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Southern Economic Journal, Vol. 56, No. 4. (Apr., 1990), pp. 1079-1093.

Stable URL:
http://links.jstor.org/sici?sici=0038-4038%28199004%2956%3A4%3C1079%3ATIOPOF%3E2.0.CO%3B2-O

Southern Economic Journal is currently published by Southern Economic Association.

The Impact of Protectionism on Firm Wealth: The Experience of the Steel Industry*

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I. Introduction

Neo-classical trade theory argues that trade restrictions result in a redistribution of income from consumers to the protected firms. If this argument is valid, then the imposition of new trade restrictions should result in an increase in the protected firms' expected profits. Further, under efficient capital markets the increase should be immediately capitalized in the firms' share prices, providing an immediate wealth gain for the firms' shareholders. Similarly, a loss in equity accompanies the removal of trade restriction. In this paper we test for the existence of wealth gains (or losses) upon changes in trade protection for the steel industry. The gains or losses are related to individual firm characteristics. This second issue is important because economists typically analyze the effects of trade protection on an industry basis; rarely do they discuss the question of the distribution of rents to individual firms.[1]

Several recent studies have examined the distributional and welfare effects of trade restrictions on the steel industry. A study by the Congressional Budget Office [15] assesses the short and long run effects of proposed quotas on domestic and foreign steel producers, the domestic steel consuming industry, and the domestic economy. The study's econometric model shows that a quota on steel products will increase prices, output and employment in the domestic steel industry. It also shows that foreign producers benefit from the quotas due to the price increases. The losers are consumers as the quotas are expected to cost consumers between $4.3 and $5.9 billion.

Crandall [7] also employs an econometric model to assess the effect of a particular trade re-

*The authors would like to thank Philip Bromiley, David Clark, Steven Crane, Bill Hunter, Imre Karafiath, Jose Mendez, Stephen Magee, Michael Munger, Judy Rayburn, Brian Roberts, and an anonymous referee for helpful comments.

1. See Krueger [10] and Benson [4] for discussions of rent seeking behavior.

striction, the Trigger Price Mechanism (TPM). Using demand equations for domestic and foreign products, his results indicate that the TPM increased domestic steel prices and domestic employment. He also finds that foreign producers benefit from a restricted domestic steel market. Like the Congressional Budget Office study, Crandall concludes that higher steel prices cause income to be transferred from consumers to domestic and foreign producers.

Finally, two studies look at the total gains and losses attributable to restrictive U.S. steel policies. Denzau [8] focuses on the net employment effect of trade restrictions. The trade restrictions may lead to an increase in employment in the steel industry. These gains are offset by employment losses in the manufacturing sectors using steel as an input. Higher prices in the steel industry are assumed to cause a production decline in the manufacturing sectors using steel as an input. Denzau estimates that the production decline would result in a net loss of 35,000 jobs as a result of steel quotas. Mendez [12] confirms Denzau's findings that trade restrictions cause a net loss to society in terms of employment. He shows that employment losses occur due to a decrease in the competitiveness of industry sectors that use steel as an input. Losses also accrue as a result of decreases in the competitiveness of industries which are sensitive to exchange rate changes. The cumulative employment losses outweigh the employment gains in the steel industry.

Our research differs from these prior studies in three ways. First, we focus specifically on the question of whether or not domestic steel producers capture the economic rents created by trade restrictions. Second, unlike the above studies, we use the event study methodology from finance and accounting to measure the economic impact of trade restrictions on domestic steel producers.[2] Third, we examine the intra-industry effects of trade restrictions, using cross sectional analysis to specify the types of steel firms most likely to capture the economic rents.

II. U.S. Trade Policy and the Steel Industry

Trade restrictions imposed on the steel industry potentially affect a variety of different groups (including domestic and foreign producers, industrial users and retail consumers). The intent of import relief is to increase the competitiveness of domestic steel producers. Domestic producers consist of basically two types: integrated producers and nonintegrated producers (minimills). There are also nonsteel producers which comprise an insignificant share of the steel market. Integrated producers mine iron ore and process it into steel. They use a wide range of processing techniques: blast furnaces, basic oxygen or open hearth furnaces, and electric furnaces. The integrated producers have dominated the steel industry in terms of market share. As industry leaders, they have determined the price structure and have been the only firms active in pressing the government for trade restrictions through such activities as petitioning the International Trade Commission and lobbying for legislative restrictions.

Nonintegrated producers (minimills) differ from integrated producers in several ways. First, they use scrap steel rather than iron ore and only one processing technique (the electric furnace). Second, the minimills tend to specialize by limiting the number of manufactured products and the number of marketing areas. Third, the minimills have been in a growth stage, while the integrated producers have been in a retrenchment stage. Minimill producers have increased their market share from three percent in 1960 to twenty percent in 1980 [16].

2. Although this methodology has increasingly been used to measure the effects of regulation [5; 12; 14; 17], it has rarely been used to measure the effects of trade protection (See, however, [9]).

The erosion of the U.S. steel industry's dominance in world steel markets began in 1959. (Prior to the 1960s, the U.S. was a net exporter of steel.) The first surge of imported foreign steel was the result of a 115-day U.S. Steel strike. After the strike ended, foreign steel firms remained competitive in U.S. markets in part as a result of the discovery of additional iron ore sites, new technology, and lower shipping rates.

Several other factors contributed to the demise of the U.S. steel industry. First, the demand for domestic steel has decreased due to a reduction in the steel intensity of products and to an increase in the availability of steel substitutes. Second, the U.S. did not adopt the newer steel production technologies used by Japan and newly industrialized countries. Finally, the U.S. steel industry has relatively higher wages than its international competitors.[3]

The firms in the steel industry have reacted to these competitive threats by turning to the political process, by merging and closing antiquated plants to reduce production costs, and by diversifying into other sectors of the economy. Our analysis evaluates the economic effects of the steel industry's political efforts to obtain trade protection.

The first appeal for trade protection was a joint effort by the domestic industry and the United Steel Workers of America. They campaigned in Congress for the imposition of mandatory import quotas. At that time U.S. steel imports comprised 18% of domestic steel consumption [2, 48]. To prevent congressional action, the State Department negotiated with producer associations from Japan and the European Economic Community. The foreign producers formally agreed to restrict exports of steel products to the U.S. until 1971. Informally, the foreign steel producers agreed to maintain the same product mix and distribution patterns. However, foreign producers broke their informal agreement by increasing exports of specialty steel. Consequently, when Voluntary Restraints (VERs) were renegotiated in 1971,[4] they established new tonnage limits and restraints on specialty steel imports. These limits expired in 1974 and were not renegotiated.[5,6]

The next government decision to provide trade relief occurred in 1977 with the establishment of the Trigger Price Mechanism (TPM). The TPM implemented a price floor based on the Japanese average cost of production and transportation to the U.S.[7] If a foreign steel price was lower than this floor, then the U.S. government (rather than the steel industry) was authorized to initiate Less Than Fair Value (LTFV) suits (i.e., antidumping suits). The TPM was intended to act as a substitute for antidumping suits which are filed by industry representatives at the Department of Commerce and the U.S. International Trade Commission. When U.S. Steel filed an antidumping suit against seven European countries in March, 1980, the government rescinded the TPM. However, the government, still desiring to avoid a large number of antidumping suits, implemented a strengthened version of the TPM in October 1980 that increased enforcement and added quantitative restraints.

When seven domestic steel firms filed LTFV suits against eleven European countries in January, 1982, the TPM was permanently revoked. The petitions were withdrawn after negotiations

3. Barnett and Schorsch [2, 37–73] provide a thorough discussion of the steel industry's competitive problems.

4. Britain also participated in these second negotiations.

5. For an analysis of the price effects of the Voluntary Export Restraints on steel from 1969–1974, see Borrus [6] and Schorsch [16].

6. During the early 1970s, U.S. problems with foreign steel were virtually eliminated due to increases in world steel prices (which were then greater than U.S. prices). A world recession in 1975 caused foreign steel to again become highly competitive with domestic steel.

7. The Trigger Price Mechanism was actually a major component of a larger governmental steel aid package which also promised loan guarantees from the Economic Development Administration, less stringent environmental enforcement by the Environmental Protection Agency, and a re-examination of depreciation rates by the Treasury Department.

Table I. Summary of the Events and their Expected Impact on Steel Firms' Share Prices

January 8, 1969:	Voluntary Export Restraints were negotiated by the Johnson Administration with Europe and Japan.
	This event is predicted to have had a positive impact on the steel industry since imports were restricted.
December 5, 1977:	The Trigger Price Mechanism was imposed by the Carter Administration.
	This event should have affected the steel industry's share values positively since this mechanism establishes a price floor which reduces foreign price competition.
March 21, 1980:	U.S. Steel filed an antidumping suit which led Carter to rescind the Trigger Price Mechanism.
	This event should have had a negative impact on the steel industry because without the Trigger Price Mechanism the industry would be more vulnerable to price competition, unless dumping duties were imposed.
October 1, 1980:	The Trigger Price Mechanism was strengthened and reinstated.
	Re-establishing a price floor is expected to have had a positive impact on the steel industry.
January 8, 1982:	The Trigger Price Mechanism was rescinded due to massive antidumping and countervailing cases filed by the steel industry.
	This action is expected to have affected the steel industry negatively. As a result of this action, they were again unprotected against foreign price competition unless dumping duties were imposed.
October 22, 1982:	Voluntary Export Restraints were established with Europe.
	This event which limited foreign steel producer's market share is predicted to have had a positive impact on the steel industry.

between the U.S. government and eleven European countries concluded successfully in October 1982. In these negotiations the Europeans agreed to limit their steel shipments to the U.S. until 1985. Although an informal agreement existed with Japan, similar formal negotiations were conducted to limit imports from Japan.[8] This study focuses on how these trade policy decisions affected the steel industry. Table I summarizes the events we examine, each event's announcement date, and each event's expected impact on steel industry equity values.

III. Measuring the Economic Impact of Steel Trade Restrictions

This section examines the expected effects of trade restrictions on the market value of the steel firms' equity issues. The methodology used to analyze the impact of trade restrictions is described. Then, we test our hypotheses and analyze the empirical results.

One of the most important effects we wish to investigate is whether the announcement of protective measures has an effect on the equity value of the firms involved. In an efficient mar-

8. Since 1982 there have continued to be changes in trade protection for the steel industry. For the purposes of this study, we limit our analysis to the period from 1969 through 1982.

ket, security prices reflect the expected return from holding shares in a firm. If there is a change in the expected future profits due to an alteration in trade policies, then the stock price should immediately reflect that change. If the announcement of altered trade policies is not completely anticipated by investors, then we would expect a change in the firm's equity value upon the announcement. Our first null hypothesis is:

H_0^1: *The announcement of the imposition of trade protection measures had no effect on steel firm equity values.*

(Note, however, that if the measures were expected, they would have already been capitalized in the price of the steel stock.) This hypothesis is tested for each of the events summarized in Table I. The quantitative restraints, the 1969 and 1982 VERs, and the price restraints, the original TPM and the 1980 relatively stronger version of the TPM, are expected to have increased the steel industry's competitiveness. Quantitative restraints should enable the domestic steel industry to at least maintain their domestic market share and increase domestic steel prices. Price restraints such as the TPM should make the domestic steel industry more profitable by limiting price competition between domestic and foreign steel producers. The remaining events, the two suspensions of the TPM, are predicted to have had a negative impact on steel industry equity values because they represent a potential increase in foreign competition.

We are also interested in the potential change in a firm's risk characteristics once an industry becomes protected from import competition. Peltzman [13] states that regulation should cause firms to have a smaller systematic risk because they are buffered against demand and cost changes. Systematic risk is measured by beta which is the risk of the asset's return relative to the return of the market portfolio. If this hypothesis is correct, we would expect the beta of firms to decrease when trade restrictions are imposed and to increase when the restrictions are removed. Our second null hypothesis is then:

H_0^2: *There was no change in the beta parameter of the market model for steel firms given a change in the level of trade restrictions.*

Methodology and Data

In order to test these hypotheses concerning the effect of changes in trade policies on steel firms, we employ the event study methodology used in the economics, finance and accounting literature[9] and test for changes in the firms' equity values. To control for general market movements on the event dates and consequently to isolate the effect of the imposition (or removal) of trade restraints, we employ two modified versions of the market model, a portfolio approach and an unconstrained approach. Both of these approaches allow us to eliminate a common problem, cross sectional correlation, which occurs when an event simultaneously affects all firms in the same industry.

The first approach, the portfolio approach, enables us to estimate the average industry reaction to changes in trade protection. The specific regression equation we use is:

$$R_{It} = a_I + a_I D_j + \beta_I R_{mt} + \beta_I R_{mt} D_j + \sum_t W_{Ijt} E_{jt} + U_t \qquad (1)$$

where

R_{It} = the return on the portfolio of shares in industry I at time t,

9. For a discussion of the application of the methodology to regulation, see Schwert [17] or Binder [5].

D_j = a dummy variable, equal to one for every day after the announcement date until the last observation in the sample and zero otherwise,

β_I = the covariance $(R_I R_m)$ divided by the variance (R_m),

R_{mt} = the return on a market proxy portfolio, in this case the return on the CRSP value-weighted index, at time t,

E_{jt} = a dummy variable for each date during a given event period, equal to one if event j occurs during t and equal to 0 otherwise,

t = day relative to the announcement,

and

U_t = a random error term with expected value of zero.

The coefficients on the E_{jt} (the W_{Ijt}) lend themselves to a natural interpretation. They are equivalent to the abnormal return to firm I for each date relative to event j. Thus, they allow us to interpret the sign, magnitude and significance of the abnormal return during a given event period. The dummy variables, the D_j, allow the intercept and slope terms to shift when the market's expectation of the effects of trade protection changes.

Although the portfolio approach provides higher power hypotheses tests than the unconstrained approach, there are advantages in employing the unconstrained approach. First, the unconstrained approach estimates a separate coefficient for every firm for every event. This makes it possible to detect important differences among firms in their responses to an event. These differences would be obscured using the portfolio approach which estimates an average response for all the firms in the sample. Second, since a system of equations is estimated, it is possible to test joint hypotheses concerning each firm's response to an event while controlling for cross equation correlations. Third, this method also makes it possible to test the relationship between abnormal returns and firm-specific characteristics.

We use the following equation in the unconstrained approach:

$$R_{it} = a_i + a_i D_j + \beta_i R_{mt} + \beta_i R_{mt} D_j + \sum_t W_{ijt} E_{jt} + U_t. \tag{2}$$

The main difference between equations (1) and (2) is that the dependent variable, R_{it}, is the return on the shares of firm i at time t. Equation (2) is estimated as a seemingly unrelated regression model. This model allows the disturbance variance to differ across firms.[10] Since both the portfolio and the unconstrained approach may not fully capture the complete wealth effect of the change in the level of trade protection, our interest is in the sign and significance of the abnormal returns rather than their magnitude per se.[11]

The data set used to test our hypotheses consists of the major integrated producers and minimills listed in the steel industry publication Iron Age. The selected steel producers also have daily return data available from the University of Chicago's Center for Research in Security Prices

10. For further discussion of this approach see Binder [5].

11. Equity values may not capture the complete effect of a change in trade protection. In the case where the change is partially or completely anticipated by investors, the effect is already capitalized in the stock price before the announcement date. Thus, we have the problem of identifying when the market first anticipates the policy change. We searched the *Wall Street Journal*, *New York Times*, and the *Dow Jones News Retrieval Service* for the earliest announcement of a change in trade policies. This does not guarantee that the announcement was a complete surprise, so we cannot assume that any reaction we find was the total expected wealth effect from the change. Consequently, our interest in this study is in the sign and significance of the abnormal returns rather than their magnitude, per se.

Table II. Percentage Abnormal Returns for a Portfolio of Steel Firms Around Announcements of Changes in Trade Protection, Cumulated over Days −10 through +1, Where Day 0 Is the WSJ Announcement Date

$$R_{It} = a_I + a_I D_j + \beta_I R_{mt} + \beta_I R_{mt} D_j + \sum_{t=-10}^{+1} W_{Ijt} E_{jt} + U_t \quad (1)$$

t = −250 to +250 day
I = Portfolio of 21 or 22 steel firms, depending on data availability.
j = Event

Event Date	Predicted Return Effect	Abnormal Return ΣW_{Ijt}	Change in Beta $\beta_I D_{jI}$	R^2
1-8-69	+	−.009	.249	.58
		(.30)	(2.78)**	
12-5-77	+	.026	.06	.49
		(1.84)*	(.75)	
3-21-80	−	.002	−.24	.54
		(.004)	(−3.00)**	
10-1-80	+	−.022	−.12	.54
		(.69)	(−1.72)*	
1-8-82	−	.0255	−.096	.48
		(.95)	(1.33)*	
10-22-82	+	.0031	.05	.52
		(2.44)**	(.43)	

t-Statistics in parentheses
*Significant at the 10% level (for a one-tailed test)
**Significant at the 5% level (for a one-tailed test)

(CRSP) tapes for the four years surrounding each of the announcement dates used. The sample consists of 22 firms.

Results

In this section, we present the results of the empirical tests of the first two hypotheses. Table II contains the results of the tests of the hypothesis that trade protection does not affect industry equity values. Equation (1) was estimated for the portfolio of steel firms using daily returns over a 500 trading day period surrounding each event (250 days preceding the event and 250 days following the event). Event responses were measured two weeks prior to the announcement and one day following the announcement (−10, +1). This observation period allows prior anticipation by investors about the impact of an event to be included in the measured responses.

According to the portfolio approach, the null hypothesis can be rejected at the 10% level for the initial imposition of the Trigger Price Mechanism in 1977 and at the 5% level for the Voluntary Export Restraints Agreement with Europe in October 1982. The initiation of the TPM program appears to have increased the steel industry's equity values by 2.6% and the VER agreement increased equity values by 0.3%.

The abnormal returns for the remaining events were not statistically significant. This absence of significant results could stem from two factors. First, the change in trade policy could have been anticipated by investors. Both suspensions of the TPM were a result of steel firms filing anti-

Table III.A. Individual Steel Firms' Percentage Abnormal Returns around Announcements of Changes in Trade Protection, Cumulated over Days −10 through +1, Where Day 0 Is the WSJ Announcement Date

$$R_{it} = a_i + a_i D_j + \beta_i R_{mt} + \beta_i R_{mt} D_j + \sum_{t=-10}^{+1} W_{ijt} E_{jt} + U_t \qquad (2)$$

t = −250 to +250 days
i = Individual firm
j = Event

Imposition of Trigger Price Mechanism: December 1977

Firm	$\Sigma_t W_{ijt}$	(t-stat)	$\beta_i D_{ji}$	(t-stat)
Allegheny-Ludlum (in)	.0106	(2.39)**	.203	(.98)
Armco (in)	.0043	(1.18)	.099	(.58)
Athlone (m)	.0042	(.93)	.017	(.08)
Bethlehem Steel (in)	.0006	(.12)	−.145	(−.64)
Carpenter Technology (m)	−.0002	(−.04)	−.326	(−1.35)*
Copperweld (m)	−.0008	(−.21)	−.048	(−.26)
Cyclops (m)	.0080	(1.45)*	.306	(1.19)
Florida Steel (m)	−.0095	(−1.90)**	−.014	(−.06)
Inland Steel (in)	.0026	(.86)	.124	(.89)
Interlake Steel (in)	.0048	(1.31)	−.581	(−3.39)**
Keystone (m)	.0056	(.98)	.228	(.85)
LTV (in)	.0053	(.00)	.285	(.68)
Lukens (m)	.0010	(.21)	−.548	(−2.45)**
National Steel (in)	−.0032	(−.58)	−.078	(−.30)
Northwest. Steel & Wire (m)	.0025	(.62)	.087	(.46)
Nucor (m)	−.0017	(−.30)	−.094	(−.35)
Phoenix (m)	−.0058	(−.40)	1.452	(2.15)**
Republic Steel (in)	.0021	(.58)	−.202	(−1.19)
Sharon (in)	.0010	(.00)	.216	(.75)
U.S. Steel (in)	.0032	(.78)	−.095	(−.50)
Wheeling-Pittsburgh (in)	.0063	(.93)	.483	(1.61)*

(in) denotes integrated firms
(m) denotes minimill
t-statistics in parentheses
*Significant at the 10% level (for a one-tailed test)
**Significant at the 5% level (for a one-tailed test)

dumping cases with the U.S. International Trade Commission (ITC). It is possible that the firms disclosed their intentions prior to the filings with the ITC. Second, the investors' lack of reaction may have been due to a belief that the TPM was ineffective in providing import protection. We do not have any means of distinguishing between these two explanations.

We next examine investor reactions to these events using the unconstrained approach. Firm-specific results are reported in Table III.A for the original TPM in 1977 and in Table III.B for the VER established in 1982. The TPM and VER illustrate the two types of import relief implemented in the steel industry. The TPM is an example of a price control while the VER is an example of a quantitative restraint. Both of these events showed significant investor reaction for some firms using the unconstrained approach. In 1977, four firms had significant (beyond the 10% level) abnormal returns and fifteen of the firms had abnormal returns in the expected direction (i.e., positive) upon announcement of the TPM program. Similarly, in 1982, about one-fourth of the firms exhibited significant positive abnormal returns and a significant majority of the firms

Table III.B. Individual Steel Firms' Percentage Abnormal Returns around Announcements of Changes in Trade Protection, Cumulated over Days −10 through +1, Where Day 0 Is the WSJ Announcement Date

$$R_{it} = a_i + a_i D_j + \beta_i R_{mt} + \beta_i R_{mt} D_j + \sum_{t=-10}^{+1} W_{ijt} E_{jt} + U_t \qquad (2)$$

t = −250 to +250 days
i = Individual firms
j = Event

Imposition of Voluntary Restraint Agreement: October 1982

Firm	$\Sigma_t W_{ijt}$	(t-stat)	$\beta_i D_{ji}$	(t-stat)
Allegheny-Ludlum (in)	.0093	(1.40)*	.073	(.37)
Armco (in)	.0093	(1.51)*	.278	(1.54)*
Athlone (m)	.0025	(.39)	.005	(.03)
Bethlehem Steel (in)	.0067	(1.17)	−.178	(−1.08)
Carpenter Technology (m)	.0166	(2.99)**	.189	(1.15)
Copperweld (m)	.0011	(.16)	.226	(1.13)
Cyclops (m)	.0147	(2.41)**	−.243	(−1.36)*
Florida Steel (m)	.0065	(.78)	−.100	(−.41)
Inland Steel (in)	.0148	(2.53)**	.554	(3.31)**
Interlake Steel (in)	.0004	(.11)	−.010	(−.08)
Kaiser (in)	−.0139	(−.05)	−.354	(−1.12)
Keystone (m)	−.0028	(−.02)	−.178	(−.72)
LTV (in)	.0230	(.02)	.068	(.30)
Lukens (m)	.0143	(1.87)**	.259	(1.14)
National Steel (in)	−.0008	(−.09)	.147	(.61)
Northwestern Steel & Wire (m)	.0112	(2.25)*	.133	(.90)
Nucor (m)	−.0027	(−.41)	−.462	(−2.41)**
Republic Steel (in)	.0106	(.01)	−.383	(−.67)
Sharon (in)	.0038	(.26)	.410	(2.16)*
U.S. Steel (in)	.0131	(2.02)**	−.193	(−.46)
Wheeling-Pittsburgh (in)	.0154	(1.68)*	−.068	(−.36)

(in) denotes integrated firms
(m) denotes minimill
t-statistics in parentheses
*Significant at the 10% level (for a one-tailed test)
**Significant at the 5% level (for a one-tailed test)

again had abnormal returns in the expected direction. These results combined with the results using the portfolio approach provide substantial evidence that the steel industry benefitted from the trade restrictions implemented in 1977 and in 1982.[12,13]

Our tests of the second hypothesis concerning changes in systematic risk are inconclusive. Under the portfolio approach (Table II) we find that four of the six events resulted in significant changes in beta. However, three of the four changes are in the opposite direction to that predicted. In 1969, the systematic risk increased upon the imposition of new trade restraints while in March

12. Under the unconstrained approach the F-statistic for the null hypothesis that the individual firm's responses are all equal to zero is .782 for 1977 (p = .37) and 1.20 for 1982 (p = .125). As expected the low power of this approach prevents us from rejecting the null hypothesis.

13. In both the portfolio and the unconstrained approaches we tested for autocorrelation. The Durbin-Watson statistic indicated that in both approaches it was not a problem.

1980 and January 1982, the systematic risk decreased after the TPM was rescinded. These results are inconsistent with Peltzman's hypothesis that regulation shelters firms from competitive forces and decreases systematic risk.

IV. The Interaction of Firm Structural Characteristics with the Impact of Trade Restrictions

It is obvious from the results reported in Tables III.A and III.B using the unconstrained approach that not all firms benefit equally from protection. There are several potential explanations for these differences. Prior to the implementation of import relief, firms could be operating at different points on their average cost curves, be using different processing techniques, or be at different capacity levels. It is possible that the more efficient producers such as the nonintegrated producers are the major beneficiaries. It is equally possible that the major integrated producers which are less efficient, but have a larger share of the market are able to capture the wealth created by import relief. To account for these differences among steel producers, we select characteristics which are potentially important in distinguishing between the types of steel producers and the variance in efficiency among all steel producers.

Hypotheses

The first firm-specific hypothesis we test is whether the type of producer affects the impact of trade restrictions. A dummy variable is used to test for differential effects of import relief on the major integrated producers and the minimills (nonintegrated producers). Differential effects are likely to occur for several reasons. First, the damage caused by imports in terms of lost market share and profitability vary by type of producer. Second, operating and marketing strategies vary by type of producer. Finally, firm inputs in terms of technology and labor also vary by type of producer.

H_0^1: *The reaction to trade protection measures for steel firms does not vary with the type of steel producer.*

It has been commonly asserted that import protection benefits producers with the largest market share. Trade protection allows the major integrated producers to bring out outmoded capacity into production and to reestablish oligopoly control over the domestic market.[14] If this assertion is valid, we expect the equity of firms with relatively higher shares of steel shipments to react more to changes in trade restrictions.

H_0^2: *The reaction to an increase in trade protection for steel firms does not vary with their market shares.*

Another common assertion is that trade protection compensates unprofitable producers and injures the more competitive segments of the industry. The basis for this assertion is that the VRA's allowed relatively uncompetitive producers to retain domestic market shares and to operate at a profit at the expense of the competitive producers.[15] One measure of profitability is the

14. For an example of this type of assertion, see Borrus [6, 79].

15. Again, for an example of this type of assertion, see id., pp. 84–85.

change in a firm's net income over the preceding two years. Given this assertion we expect less profitable firms to benefit the most from increased protection.

H_0^3: *The reaction to an increase in trade protection for steel firms does not vary with their percentage change in net income.*

Another characteristic which could affect a firm's benefits from increased trade protection is the amount of financial leverage which the firm has undertaken. Firms with larger relative amounts of debt in their capital structure may benefit more from an increase in the price of their product. This would imply a positive reaction to those trade restrictions which cause price increases. However, for firms with high financial leverage, the increase in expected returns may not be fully captured by equityholders. Part of the increased wealth may flow to the debt holders due to the reduction in probability of default.

H_0^4: *The reaction to an increase in trade protection for steel firms does not vary with their financial leverage.*

Methodology and Data

We test whether these firm specific hypotheses affect the incidence of economic rents by regressing the abnormal returns obtained from the event study regressions using the unconstrained approach (i.e., the $\sum_t W_{ijt}$ coefficients) on measures of the firms' characteristics. Our regression equation is:

$$\sum_t W_{ijt} = a_1 + a_2 * CLASS + a_3 * MKTSHR + a_4 * CHGING + a_5 * FINLEV + e_i \qquad (3)$$

where the dependent variable is the share price response to the 1977 TPM and 1982 VERs obtained from the unconstrained regressions of equation (1). The independent variables are the firms' characteristics described in the previous section. To control for possible heteroskedasticity our dependent variable is the cumulative abnormal return ($\sum_t W_{ijt}$) divided by its standard error. The actual independent variables employed and their sources are summarized in Table IV.

The correlation coefficients between the independent variables are also reported in Table IV. As would be expected since minimills are smaller firms, there is a significantly negative correlation between the market share and classification variables. For the 1977 data there also was a tendency for firms with more financial leverage, ceteris paribus, to have been larger and less profitable. These relationships did not appear as strongly in the 1982 data. Although the signs of the correlation coefficients between these variables were the same as in 1977, they were not significant. Given the potentially strong commonalities among these variables, we employed techniques[16] to check for problems with collinearity. We found no substantial problems with collinearity, but we ran equation (2) including and excluding the market share and classification variables.

Another potential problem with running the cross-sectional tests over a small number of firms is the possibility that a few observations are too influential on the results because one subset of the firms' variates are outliers. To test for this possibility, we employed the Belsley, Kuh, and Welsch [3] techniques for diagnosing influential data points. For the 1977 regression, these techniques showed that one firm's variates were indeed too influential. Accordingly, we reran the regression

16. The techniques we employed are suggested by Belsley, Kuh, and Welsch [3].

Table IV. Pearson Correlation Coefficients for Individual Firm Characteristics (Probability > R under $Ho : R = 0$)

	CLASS	*MKTSHR*	*CHGINC*	*FINLEV*
1977 Data				
CLASS	1.000			
	.000			
MKTSHR	−.620	1.000		
	.003	.000		
CHGINC	.165	−.095	1.000	
	.474	.682	.000	
FINLEV	−.399	.254	−.400	1.000
	.091	.295	.090	.000
1982 Data				
CLASS	1.000			
	.000			
MKTSHR	−.577	1.000		
	.005	.000		
CHGINC	−.027	.219	1.000	
	.908	.341	.000	
FINLEV	−.338	.067	−.219	1.000
	.157	.787	.369	.000

CLASS: A dummy variable indicating whether the firm is a minimill (value of dummy = 1) or an integrated producer (value of dummy = 0).

MKTSHR: Market share, a firm's percentage of the industry's total steel shipments.

CHGINC: A firm's percentage change in income over the preceding two year period.

FINLEV: Financial leverage, a firm's debt to invested capital ratio.

Information for these variables were obtained from annual issues of *Iron Age*, from Standard and Poor's Industry Surveys, from COMPUSTAT and from the firm's annual reports.

without the observations for U.S. Steel. For the 1982 regression none of the observations appeared to cause a problem.

Results

This section interprets the cross-sectional results reported in Table V. The results vary with the time period and with the type of import relief. For the full 1977 model, when price controls were implemented, three of the four variables are significant at least at the five percent level. For 1982, two variables are significant. The F statistics on the regressions for both periods indicate that the models fit the data well.

We examine these results in more detail by discussing each of the firm specific hypotheses. The first hypothesis concerns the type of firm, that is, whether the firm is considered a major integrated producer or a minimill. In 1977, the investor reaction to the announcement of the increased trade protection depends on whether the firm is an integrated producer or a minimill. Investors perceived the integrated producers as receiving relatively more of the benefits from protection. For the full model we can reject the null hypothesis of no difference in reaction at the 5% significance level. In fact, if we examine the average abnormal return by group, the average for the integrated producers was over twice as large as the average for the minimills. This difference

Table V. Estimated Coefficients of Regression of Abnormal Returns for the Individual Firms

$$\sum_t W_{ij} = a_1 + a_2 * CLASS + a_3 * MKTSHR + a_4 * CHGINC + a_5 * FINLEV + e_i \quad (3)$$

Characteristic	*INTERCEPT*	*CLASS*	*MKTSHR*	*CHGINC*	*FINLEV*	*F*-Statistic
Imposition of Trigger Price Mechanism: December 1977						
Coefficient	1.846	−1.137	−15.640	−1.734	−1.024	3.870
Standard Error	.603	.506	6.368	.649	1.185	
Prob. > *T* or *F*	.009	.043	.029	.019	.391	.028
Coefficient	.912	−.330		−1.691	−.917	2.316
Standard Error	.546	.449		.757	1.346	
Prob. > *T* or *F*	.117	.475		.042	.507	.120
Coefficient	.791		−6.355	−1.956	−.370	2.699
Standard Error	.430		5.500	.729	1.269	
Prob. > *T* or *F*	.087		.267	.018	.775	.087
Voluntary Export Restraints Agreement with Europe: October 1982						
Coefficient	1.879	.000	4.643	−.456	−4.524	2.218
Standard Error	.856	.650	6.546	.257	1.825	
Prob. > *T* or *F*	.046	.999	.489	.097	.027	.120
Coefficient	2.290	−.304		−.437	−4.764	2.885
Standard Error	.620	.480		.251	1.764	
Prob. > *T* or *F*	.002	.536		.102	.016	.070
Coefficient	1.879		4.642	−.456	−4.524	3.168
Standard Error	.504		4.751	.246	1.610	
Prob. > *T* or *F*	.002		.344	.084	.013	.055

in reaction does not hold for the 1982 announcement. In that period, the average abnormal return for the integrated producers is only slightly larger than that for the minimills. Thus, we cannot reject the null hypothesis that there was no difference in investor reaction.

The second hypothesis examines the importance of market share in a firm's reaction to new trade restrictions. Again the results vary with time period. In 1977, the market share coefficient is negative and significant at the .03 level in the first regression. In 1982, the varible has an insignificant coefficient. Thus, using the full model, in 1977, the firms with smaller market shares, ceteris paribus, benefitted more from the increased trade protection, while in 1982, no statement can be made from the results. The results of these tests raise serious questions about the common assertion that import protection benefits producers with the largest market shares.

The third firm-specific hypothesis examines the importance of the firm's relative profitability. For this variable, the results are more consistent across the two time periods. The coefficients are negative and significant at the .05 level for 1977 and at about the .10 level for 1982. Thus, the null hypothesis that a firm's profitability does not affect the impact of trade protection can be rejected. This result suggests that those firms that were less profitable are expected to gain more from the protection.

A measure of the firm's financial position is the firm's financial leverage. The coefficients on this variable are not significantly different from zero in 1977. However, in 1982 they are nega-

tive and significant. Thus, for 1982, the implication is that the equityholders of firms with high financial leverage had relatively smaller increases in wealth upon announcement of the change in trade protection. A possible explanation for this result is that for highly leveraged firms some of the increased wealth went to bondholders rather than to equityholders. To test this proposition, we collected data on publicly traded bonds for our sample of steel firms. We were able to obtain a time series of weekly prices on bonds for ten companies. We then used the comparison period returns method by computing the mean return on our bond portfolio for six weeks prior to the announcement date and comparing the return during a one week announcement period to the earlier mean return. The abnormal return for this portfolio for the week of October 18 was 1.9 percent with a t-statistic of 5.0521, implying a significant increase in wealth for these bondholders. In addition, the abnormal returns for 8 out of the 10 individual firms' bonds were positive. If we correlate these bonds' abnormal returns with the firm's debt ratios, we get a Spearman's correlation coefficient of .738 with a significance level of .037. Thus, it appears that bondholders were also the beneficiaries of the 1982 restrictive trade agreements and the higher the financial leverage in a firm, the more the bondholders benefitted.

In summary, we have attempted to determine what type of steel firm benefits from import protection. In 1977, it is interesting to note, that the imposition of the TPM benefitted the smaller major integrated producers rather than the steel industry leaders. Among these producers, it was the less profitable firms that experienced positive abnormal returns. For the 1982 adoption of the VERs our results make it difficult to identify which type of steel firm gained from the VERs. It appears, however, that the equityholders of the less profitable and less highly leveraged firms benefitted. For the more highly leveraged firms our results suggest that bondholders shared in the expected gains from trade protection.

There are three alternative explanations for the differences between the 1977 and 1982 regression results. First, the type of firm that benefits from protection may vary with the form of that protection. Our evidence is consistent with the argument that price restraints have more differential effects on firms than do quantity restraints (at least along the dimensions which we analyze). A second alternative explanation is that the difference in the results may be due to the stringency of the protective measures rather than their type. If the TPM was expected to be less stringent than the VERs, then the effects would have been expected to be more differential among firms. Finally, the disparity in the results may be due to transformations in the steel industry itself so that there was less differentiation in the effects of protection on firms in 1982.

V. Conclusion

The results of this study lead to some significant generalizations about the impact of trade restrictions on the steel industry. First, the event study results, using both the portfolio and unconstrained approach, indicate that steel firms capture a statistically signficant percentage of the economic rents created by trade restrictions. Second, the results from the unconstrained approach show that the majority of steel firms experienced positive abnormal returns regardless of whether price or quantity controls were implemented. Third, these results also show that not all steel firms benefit equally from import relief.

The cross-sectional results provide information about the expected effects of import protection. It is expected that the firms which actively demand relief from imports are the primary beneficiaries. Yet, we find in 1977 that the TPM did not necessarily help the larger major inte-

grated producers which were the most active in the political efforts to obtain trade protection. Instead, the smaller integrated producers appear to benefit the most from protection. The results from 1982 show that the minimills benefit almost as much as the major integrated producers. It is also expected that less profitable producers benefit more from protection. The negative and significant coefficent of the change in net income variable in our results from 1977 and 1982 confirm these expectations.

This work suggests possibilities for future research. The empirical technique of combining the results from unconstrained event studies with cross-sectional analysis can be applied to other industries which have been affected by trade restrictions such as the auto, copper, semiconductor and softwood lumber industries. This type of analysis would yield generalizations about the wealth consequences of trade restrictions and the distribution of their effects. Further empirical evidence may indicate whether protectionist policies using price constraints and quantitative restraints are effective in helping firms to compete with imports.

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