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RENT SEEKING, PROTECTIONISM AND INNOVATION IN THE AMERICAN STEEL INDUSTRY*

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Trade protection in a declining industry can cause damages beyond those revealed in the usual trade diagram analysis. Using data on the US steel firms, we show that trade protection in that industry rewards poor performance, reduces incentives to innovate, and frustrates the normal Schumpeterian process of creative destruction.

Free trade gives consumers the lowest prices. Nonetheless, protectionism in various guises is pervasive. This, we show, is probably due to political rent-seeking by groups that expect to lose as trade patterns adjust to innovation and altered economic conditions. These groups invest in political lobbying to secure future returns in trade protection. We find empirical evidence that trade protection returns private benefits to the shareholders, senior workers, and CEO's of lobbying firms. Perhaps more disturbingly, trade protection also appears to reward less innovative firms, and may thus frustrate the Schumpeterian development of an industry.

We examine US steelmakers, among the most active lobbyers in recent decades. Steel firms that lobby congress for protection tend to be larger, older, less diversified, and less profitable than non-lobbyers. They pay their workers and CEOs more, and their CEOs have longer tenure and are more likely to have risen through the ranks of their companies. This suggests the owners, managers and workers of less dynamic steel firms stand to lose from free trade. The announcement of protection raises the stock prices of US steelmakers, but by much more for lobbyers than non-lobbyers when comprehensive and enduring protection was finally announced. Lobbyers, more than non-lobbyers, cut jobs while maintaining or possibly increasing wages once comprehensive protection is in place. Protection also leads to large pay increases for lobbyers' CEOs. This seems consistent with rent-seeking and inconsistent with protection helping lobbyers mitigate social consequences of downsizing like unemployment. Our most striking finding is that high past R & D spending is negatively correlated with stock price changes when protection is announced, and positively correlated with subsequent exit from the industry. This seems inconsistent with protection providing a hiatus for retooling. Rather, it suggests

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protection has repercussions beyond the losses shown in trade theory diagrams. Rent-seeking may not only be a substitute for innovation, it may actually decrease the returns from true innovation, as predicted by Magee *et al.* (1989), Baumol (1990), and Murphy *et al.* (1991, 1993).

The paper is organised as follows. Section I describes our sample and data, while Section II contrasts lobbyers and non-lobbyers. Section III explores returns to protection for shareholders, workers, and top managers. Section IV examines the impact of protection on dynamic aspects of the industry. Section V concludes.

I. DATA

Our sample consists of all steelmakers listed in the *Standard and Poor's Corporate Register* between 1977 to 1988 under SIC codes 3312 (steel works), 3315 (blast furnaces), 3316 (rolling mills), and 3317 (finishing mills). Firms not included on the *Compustat* tapes are dropped. These are either privately-held or very small. Our sample thus omits some minimills, however a comparison with Barnett and Crandall (1986) shows that we include all minimalls in their sample with capacities greater than 400,000 tons. The annual reports and proxy statements of all remaining firms were inspected. For ten firms, these did not indicate steel production as a significant business, and these firms were dropped. The result is a panel of 890 firm-year observations spanning 130 firms. Because of entry and exit, the panel is not balanced across years.

Some of our steelmakers are quite diversified. If these firms are also consumers of steel, our results may be biased. We therefore investigate a subsample of only highly focused steelmakers. We define these as firms whose primary line of business in *Standard and Poor*'s manual for that year is 3312, 3315, 3316 or 3317 – the steelmaking SIC codes, or if all four steel SIC codes are listed. We set a 'steel focus dummy' to one if a firm is a member of this subsample, and use this as a control variable. An alternate control variable, the fraction of SIC codes in steelmaking, leads to qualitatively similar results.

The *Federal Register* and the *CIS Congressional Abstract Index* indicate which firms petition for escape clause protection, countervailing duties or anti-dumping measures; file complaints about foreign government practices; or testify in support of protection in congressional hearings. Lobbying by a subsidiary is assigned to the parent, found by searching the *Standard and Poor's Corporate Register*, *Moody's Industrial Manuals*, *Capital Adjustments*, the *Value Line Investment Survey*, and the *Directory of Corporate Affiliates*. Since firms likely free-ride on each others' lobbying, firms are defined as lobbyers if they lobby at any time during the sample period. This misses changes of heart in some firms and misclassifies complete free-riders.

Of our 130 steelmakers, 36 lobbied for protection during our sample period of 1977 to 1988, and 94 did not. We use the 1977 to 1988 period because it saw intense lobbying leading to a sequence of price and quantity trade barriers.

Financial data are from Compustat.[1] Data on CEO characteristics are from proxy statements.[2]

II. FIRMS THAT LOBBY FOR PROTECTION VS. FIRMS THAT DO NOT

Table 1 displays univariate comparisons of firm, labour force and CEO characteristics. Firms that lobby are larger, reflecting the probable economies to scale in lobbying. They are also more specialised in steel, as indicated by the 'steel focus dummy', which is zero if the firm has substantial non-steel operations, and one otherwise. It is reasonable that undiversified firms might tend to resort to 'voice' rather than 'exit'. Lobbying firms perform comparatively poorly. Their returns on assets are significantly below those of non-lobbyers. Their sales show a mean decline of 1·16% per year, while those of nonlobbyers show mean growth of 1·43% per year. The medians of both groups are positive, however, and that of lobbying firms is actually greater. This suggests that some lobbyers are downsizing rapidly in some years, but typical lobbyers in typical years are not. Lobbyers have depreciated more of their plant and equipment, which suggests their facilities are older. The capital investment rates of the two groups are similar, but lobbyers spend less on R & D. Workers at lobbying firms earn average wages almost $9,000 higher than those of non-lobbyers' workers. They also have lower labour to capital ratios, which can be interpreted as proxying for higher wages. Lobbyers are larger, and large firms tend to pay more. Larger steelmakers are also more likely to be unionised, and this doubtless boosts wages. Regardless of the reasons, lobbyers' workers apparently have more to lose. Lobbyers' CEOs make about $66,000 more per year than non-lobbyers' CEOs. Firm size is related to CEO compensation (Jensen and Murphy, 1990). Also, some CEOs of lobbying firms have very long histories with their firms (average tenure 31·5 years). Presumably, they have considerable firm and industry specific human capital. Lobbyers' CEOs also apparently have more to lose. These differences are not solely due to non-lobbyers being more diversified. Similar results hold over a subsample of highly focused steel firms (i.e. 'steel focus dummy' = 1) in which the fractions of firms' SIC codes in steelmaking are actually negatively correlated with lobbying ($\rho = -0{\cdot}21$, p = 0·14). The notable exception is that

[1] The following variables are constructed using data from *Standard and Poor's Instustrial Compustat* database: Total Assets is adjusted for inflation and is in millions of 1983 dollars. Depreciation is taken from the balance sheet and divided by book value of net plant and equipment. Labour to capital ratio is number of employees per $100,000 of total assets. This can be interpreted as a proxy for unit labour costs. A firm with higher labour costs should, *ceteris paribus*, employ fewer workers per dollar of capital. Average wage is real total labour cost per employee. This more direct measure is unfortunately available for only one quarter of our sample because disclosure of labour costs is not mandatory. Sales growth is calculated over the most recent sales figure and is adjusted for inflation. It has slightly fewer observations because of the need for two years of data. Return on assets is income before extraordinary items gross of depreciation and interest expenses per dollar of total assets. Research and development spending is measured per dollar of total assets. If R & D is not reported, but all other financial data are available, we assume R & D spending to be nil. Investment rate is capital expenditure on plant and equipment (from the firm's statement of changes in financial position) over total assets.

[2] Compensation data from proxy statements are available for only a small subsample. First and last year compensation is excluded.

Table 1

Firm, Labour Force and CEO Characteristics for Steel Companies that Lobbied for Protection at Least Once Between 1977 and 1985 Compared with Steel Companies that did not Engage in Lobbying

	Non-protection-seekers			Protection-seekers			Differences p-level	
	Mean	Median	*n*	Mean	Median	*n*	Means	Medians
				Firm characteristics				
Total assets*	\$689	\$268	582	\$1,298	\$426	308	0·27	0·01
Steel focus dummy†	0·344	0	582	0·659	1	308	0·01	0·01
Return on assets	10·3%	11·2%	582	7·95%	9·85%	308	0·01	0·01
Growth rate in sales	1·43%	0·369%	579	−1·16%	1·03%	303	0·02	0·06
Depreciation/pt. & eq.	0·904	0·845	582	0·976	0·916	308	0·01	0·01
Investment/asets	6·87%	5·50%	582	7·95%	9·85%	308	0·39	0·31
R & D spending/assets	0·855%	0	582	0·579%	0	308	0·01	—
				Labour force characteristics				
Average wage‡	\$31·5	\$30·0	114	38·9	\$38·9	92	0·01	0·01
Labour/capital ratio§	1·80	1·62	582	1·48	1·44	308	0·01	0·01
				CEO characteristics				
Salary and benefits‡	\$339·0	\$286·5	396	\$405·2	\$310·7	216	0·01	0·04
Age of CEO‖	57·9	59·5	115	56·7	57·0	64	0·36	0·29
Years as CEO‖	5·49	4·00	70	11·0	4·00	49	0·06	0·58
Years with the firm‖	17·7	14·5	16	31·5	29·4	13	0·03	0·08

Probability levels in the means column are for F-tests to reject the hypotheses that the average coefficient on firm dummies for protection-seekers is equal to the average coefficient on firm dummies for non-protection-seekers. Probability levels in the medians column are for F-tests to reject the same hypothesis, but in a regression on the rank transformation of the variable in question. For incorporation year and the CEO employment history variables, a simple t-test comparison of means and ranks is used instead.

* Millions of 1983 dollars.

† This dummy variable, described in footnote 3, indicates low diversification.

‡ Thousands of 1983 dollars.

§ Working per \$100,000 of total assets.

‖ Data as of 1980.

among highly focused steel firms, lobbyers actually spend slightly more on R & D (0·485% of assets compared to 0·260% for non-lobbyers).

These univariate effects are probably interdependent. Table 2 therefore presents logistic regressions, whereby we identify which firm characteristics are more important in identifying lobbyers. These regressions use time averages of all descriptive variables. Although this 'throws away' the panel structure of our data, there is little choice. We could conceivably use firms' decisions to lobby in a given year as the dependent variable in a panel logit; however, our right-hand-side variables for a given firm may well be dependent across years, and the econometric theory of logits in such situations is still being developed. Our econometric approach follows Rosner *et al.* (1989).

The effects in Table 1 are related to size and focus, but are not entirely due to these factors as the signs and, in some cases, significance levels in Table 2, tell the same story. The first panel of Table 2 suggests that differences in profitability, growth, age and R & D in Table 1 are related to size and focus as these variables' become insignificant when size and focus control variables are both present. The low R & D of lobbying firms remains significant when size is

Table 2

Logits Using Firm, Labour Force and Management Characteristics to Explain Steel Firms' Decisions to Lobby for Trade Protection between 1977 and 1988

Firm characteristics	—	(2·1)	—	(2·2)	—	(2·3)
Constant	—	−3·22	—	−0·633	—	−4·31
		(0·02)		(0·43)		(0·01)
Log of total assets	—	0·481	—	—	—	0·553
		(0·01)				(0·01)
Steel focus dummy	—	—	—	1·28	—	1·57
				(0·01)		(0·01)
Return on assets	—	−8·08	—	−7·62	—	−5·68
		(0·09)		(0·11)		(0·26)
Sales growth rate	—	0·00142	—	−0·782	—	−0·265
		(0·99)		(0·64)		(0·88)
Depreciation/plant & equipment	—	0·298	—	−0·230	—	0·222
		(0·63)		(0·66)		(0·72)
Investment/assets	—	3·39	—	1·17	—	1·44
		(0·63)		(0·86)		(0·85)
R & D spending/assets	—	−48·0	—	−9·42	—	−26·9
		(0·06)		(0·63)		(0·29)
Sample	—	122	—	122	—	122
Labour force characteristics	(2·4)	(2·5)	(2·6)	(2·7)	(2·8)	(2·9)
Constant	−7·28	−1·49	−4·20	−0·496	−7·73	−3·61
	(0·02)	(0·15)	(0·03)	(0·44)	(0·02)	(0·01)
Log of total assets	0·333	0·329	—	—	0·513	0·470
	(0·28)	(0·03)			(0·15)	(0·01)
Steel focus dummy	—	—	1·55	1·15	2·15	1·56
			(0·18)	(0·01)	(0·10)	(0·01)
Average wage	13·4	—	7·99	—	7·16	—
	(0·02)		(0·19)		(0·25)	
Labour/capital ratio	—	−85·0	—	−60·3	—	−50·8
		(0·01)		(0·06)		(0·13)
Sample	33	123	33	123	33	123
CEO characteristics	—	(2·10)	—	(2·11)	—	(2·12)
Constant R & D	—	−2·58	—	−2·59	—	−4·23
		(0·01)		(0·01)		(0·01)
Log of total assets	—	0·241	—	—	—	0·334
		(0·17)				(0·09)
Steel focus dummy	—	—	—	1·82	—	1·93
				(0·01)		(0·01)
Salary and benefits	—	0·00077	—	0·00244	—	0·00133
		(0·34)		(0·02)		(0·16)
Sample	—	106	—	106	—	106

Independent variables are time series averages. Values in parentheses are probability levels for Wald χ^2-tests against zero coefficient values. See Table 1 footnotes.

included, but is subsumed by the steel focus dummy. However, its point estimate remains negative. Profitability remains significant unless both size and focus effects are included, and even then the coefficient again remains negative. In the second panel, labour to capital ratios, inverse proxies for wage levels, remain significantly different when either size or steel concentration is included, and 'almost' significant ($p = 0{\cdot}13$) when both are included. The point estimate remains negative, pointing to higher wages for lobbyers. In the third panel, CEO compensation is significant except when firm size is controlled for, and even then its sign remains positive. Note that the partial

correlation coefficient of CEO compensation with size is 0·74 ($p = 0·0001$), while that with the steel focus dummy is −0·24 ($p = 0·014$). Focus on steel is thus correlated with lower CEO compensation. This is probably related to the fact that many small steel firms are also highly focussed. The correlation of size with steel focus is −0·107 ($p = 0·21$). Thus, focusing on steel is related to both lobbying and lower CEO compensation. The higher CEO compensation of lobbyers is clearly not an artifact of their greater steel focus, though it is related to their greater size. Indeed, when Table 2 is replicated using only highly focused steel firms, qualitatively similar results ensue. The biggest difference is that R & D is completely insignificant ($p = 0·99$) in the analogue of logit (2·1), consistent with highly focused lobbyers not having low R & D spending. Average wage remains significant with a coefficient of 12·06 ($p = 0·07$) in the analogue of logit (2·4), while the labour capital ratio retains its signs but becomes insignificant in the analogue of (2·5). In the analogue of (2·10), CEO compensation again has a positive insignificant coefficient.

In summary, lobbyers are larger and less diversified than non-lobbyers. They thus can exploit economies of scale in lobbying, and have a greater incentive to lobby because they are less able to exit. Partially related to their size and focus, lobbyers are less profitable and, except for highly focused steelmakers who lobby, are also less innovative. This raises the possibility that diversified lobbyers, at least, may be Schumpeterian laggards. Lobbyers also pay their workers and CEOs more, and have CEOs whose skills are more specific to steel. For CEOs, this is related to lobbyers' large size. Regardless, both lobbyers' workers and managers appear to have more to lose than their peers at non-lobbyers.

III. ALLOCATING THE RETURNS TO LOBBYING FOR TRADE PROTECTION

We now examine the direct returns from trade protection to shareholders, labour and management. During our sample period, 1977 to 1988, the United States announced four major steel trade barriers.

The first, the *1977 Trigger Price Mechanism,* was initially an effective price-based barrier. A 'trigger price' for each steel product was based on estimated production costs in Japan, which was defined as the 'lowest cost producer'. These were converted to US dollars using a 60 day average exchange rate. If imports entered the United States at a lower price, the Treasury Department 'triggered' antidumping or countervailing duty investigations. If injury to the industry was found, countervailing duties were imposed. A falling yen soon emasculated the barriers. Renewed lobbying the US Steel ensued, and the trigger price mechanism, which included a no lobbying agreement, was discontinued. However, when candidate Reagan endorsed steel protection, the Democrats had to act.

The Carter administration unveiled the second barrier, the *1980 Trigger Price Mechanism,* this time with a 36 month moving average exchange rate. However, the trigger prices were low and were widely regarded from the outset as

Table 3

Steel Firms' Abnormal Stock Return upon Announcement of Trade Protection

All firms		Lobbying firms		Non-lobbying firms		Difference p-level	
Median	Mean	Median	Mean	Median	Mean	Medians	Mean
			1977 trigger price mechanism				
1·31%	1·43%	1·22%	1·03%	1·42%	1·59%	(0·72)	(0·51)
(0·00)	(0·00)	(0·03)	(0·14)	(0·00)	(0·00)		
			1980 trigger price mechanism				
−0·95%	−1·06%	−1·04%	−1·02%	−0·95%	−1·08%	(0·84)	(0·95)
(0·02)	(0·05)	(0·22)	(0·28)	(0·07)	(0·11)		
			1982 voluntary export restriction				
−0·04%	0·59%	1·76%	2·37%	−0·20%	−0·32%	(0·11)	(0·11)
(0·49)	(0·47)	(0·06)	(0·04)	(0·70)	(0·76)		
			1984 voluntary export restriction				
1·12%	1·92%	1·64%	3·78%	0·48%	0·88%	(0·01)	(0·01)
(0·00)	(0·00)	(0·00)	(0·00)	(0·14)	(0·10)		

Numbers in parentheses are probability levels for tests to reject the hypothesis that the median, mean or difference is zero. Tests involving means are standard t-tests, those involving medians are rank t-tests. The sample consists of 77 firms in 1977 (23 protection-seekers and 54 non-protection-seekers), 78 firms in 1980 (26 protection-seekers and 52 non-protection-seekers), 77 firms in 1982 (26 protection-seekers and 51 non-protection-seekers) and 67 firms in 1984 (24 protection-seekers and 43 non-protection-seekers).

ineffective. Also, the depreciation of European currencies relative to the yen cast doubt on Japan being the lowest cost producer. Lobbying by the industry continued.

To head off further US actions, the EC agreed to the third barrier, the *1982 Voluntary Export Restraints* – a system of partial quotas. Since only EC imports were covered, US firms continued to lose market share and to lobby.

In 1984, candidate Mondale and President Reagan both promised comprehensive steel protection. By the year's end, many countries, including Japan, South Africa, Australia, and South Korea, accepted voluntary export restraints, and the 1982 EC agreement was expanded to more products. The *1984 Voluntary Export Restraints* were widely seen as effective, comprehensive and enduring.

We now examine returns to lobbying for shareholders, labour, and management.

Shareholders

Table 3 shows steelmakers' cumulative abnormal stock returns over the days when each of the four trade barriers were announced.[3] The reaction to the 1977 trigger price mechanism was uniformly positive, while that to the 1980 mechanism was uniformly negative, probably reflecting investors' disappointment at the lower trigger prices. Shareholders of lobbyers and non-lobbyers reacted differently to the 1982 and 1984 voluntary export restraints.

[3] The event dates are December 5, 1977, September 9, 1980, October 22, 1982, and September 20, 1984. Abnormal returns are *cum* dividend returns minus the *CRISP* value-weighted market return over three day windows centred on the event dates. These are available for most of the firms in our *Compustat* sample.

The share prices of lobbying firms went up for both events. Those of non-lobbying firms did not move at news of the 1982 barriers, and went up significantly less than those of lobbying firms upon news of the 1984 barriers. When Table 3 is replicated using only the subsample of highly focused steel firms, the results are similar. The main difference is that the reactions of non-lobbyers' stocks in 1982 have large, positive point estimates (2·14% mean and 2·64% median) but remain insignificant ($p = 0{\cdot}63$ and $0{\cdot}27$). However, lobbyers' stock price reactions to comprehensive, enduring protection in 1984 ($\mu = 1{\cdot}22\%$, $p = 0{\cdot}00$; median $= 2{\cdot}66\%$, $p = 0{\cdot}01$) are still greater and more significant than those of non-lobbyers ($\mu = 0{\cdot}47\%$, $p = 0{\cdot}79$; median $= 1{\cdot}41\%$, $p = 0{\cdot}28$). These results are thus not due to differential steel focus.

Labour

Prior to 1984, growth in mean wages, employment and total wage costs for lobbyers and non-lobbyers are similar. Both showed increases in all three variables in the two years following the short-lived 1977 barriers, and decreases from 1980 through 1983. But lobbyers' mean wages grow by 1·5% per year from 1984 to 1988, while those of non-lobbyers fall by 1·6% per year. The difference is significant ($t = 1{\cdot}56$). During this period, total employment by lobbyers falls by 6·3% per year, while that by non-lobbyers falls by 0·2% per year, which is significantly lower ($t = 2{\cdot}20$). Lobbyers' total wage outlays fall by 5·48% per year while non-lobbyers' rise by 0·5% per year, which is significantly different ($t = 1{\cdot}95$).[4] Again, a similar pattern holds in the subsample of only highly focused steelmakers.

Top Management

Standard CEO compensation regressions (Jensen and Murphy, 1990), with p-levels in parentheses, were run for lobbyers,

$$\Delta CEO\ compensation = \underset{(0{\cdot}50)}{0{\cdot}021} + \underset{(0{\cdot}03)}{0{\cdot}270}\ \Delta sales + \underset{(0{\cdot}07)}{0{\cdot}738}\ \Delta return\ on\ assets + \underset{(0{\cdot}08)}{0{\cdot}084}\ post\ 1984\ dummy \qquad (n = 130,\ R^2 = 0{\cdot}16)$$

and non-lobbyers,

$$\Delta CEO\ compensation = \underset{(0{\cdot}13)}{0{\cdot}032} + \underset{(0{\cdot}01)}{0{\cdot}246}\ \Delta sales + \underset{(0{\cdot}01)}{0{\cdot}922}\ \Delta return\ on\ assets + \underset{(0{\cdot}27)}{0{\cdot}038}\ post\ 1984\ dummy \qquad (n = 228,\ R^2 = 0{\cdot}11).$$

[4] This is consistent with Crandall (1987). Also, average wage, equal to total wage costs during the year divided by year-end employment, is biased down when employment is rising and up when it is falling, so the higher wage growth rate for lobbyers after 1984 may be overstated when downsizing begins.

After comprehensive and enduring protection was introduced in 1984, lobbyers' CEO compensation grows by 8·4% more per year than prior to 1984. That of non-lobbyers' CEOs does not accelerate significantly after 1984. The coefficients of the dummies in the two regressions are significant different from each other ($t = 1·97$). This difference holds in analogous regressions in the highly focused steelmakers subsample, although the post-1984 dummy's coefficient is only 0·068 ($p = 0·12$) for lobbyers. The greater importance of growth and lesser importance of profitability in setting lobbyer CEOs' compensation might be taken as evidence of greater agency problems in lobbyers, however this difference does not hold up in the highly focused steelmaker subsample.

In summary, lobbyers' shareholders, senior workers, and CEOs obtain private benefits from protection. Lobbyers, more than non-lobbyers, maintain wages and adjust labour costs through job cuts. Workers with seniority, presumably including union leaders, are the probable beneficiaries. Lobbyers' shareholders gain more than non-lobbyers' from later trade protection. Yet non-lobbyers have lower wage costs, newer equipment and are generally more competitive. Perhaps lobbyers learned to engineer trade barriers politically to favour themselves. Or lobbying may have undermined non-lobbyers in other ways. We now turn to this possibility.

IV. THE EVOLUTION OF THE STEEL INDUSTRY UNDER TRADE PROTECTION

The 1984 barriers presage a sharp increase in non-lobbyers' exit rate, from about 4 firms per year to 7·4 firms per year. In contrast, lobbyer exits are nil until 1984 and then rise to only 2·8 firms per year. Though there are more non-lobbyers, their potential exit rate is also higher. In total, 66 of our 94 non-lobbyers ultimately exited, versus only 14 of 36 lobbyers. If exists were random, the probability of this would be substantially below 1%.

Table 1 shows non-lobbyers to be both more diversified and in better financial shape than lobbyers. If steel is characterised by lower performance than other industries, we might merely be picking up diversified firms abandoning steel. (Although even were this so, it is remarkable that the exit rate rises so sharply after 1984.) Table 4 explains exits using investment and R & D spending, controlling for steel specialisation, lobbying and profitability. Existing diversification significantly predicts exit, but high R & D spending also remains a strong determinant. Thus, the most innovative firms appear to be leaving the industry in response to protection. This belies the argument that protection gives firms a hiatus to retool and better meet foreign competition. This result is robust to controlling for firm size. To check whether high R & D among exiting firms might be due to their being more diversified, we restrict the sample to highly focused steel firms. The R & D coefficient is 45·8 ($p = 0·11$) in the analogue of logit (4·2), where return on assets is not included, and 47·1 ($p = 0·12$) in the analogue of (4·4), which includes return on assets. Moreover, within this highly focused subsample, exit is insignificantly positively

Table 4

Logits Explaining Firms' Divestments of Their Steel Operations Using R & D Spending and Investment, and Controlling for Lobbying, Lack of Diversification and Profitability

	(4·1)	(4·2)	(4·3)	(4·4)
Constant	−0·580	−0·926	−0·833	−0·723
	(0·27)	(0·01)	(0·09)	(0·26)
Protection seeking dummy	−0·040	0·057	0·008	0·125
	(0·94)	(0·91)	(0·99)	(0·81)
Steel involvement dummy	−1·43	−1·29	−1·48	−1·10
	(0·01)	(0·02)	(0·01)	(0·04)
Return on assets	8·03	—	—	2·85
	(0·99)			(0·59)
R & D spending/assets	—	30·9	—	31·7
		(0·05)		(0·08)
Investment/assets	—	—	3·77	0·81
			(0·54)	(0·90)
Sample	125	125	125	122

Numbers in parentheses are probability levels for t-tests to reject the hypothesis that the coefficient is zero. Explanatory variables are time series averages. See Table 1 footnotes.

Table 5

Abnormal Stock Returns upon Announcement of Protection Regressed on Capital Investment and R & D, Controlling for Lobbying and Lack of Diversification

	All firms	Exiting firms	Non-exiting firms	All firms	Exiting firms	Non-exiting firms
	1977 trigger price mechanism			1984 voluntary export restriction		
	(5·1)	(5·2)	(5·3)	(5·4)	(5·5)	(5·6)
Constant	0·028	0·045	0·003	0·011	0·049	0·009
	(0·00)	(0·07)	(0·00)	(0·42)	(0·38)	(0·52)
R & D spending per $ of assets	−0·441	0·416	−1·375	−0·409	0·018	−0·916
	(0·22)	(0·44)	(0·02)	(0·24)	(0·98)	(0·07)
Capital investment per $ assets	−0·117	−0·481	−0·050	0·073	−0·325	0·081
	(0·20)	(0·09)	(0·59)	(0·69)	(0·70)	(0·64)
Protection seeking dummy	−0·004	0·018	−0·010	0·031	0·029	0·031
	(0·64)	(0·41)	(0·32)	(0·01)	(0·50)	(0·01)
Involvement in steel dummy	−0·001	0·004	−0·004	−0·011	0·014	−0·012
	(0·99)	(0·83)	(0·67)	(0·38)	(0·78)	(0·33)
R^2	0·051	0·217	0·613	0·12	0·126	0·184
Sample	77	24	53	67	14	53

Numbers in parentheses are probability levels for rejecting the hypothesis that the coefficient is zero. See Table 1 footnotes.

correlated to the fraction of firms' SIC codes in steelmaking ($\rho = 0{\cdot}0157$, $p = 0{\cdot}91$). The greater likelihood of exit by high R & D firms is thus not due to differential diversification.

The results in Table 4 raise the possibility that trade barriers reduce the value of innovation in the protected industry. Table 5 relates prior R & D

spending to firms' stock price reactions upon the announcements of effective protection in 1977 and 1984. Among firms that stay in steel, after controlling for steel focus and lobbying activity, low R & D firms have higher stock price reactions. This is not due to lobbyers being more focused in steel. This result also holds in our subsample of highly focused steelmakers. Although the R & D coefficient's significance declines to p = 0·27 in the analogue of (5·6), probably reflecting the smaller sample, the point estimate, −0·918, hardly changes. In this subsample, the correlation of fraction of SIC codes in steel with R & D is insignificantly positive ($\rho = 0{\cdot}0002$, p = 0·99), while that with stock price reaction to protection is negative ($\rho = -0{\cdot}29$, p = 0·13). Also consistent with protection reducing the value of innovation, firms that stay in steel and have R & D programmes cut back on R & D spending under protection. Their mean R & D spending per dollar of assets is 0·00229 lower (p = 0·45) in the years after 1984. The median is 0·00115 lower (p = 0·12).

Among exiting firms, R & D may relate to diversification. Its lack of significance in that subsample is not surprising.

V. CONCLUSIONS

Lobbyers are larger and less diversified than other firms. They thus can exploit economies of scale in lobbying, and have greater incentives to lobby because they are less able to leave the industry. Possibly related to their size and steel concentration, lobbyers are, older, less profitable and (except among highly focused steel firms) less innovative. Lobbyers pay their workers and managers more, and have managers whose skills are more specific to steel. Both their workers and top managers thus have more to lose than their peers at other firms. Workers with seniority, top managers, and shareholders of lobbyers gain private benefits from protection. Lobbyers, more than non-lobbyers, maintain wages and adjust labour costs through job cuts. Also CEO compensation rose by significantly more each year in lobbying firms than in other firms following the implementation of effective, comprehensive trade barriers. Shareholders of lobbyers benefited more than those of non-lobbyers from later trade protection. Lobbyers may have grown more adept at politically engineering trade barriers specifically favourable to themselves, but may also have undermined non-lobbyers' investments in innovation. In the industry restructuring that followed comprehensive protection, stronger, more innovative firms left the industry. Also, high prior R & D spending is correlated with a negative stock price reaction to the announcement of protection.

Overall, our results are consistent with the following conclusions: Lobbying for trade protection is undertaken by less competitive firms whose workers and top managers have established comfortable positions. Protection is a form of political rent-seeking. It confers private benefits upon lobbyers' shareholders, senior workers, and top managers. Protection does not appear to be effective as a way of mitigating the social costs of restructuring, such as unemployment. It does not appear overall to be used as a hiatus for retooling to better meet

foreign competitors. Rather, the form of rent-seeking appears to reduce returns to true innovation and to encourage innovative firms to exit. These dynamic costs of protection reflect disruptions of the industry's normal Schumpeterian development. They are potentially much more serious than the distortions shown in standard trade theory diagrams.

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References

Baden-Fuller, C. W. F. (1989). 'Exit from declining industries and the case of steel castings.' Economic Journal, vol. 99, December, pp. 949–61.

Barnett, Donald F. and Crandall, Robert (1986). *Up From the Ashes: The Rise of Steel Minimills in the United States*. Washington D.C.: Brookings Institute.

Baumol, William J. (1990). 'Entrepreneurship: productive, unproductive, and destructive.' *Journal of Political Economy*, vol. 98, October, pp. 893–921.

Crandall, Robert W. (1987). 'The effects of U.S. trade protection for autos and steel.' *Brookings Papers on Economic Activity*, vol. 1, pp. 272–88.

Jensen, Michael and Murphy, Kevin J. (1990). 'Performance pay and top management incentives.' *Journal of Political Economy*, vol. 98, April, pp. 225–64.

Krueger, Ann O. (1974). 'The political economy of the rent-seeking society.' *American Economic Review*, June, vol. 64, pp. 291–303.

Magee, Stephen, P., Brock, William A. and Young, Leslie (1989). *Black Hole Tariffs and Endogenous Policy Theory Political Economy in General Equilibrium*. Cambridge: Cambridge Univesity Press.

Murphy, Kevin M., Shleifer, Andrei and Vishny, Robert W. (1991). 'The allocation of talent: implications for growth.' *Quarterly Journal of Economics*, May, pp. 503–30.

Murphy, Kevin M., Shleifer, Andrei and Vishny, Robert W. (1993). 'Why is rent-seeking costly to growth?' *American Economic Review*, vol. 82, May, pp. 409–14.

Rosner, B., Willett, W. C. and Spiegelman, D. (1989). 'Correction of logistic regression relative risk estimates and confidence intervals for systematic within-person measurement error.' *Statistics in Medicine*, no. 8, pp. 1051–69.