalized to one to permit identification of the remaining parameters. To facilitate the interpretation of the results, the abnormal returns corresponding to events that decreased the perceived probability that the agreement would be implemented are multiplied by negative one. Therefore the expected signs of all of the γ parameters are positive. The estimated sign of γ_2 is negative. This is possibly due to other new information learned during the event window that was unrelated to the FTA. The magnitude of γ_e reflects the impact of event e on expectations relative to the impact of event 6. For example, the estimate of γ_4 suggests that the impact of the fourth event (reaching the agreement in October, 1987) on expectations was over three and one half times greater than the impact of the final event (the outcome of the General Election). An alternative interpretation is that this event was a "cleaner" event: the FTA news learned at this time was not clouded by other news such as the non-FTA implications of the election outcome. The coefficients of the labor intensity and natural resource intensity variables are both positive. This suggests that investors expected natural resource intensive industries and labor intensive industries

to benefit from the FTA relative to capital intensive industries. The coefficient of the scale variable is negative, suggesting that firms operating in industries where the average plant scale is small relative to the United States were expected to experience losses as a result of free trade. All of these parameters, however, are estimated with large standard errors. Thus, they should be interpreted with caution.

The estimation of the large number of parameters in equation 24 is understandably problematic due to the relatively small size of the sample. To reduce the number of parameters to be estimated, the values of the γ parameters are set equal to one for all six events.[17] This is an implicit assumption in past event studies, including Rose (1985). If these restrictions are reasonable, their incorporation will result in more efficient estimation of the remaining parameters of the model. A likelihood ratio test is performed to test the validity of the restrictions. The likelihood ratio statistic, $-2(L_R - L_{UR})$, is asymptotically distributed as a χ^2 with ν degrees of freedom, where ν is equal to the number of restrictions and L_R and L_{UR} are the values of the log likelihood functions at their maximums with and without restrictions, respectively. The values of this statistic for the 6-event and 3-event samples are 9.5 and 1.68 respectively. Therefore the hypothesis that the restrictions are valid cannot be rejected at the 5% level of significance for the six-event sample (The value of $\chi^2_{.05,5}$ equals 11.07.) nor at any of the conventional levels of significance for the three-event sample.

The results based on the restricted regressions are reported in the third and fourth columns of Table 3. For both samples, the labor intensity and natural resource intensity coefficients are both positive and the scale coefficient is negative. Only the scale coefficient for the six-event sample is statistically significant at the 10% level. Using a one-tail t-test, however, both the scale and natural resource coefficients are significant at the 10% level for the three-event sample.

The negative coefficient of the scale variable provides support for the economies of scale hypothesis. The positive coefficient of the natural resource variable is consistent with the comparative advantage model and may be interpreted as an indication that Canada has a comparative advantage

[17]Note that each event is allowed to have a unique constant term in the form of the fixed effects coefficient.

in the production of natural resource intensive goods. Referring to Table 2, however, this coefficient is also consistent with the economies of scale model if the price of natural resources was expected to fall as a result of free trade (i.e. $\sum_{i=1}^{S} \mu_{in}\theta_{if}\hat{q}_i^{us-c} < 0$). The sample correlation between the natural resource share of the firm and the relative scale disadvantage is $-.163$. This implies that firms in natural resource intensive industries tend to be relatively large and that these industries are not likely to require much further rationalization. It therefore is not likely that the price of natural resources was expected to fall. It is much more plausible that the positive relationship between abnormal returns and the natural resource intensity of firms is an indication that investors perceived Canada to have a comparative advantage in natural resource intensive goods. Taken together, these results suggest that both scale economies and relative factor prices were perceived by investors to play a role in the adjustment of Canadian manufacturing firms to the FTA.

6 Sensitivity Analysis

In this section the sensitivity of the results reported above is examined with respect to 1) the presence in the sample of Canadian subsidiaries of U.S. firms, and 2) the presence of outliers in the sample. For simplicity, the γ parameters in equation 24 will be restricted to be equal to one.

6.1 Subsidiaries of U.S. Corporations

Some of the firms in the sample are subsidiaries of U.S. corporations. There are a number of reasons why U.S.-owned firms may be affected differently by the FTA than domestically-owned firms. It has been suggested, for example, that many of the U.S. subsidiaries in Canada were established to avoid tariffs and that when these tariffs are removed, the subsidiaries will be shut down. On the other hand, many subsidiaries may be efficient in the sense that they were established in Canada because of cost advantages unrelated to tariffs. To allow for the possibility that the FTA will have differential effects among firms controlled by U.S. parents and subsidiaries of other foreign

firms or domestically controlled firms, a dummy variable is included to indicate whether the firm is a subsidiary of a U.S. parent corporation. Data on U.S. ownership is taken from *America's Corporate Families and International Affiliates*, published by Dun's Marketing Services. Fourteen of the firms in this sample are subsidiaries of U.S. corporations. As seen in Table 5, controlling for U.S. ownership does not alter the implications of the results reported in Table 4 and the coefficient of the U.S. ownership variable indicates that there is not a clear relationship between ownership by U.S. firms and abnormal returns.

6.2 Outliers

As seen in Figure 1, there are a number of standardized cumulative abnormal returns that are extremely large relative to the rest of the sample.[18] These observations may disproportionately influence the parameter estimates as well as lead to large standard errors. To test the sensitivity of the results to the presence of outliers, the outliers are excluded from the sample and the models are re-estimated. For this purpose, outliers are defined to be observations that are more than three standard deviations away from the mean. According to this definition, there are a total of ten outliers, two corresponding to event one, four corresponding to event two, one corresponding to event three, and three corresponding to event four. Note that the sample of firms over the last three events contains only three outliers.

Some of these outliers may be attributed to firm specific announcements such as stock splits, earnings announcements, and potential acquisitions. For example, Corporate Foods experienced a large positive abnormal return on September 25, 1987 (during the third event window), coinciding with the company's announcement of plans for a stock split; and a large drop in the share price of CCL Industries on September 31 1987 (during the fourth event window) followed the announcement of unfavorable earnings for the third quarter of 1987. At least two of the ten outliers, however, are

[18] Each point on the graph represents one observation of sar_{it}. There are 76 observations for each event window corresponding to the 76 firms in the sample.

likely to represent responses to the FTA. Two wine firms, Andres Wine Limited and T. G. Bright and Company, Limited (the only two wine firms in the sample) both experienced large declines in their stock prices on October 6, 1987, the Tuesday after the agreement was reached. On this day, the *Globe and Mail* printed an article discussing why the Canadian wine industry would be threatened by the FTA.

As seen in Table 5, removing the outliers from the sample does not alter the signs of the coefficients of the factor share and scale variables. The coefficient of the scale variable is now statistically significant at the 5% level for the three-event sample, providing increased support for the economies of scale hypothesis. The most striking difference between the results based on the samples including all firms and the samples excluding the outliers is that the estimated coefficient of the natural resource variable is now statistically significant at the 2% level of significance for both samples of events. This result is largely due to the removal from the sample of the two outliers corresponding to the wine firms during the fourth event window. The wine industry represents a contradiction to the H-O hypothesis: wine is a natural resource intensive product, yet the wine industry was expected to be hurt by the FTA. This illustrates the difficulty involved in treating natural resources as a homogeneous factor. Canada may have a relative abundance of certain types of natural resources and a relative scarcity of others. While these results do not support the H-O hypothesis in a strict sense, when the heterogeneous nature of natural resources is recognized, this analysis reinforces the conclusion above that this hypothesis provides insight into the comparative advantage of Canadian firms.

7 Concluding Remarks

In this paper, a stock market event study is employed to analyze the market's expectations about the consequences of the FTA for Canadian manufacturing firms. Two primary questions are addressed: 1) whether relative factor prices played a role in determining investors' perceptions of the

comparative advantage of Canadian firms; and 2) whether firms operating in industries where the average plant scale is small relative to the corresponding U.S. industries were expected to experience losses as a result of the FTA.

Abnormal returns corresponding to six FTA-related events are estimated for individual Canadian manufacturing firms. The relationship between these abnormal returns and relative factor shares and relative plant scales is estimated for two samples of events for four versions of the basic model. The results are consistent across all of these variations. They indicate that investors anticipated that natural resource intensive and labor intensive firms would benefit from the FTA relative to capital intensive firms. With respect to plant scale, a negative relationship is found between abnormal returns and plant scale disadvantage. This result suggests that firms operating in industries where the average plant scale is small relative to their U.S. competitors were anticipated to experience losses. This may be interpreted as an indication that the industry was expected to rationalize its production facilities in response to free trade. It can be concluded that both scale economies and relative factor prices were perceived by investors to play a role in the adjustment of Canadian manufacturing firms to the FTA.

List of Event Windows

1. Threat to Deny Fast-Track Authorization: 4/11/86 - 4/16/86

   4/11/86. The Senate Finance Committee announced its intention to deny fast-track authorization of the agreement. According to the *Wall Street Journal* (4/14/86) and the *Globe and Mail* (4/12/86) this news was a surprise. It represented a serious setback.

2. Approval of Fast-Track Procedure: 4/22/86 - 4/28/86

   4/22/86. A close vote was anticipated by the *Globe and Mail* indicating that there was a chance that the Committee would approve the fast-track procedure.

   4/22/86. The Senate Finance Committee put off its vote in response to lobbying on the part of the Administration.

   4/23/86. The Senate Finance Committee vote was tied so negotiations could begin.

3. Negotiations Halted: 9/23/87 - 9/28/87

   9/23/87. Canada broke off negotiations.

4. Agreement Reached: 10/1/87 - 10/6/87

   9/30/87. It was announced at midnight that the Canadian negotiators would fly to the United States the next day to resume negotiations. (*Globe and Mail* (10/1/87))

   10/3/87. A trade accord was reached within one hour of the midnight deadline.

5. Turner Gains Favor, Agreement at Stake: 10/25/88 - 11/9/88

   10/25/88. This was the day after the first night of the televised debates.

   10/26/88. The *Globe and Mail* reported that the consensus of journalists and professional observers was that Turner had a clear edge in the first debate.

10/28/88. A poll by Environomics Research Group indicated that Turner was the clear winner of two debates.

10/29/88. An Angus Reid poll was released that indicated that Conservatives and Liberals were neck and neck.

11/1/88. According to a Globe and Mail Environomics poll, the Liberals had pulled ahead. 2/3 of the pubic opinion polls published in the last 24 hours indicated that the Liberal Party was leading for the first time.

11/7/88. A Gallup poll was released indicating that the Liberals had a ten percentage point lead.

6. Canadian Federal Election: 11/15/88 - 11/24/88

11/16/88. The *Globe and Mail* reported unconfirmed rumors of increasing Conservative support.

11/19/88. Three national public opinion polls were released that indicated a surge of support for Mulroney and the Conservative Party.

11/21/88. Election Day.

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Table 3: Labor Compensation and Interest Rates in Canada and the United States

YEAR	LABOR COMPENSATION*		INTEREST RATE**	
	U.S.	CANADA	U.S.	CANADA
1985	$12.96	$10.81	4.14	5.43
1986	$13.21	$11.00	4.21	4.87
1987	$13.46	$11.97	2.20	3.85
1988	$13.90	$13.58	2.78	5.43

*Average hourly compensation for production workers in U.S. dollars.
**Rate of return on three month Treasury Bills minus the rate of inflation.

SOURCES: United States Department of Labor, Bureau of Labor Statistics, *Bulletin*, August 1989, and various issues of Bank of Canada, *Bank of Canada Review*, and the International Monetary Fund, *International Financial Statistics*.

Table 4: Regression Results

$$\text{Model}: sar_{ie} = f_e + \gamma_e \left(\delta_1 \frac{\theta_{il}}{\theta_{ik}} + \delta_2 \frac{\theta_{in}}{\theta_{ik}} + \delta_3 \hat{q}_i^{us-c} \right) + \epsilon_{ie}$$

VARIABLES	UNRESTRICTED		RESTRICTED	
	6 EVENTS	3 EVENTS	6 EVENTS	3 EVENTS
F1	-0.269*		-0.399***	
	(0.157)		(0.195)	
F2	0.046		0.014	
	(0.144)		(0.195)	
F3	-0.097		-0.191	
	(0.141)		(0.195)	
F4	0.053	-0.033	-0.068	-0.068
	(0.155)	(0.162)	(0.195)	(0.180)
F5	0.246*	0.204	0.155	0.155
	(0.145)	(0.133)	(0.195)	(0.180)
F6	0.080	0.057	0.088	0.050
	(0.151)	(0.130)	(0.564)	(0.158)
GAMMA1	4.357			
	(6.451)			
GAMMA2	-2.178			
	(2.834)			
GAMMA3	1.948			
	(3.162)			
GAMMA4	3.698	3.981		
	(5.511)	(6.492)		
GAMMA5	1.765	2.038		
	(3.117)	(3.604)		
LABOR/CAPITAL	0.245	0.260	0.528	0.505
	(0.454)	(0.481)	(0.501)	(0.654)
NATURAL RESOURCES	0.023	0.031	0.039	0.075
	(0.047)	(0.052)	(0.039)	(0.051)
SCALE	-0.072	-0.054	-0.124*	-0.131
	(0.110)	(0.096)	(0.065)	(.085)
LOG-LIKELIHOOD FUNCTION	-720.98	-342.98	-725.73	-343.82
NO. OBSERVATIONS	456	228	456	228

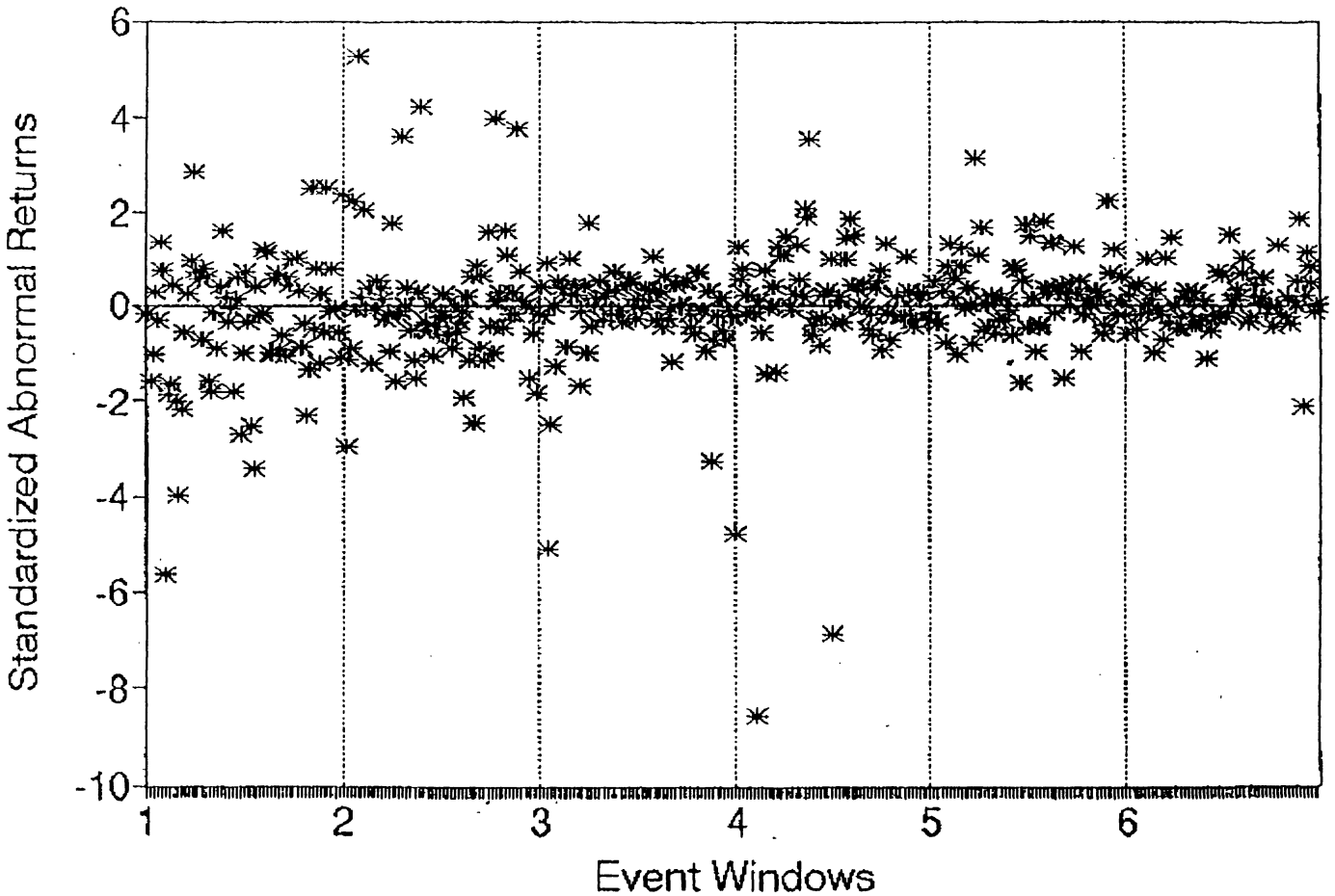
* Significant at the 10% level.
*** Significant at the 1% level.
(Standard Errors are in Parentheses.)

Table 5: Sensitivity Analysis

VARIABLES	US OWNERSHIP		OUTLIERS DELETED	
	6 EVENTS	3 EVENTS	6 EVENTS	3 EVENTS
F1	-0.399*		-0.280*	
	(0.195)		(0.147)	
F2	0.014		-0.222	
	(0.195)		(0.148)	
F3	-0.191		-0.125	
	(0.195)		(0.146)	
F4	-0.068	-0.068	0.210	0.210*
	(0.195)	(0.180)	(0.147)	(0.123)
F5	0.155	0.155	0.155	0.155
	(0.195)	(0.180)	(0.146)	(0.121)
F6	0.077	0.050	0.015	0.017
	(0.158)	(0.163)	(0.116)	(0.107)
LABOR/CAPITAL	0.540	0.505	0.505	0.399
	(0.503)	(0.657)	(0.375)	(0.442)
NATURAL RESOURCES	0.041	0.075	0.073***	0.099***
	(0.040)	(0.052)	(0.030)	(0.035)
SCALE	-0.125*	-0.131	-0.075	-0.119**
	(0.065)	(0.085)	(0.049)	(0.057)
US OWNERSHIP	0.053	-3.900E-04		
	(0.147)	(0.192)		
FINANCIAL LEVERAGE				
NO. OBSERVATIONS	456	228	446	225

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 2% level.
(Standard Errors are in Parentheses.)

Figure 1: Standardized Cumulative Abnormal Returns



*Each point on the graph represents one observation of sar_{it}.

There are 76 observations for each event window corresponding to the 76 firms in the sample.