

# Lobbying Behavior and Protection<sup>\*</sup>

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May 2004

## Abstract

Incorporating insights from behavioral economics into standard political economy models explains certain puzzling features of trade policy. In particular, we use the lobbying framework of Grossman and Helpman (1994) and assume that agents' welfare functions exhibit loss aversion and reference dependence. The policy implications of the augmented model differ in three important ways. One, there is a region of compensating protection, where a decline in the world price leads to an offsetting increase in protection, such that a constant domestic price is maintained. Two, protection following a single negative price shock will be persistent. Three, even if all sectors lobby for protection, there will still be a deviation from free trade in equilibrium. This augmented model is more consistent with the structure of protection, and to show that, we present a case study of U.S. protection in the steel industry.

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<sup>\*</sup> We are grateful to Simeon Djankov, Marcelo Olarreaga, and David Tarr for comments on an earlier draft. The findings, interpretations and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the World Bank, its executive directors, or the countries they represent.

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## I. Introduction

Although the benefits of free trade are among the most commonly expounded themes in economics, governments rarely implement liberal trade policies. As a result, a large political economy literature has emerged over the years to explain deviations from free trade. Despite wide use, however, most political economy models of trade policy fail to answer several long-standing puzzles. A prominent one is referred to as the *Anti-Trade-Bias Puzzle* by Rodrik (1995): trade policies are almost always biased against trade, rather than in favor of it. Related issues are the *declining industry protectionism* and the *persistence of protectionism*. We observe that the level of protection increases as industries start to decline, and that once instituted, it becomes hard to remove protectionist policies

Not only do political economy models of trade policy fail to explain these phenomena, some of their predictions actually run counter to observed policy outcomes. For example, the prominent Grossman and Helpman (1994) model predicts that lobbying leads to higher subsidies in an export sector, as compared with the tariffs that an otherwise-identical import competing sector receives [see Levy (1999) for a discussion].<sup>1</sup> Similarly, all else equal, export subsidies will increase as output expands while tariffs will decline when output contracts. Finally, there are no features in these models to suggest persistence of protectionism; each period's trade policy is independent of the previous period's outcome.

Incorporating insights from behavioral economics into the standard models can explain the puzzles mentioned above. In particular, we use the lobbying framework of Grossman and Helpman (1994) and assume that agents' welfare functions exhibit loss aversion and reference

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<sup>1</sup> The same feature holds for other political economy models such as the tariff-formation approach of Findlay & Wellisz (1982), political support function of Hillman (1989) and campaign contributions approach of Magee, Brock and Young (1989).

dependence. Due to loss aversion, industries devote more resources to preventing losses as opposed to obtaining similar gains. Hence, they respond to a negative shock with a greater demand for protection. We refer to this as the *behavioral effect*. In standard models, as mentioned above, the equilibrium protection level that an industry receives is increasing in its output since the gain from a marginal increase in the price level is directly proportional to the size of the output of the industry. Hence, a negative shock that reduces sales (for a given price level) also reduces the demand for protection and leads to lower equilibrium tariff level. We refer to this as the *standard effect*.

These two simple forces generate protection dynamics that are similar to those observed in many industries. If an industry experiences a negative price shock that reduces income to below its reference point, the behavioral effect leads to an increase in lobbying for protection while the standard effect dampens the demand for it. Initially, the behavioral effect dominates the standard effect generating a region of *compensating protection*: provided the world price lies in a given range, trade policy exactly offsets the world price shock and a constant domestic price is maintained. The intuition is that loss aversion is only experienced if income is below its reference level, thus protection will be provided up to the point where it exactly compensates agents for the negative shock. If conditions worsen and the industry further contracts due to even lower world prices, the standard effect becomes stronger while the behavioral effect becomes less prominent due to diminishing sensitivity to losses. As a result, lobbying will become less intense once the price level falls outside the region of compensating protection. Thus, the level of protection in a declining industry is hump-shaped: first increasing then decreasing, and eventually approaching free trade.

Our enhanced model also offers an explanation for the persistence of protectionist policies. Once in place, protection becomes difficult to remove because it gets incorporated into the reference welfare level. If an industry experiences a single large negative shock, it demands protection. If the shock persists, protection becomes permanent and the industry never fully adjusts to the new market structure. Past levels of protection are therefore very important determinants of current protection, a feature which has been ignored in the empirical literature.

The next section discusses how this model fits into the political economy literature on protection. Sections III and IV present the augmented model and comparative statics. Section V presents a case study of protection in the U.S. steel industry. Section VI concludes.

## **II. The Political Economy of Trade Policy**

Our work builds on political economy models of lobbying for trade policy and declining industry protectionism. The first set of political economy models that were developed rely on a reduced form government welfare function that places more weight on certain sectors of the economy to generate protectionist policies for them. Among these, the most prominent examples are the tariff-formation function approach of Findlay and Wellisz (1982), the political support function approach of Hillman (1989), the median-voter approach of Mayer (1984) and the campaign contributions approach of Magee, Brock and Young (1989). We do not go into details, as these are reviewed in Baldwin (1989) and Rodrik (1995) and other places.

Government objective functions were also used in earlier studies on senescent industry protection. In one of the earliest studies, Corden (1974) uses a *conservative welfare function*, whereby the government seeks to avoid “any significant absolute reductions in real incomes of any significant section of the community” (p.107). Corden’s welfare function displays loss

aversion—reductions in income have greater weight than increases—in order to generate (observed) protection for declining sectors. However, the conservative welfare function was not derived from consumer utility, but chosen because it most closely reflected protectionist policies. Hillman (1982) and Long and Vousden (1991) use a political support function to explain why declining industries get more protection. In their models, the policymaker wants to spread the cost of a price decline in a import-competing sector over the whole population. The intuition in these models comes from risk sharing as opposed to preventing losses.

A shortcoming of this class of models is their use of a reduced form government welfare function that essentially places more weight on certain sectors in order to generate protection for those sectors—the trade policy outcome is effectively assumed at the onset. In an important contribution, Grossman and Helpman (1994, henceforth GH) develop a lobbying model that derives the government's objective function from micro-foundations. There is an explicit lobbying game played between the government and various interest groups, and the weights that government places on interests of different groups are derived endogenously. Although the structure of the model is more rigorous, some of its predictions are at odds with observed policy outcomes. First, the GH model predicts that if all industries are represented through lobbies, the equilibrium policy outcome will be free trade in all sectors. As a result, one needs to assume that only some of the sectors are organized to generate protection. This implies that, as with the previous models, the extra weight given to lobbying sectors is to some extent determined exogenously.<sup>2</sup> Second, the model predicts that export sectors should receive more protection, which runs counter to the empirical evidence. Third, according to the lobbying models, if a sector suffers a negative price shock, protection should fall. In reality, it is the sectors that face

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<sup>2</sup> To endogenize the lobby formation process, Mitra (1999) assumes that there are varying levels of exogenous fixed costs to form a lobby. Only the sectors for which it is cost effective will form a lobby and obtain protection.

negative shocks that receive more protection. Finally, the model does not offer any insights about the persistence of protection.

We preserve the structure of the GH model, while incorporating assumptions from behavioral economics to generate a more accurate predictions about trade policy. In particular, numerous empirical studies from the behavioral literature find that the value people assign to a loss is significantly larger than the effect of an equivalent gain.<sup>3</sup> This so-called loss aversion appears to be a key part of the structure of protection. The vast majority of the most restrictive trade policy instruments are designed explicitly to limit the extent to which world price declines are transmitted to the domestic economy. Quota restrictions, voluntary export restraints, and price floors, only bind when the world price is low and falling. Other tools of temporary protection, such as antidumping duties and the escape clause, are only used in a weak price environment. Empirical evidence also shows that industries experiencing losses are much more likely to receive protection than otherwise similar growth industries. Marvel and Ray (1983), Ray (1991) find that protection is geared toward declining industries, and Trefler (1993) finds that protection is higher in ones in which import penetration has increased. In addition, countries have resisted liberalization in industries with declining employment and rising import penetration (Baldwin 1985).<sup>4</sup> The introduction of the behavioral assumptions into the objective functions of lobbies resolves many of the incongruities between predictions of the model and observed policy outcomes.

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<sup>3</sup> See Kahneman, Knetsch, and Thaler 1991 for a survey of the literature.

<sup>4</sup> Baldwin (1989) remarks that loss aversion is a possible explanation.

### III. Model

We use the Grossman-Helpman (1994) model of lobbying for protection and incorporate the behavioral assumptions of loss aversion and reference dependence. The key insight from behavioral economics is that welfare is not only dependent on the current state but on the change in states. In particular, Tversky and Kahneman (2000) define three characteristics of value function that differ from standard utility theory. The first is reference dependence: gains and losses relative to a reference point are important. The second is loss aversion: losses have larger effects on welfare than corresponding gains. The third is diminishing sensitivity: the marginal value of gains and losses decreases with their size.

We start describing the model with the production side. There are  $n+1$  consumption goods where good 0 is the numeraire and is produced with labor alone using constant returns to scale technology. The supply of labor is large enough to guarantee supply of good 0 so that its price and the wage rate are both set to 1. All other goods, indexed  $1 \dots n$ , require labor and a sector specific input with fixed supply; their production technology also exhibits constant returns to scale. The rewards to the owners of the sector specific factor used in the production of good  $i$  is determined by the domestic price the good,  $p_i$ , and is denoted by  $\pi_i(p_i)$ . Finally, the supply of the good  $i$  is denoted by  $y_i(p_i) = \pi'_i(p_i)$ .

The economy is composed of individuals who derive utility from the consumption of these  $n+1$  consumption goods. In addition, each person owns a share of the sector specific factors. For simplicity, we assume that each individual owns only one type of specific factor and the ownership levels are identical across individual owners of the same factor. The indirect utility function is

$$(2) \quad V_{p_j}^-(p) = E + s(p) - I_L h(\pi(\bar{p}_j) - \pi(p_j)), \quad h' > 0, h'' < 0, h(0) = 0.$$

where  $p$  is the domestic price vector,  $E$  is income and  $s(p)$  is the consumer surplus.<sup>5</sup> Since the reward level  $\pi_j(p_j)$  is strictly increasing in  $p_j$ , the reference reward level corresponds to a unique reference price, denoted as  $\bar{p}_j$ . Loss aversion is introduced through the function  $h(\cdot)$  where  $\bar{p}_j$  is the price level of the own good, for which profits form the reference point.  $I_L$  is an indicator variable which takes the value of 1 income falls below the reference point, i.e.

$\pi(\bar{p}_j) - \pi(p_j) > 0$ . This implies that the owners of specific factor  $j$  perceive a decline in their welfare when income falls below the reference point but do not derive any additional utility for reward levels above it.

Net individual government revenue can be written as the sum of the trade tax on each product multiplied by individual net imports demand.

$$(3) \quad r(p) = \sum_i (p_i - p_i^*) [d_i(p_i) - \frac{1}{N} y_i(p_i)],$$

where  $p_i^*$  is the world price of good  $i$  and  $N$  is the population size. The individual demand and domestic supply functions,  $d_i(p_i)$  and  $y_i(p_i)$ , are defined above. Thus, the joint welfare of the owners of specific factor  $i$  is defined as

$$(4) \quad W_{i,L}(p) = \{\ell_i + \pi_i(p_i) + \alpha_i N [r(p) + s(p)]\} - I_L \alpha_i N h(\pi(\bar{p}_i) - \pi(p_i)), \quad h' > 0, h'' < 0,$$

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<sup>5</sup> A utility function that corresponds to this indirect utility function is

$$u(x) = x_0 + \sum_{i=1}^n u_i(x_i) - I_L h(x_0(\bar{p}) - x_0(\bar{p})), \quad \text{where } x_0 \text{ is consumption of a numeraire good and } x_i \text{ is}$$

consumption of good  $i$  and  $\bar{p}$  is the reference vector of prices. We exclude loss aversion with respect to price increases of the  $n$  goods.

where  $\alpha_i$  is the fraction of the population that owns some of this factor and  $\ell_i$  is labor income.

We refer to this group as lobby  $i$  since their interests are aligned and opposed to owners of other specific factors. Recall that  $\pi(\bar{p}_i)$  is the reference income level based on price level  $\bar{p}_i$ . If profits fall below reference level, the members of the lobby group experience a loss through the function  $h(\cdot)$ , in addition to the direct income loss through a decline of  $\pi_i(p_i)$ , the second term in the expression above.

Since the country is small, it has no influence over the world prices  $p^*$ , and the trade-policy vector uniquely determines the domestic prices. The government cares about social welfare and values monetary political contributions which can be used for a variety of purposes including campaign spending. We adopt a linear objective function for the government, following the literature:

$$(5) \quad G = \sum_{i \in L} C_i(p) + aW(p).$$

Where  $W(p)$  represent social welfare and  $\sum_L C_i(p)$  is the sum of the contributions from the set of organized lobbies,  $L$ . The social welfare has a relative weight of  $a$  in the government's objective function and the only restriction is  $a > 0$ . We assume the government's welfare function does not explicitly include loss aversion. Government officials do not observe all of the industries' reference prices—the government knows an industry's profit function but it does not know where the industry is relative to its reference level. If an industry is loss-making and lobbies for protection, it must demonstrate its losses to the government using historical data. This assumption is sensible, as a great deal of lobbying is focused on providing information (Austen-Smith 1991). We assume that the information transmitted to the government is easily verifiable, so industries have no incentive to feign losses, but that it would be excessively costly for the

government to gather and analyze historical data for all industries. In equilibrium, the government places extra weight on the lobby's welfare, which incorporates loss aversion. Loss aversion therefore enters the government's objective function indirectly, only through its influence on the contribution schedules of the lobbies.<sup>6</sup> Because the government takes loss aversion into account when an industry lobbies, the marginal value in terms of protection of a dollar spent on lobbying by a loss-making industry is greater than the value of a dollar spent on lobbying by an industry with similar characteristics but that is not below its reference level.

Aggregate welfare is

$$(6) \quad W(p) = l + \sum_{i=1}^n \pi_i(p_i) + N[r(p) + s(p)].$$

The lobbying game played between the lobby and the government is identical to the GH framework and is based upon Bernheim and Whinston's (1986) menu auction. In the first stage, the lobbies simultaneously submit contribution schedules contingent on the trade-policy vector implemented by the government. Given these schedules, the government maximizes its objective function given by (5) and chooses a domestic price vector in the second stage. The equilibrium outcome is a set of contribution schedules and a domestic price vector (or the corresponding trade policy vector). Bernheim and Whinston (1986) show that the subgame-perfect Nash equilibrium of this game has some nice properties. For example, for each lobby group  $i$ , the equilibrium price vector maximizes the joint welfare of the that group and the government, given the contribution schedules of all other organized lobby groups. Furthermore,

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<sup>6</sup> Once a loss-making sector lobbies, the government could modify the aggregate welfare function to include that industries losses. This would only serve to strengthen the results. Without loss of generality, we do not incorporate the lobby's loss into the aggregate welfare function.

the contribution schedules are locally truthful so that they reveal the true preferences.<sup>7</sup> These imply the equilibrium domestic price vector satisfies the following:

$$(7) \quad p^o = \arg \max \sum_{i \in L} W_i(p) + aW(p)$$

In order to find the equilibrium price vector, we first calculate the effect of change in  $p_j$  on the welfare of lobby  $i$ . We obtain the following from (3) and (4),

$$(8) \quad \frac{\partial W_i}{\partial p_j} = (\delta_{ij} - \alpha_i)y_j(p_j) + \alpha_i(p_i - p_i^*)m'_j(p_j) + \delta_{ij}I_L\alpha_iNy_j(p_j)h'(\cdot)$$

where  $\delta_{ij}$  is an indicator variable that is 1 if  $i = j$  and 0 otherwise, and  $m_j(p_j)$  is net import demand,  $m_j(p_j) = Nd_j(p_j) - y_j(p_j)$ .

Next, we sum equation (6) over the set of organized lobbies,  $L$ , to obtain the change in welfare for all lobbies with respect to price  $p_j$ ,

$$(9) \quad \sum_{i \in L} \frac{\partial W_i}{\partial p_j} = (I_j - \alpha_L)y_j(p_j) + \alpha_L(p_j - p_j^*)m'_j(p_j) + I_L I_j \alpha_i N y_j(p_j) h'(\cdot),$$

where  $I_j$  is an indicator variable equal to 1 if industry  $j$  is organized and  $\alpha_L$  is the fraction of the total population of voters that are represented by a lobby.

A marginal change in the price of a particular good affects aggregate welfare (Equation 6) as follows:

$$(10) \quad \frac{\partial W}{\partial p_j} = (p_j - p_j^*)m'_j(p_j).$$

Recall that the equilibrium condition is given by (7) and implies:

$$(11) \quad \sum_{i \in L} \frac{\partial W_i}{\partial p_j} + a \frac{\partial W}{\partial p_j} = 0, \text{ for } j = 1, \dots, n$$

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<sup>7</sup> Bernheim & Winston and GH discuss in length why it is enough to focus on truthful contribution schedules since these are coalition-proof. We refer the reader to these papers.

where  $a$  is the weight on social welfare. The first order condition is

$$(12) (I_i - \alpha_L) y_i(p_i) + (a + \alpha_L) (p_i - p_i^*) m'_i(p_i) + I_L I_i \alpha_i N y_i(p_i) h'_i(\bar{p}_i) - \pi(p_i) = 0$$

Thus, the optimal trade tax  $t_i$ , defined as  $t_i = (p_i - p_i^*) / p_i^*$ , can be expressed as

$$(13) t_i^o = - \frac{y_i(p_i) [(I_i - \alpha_L) + I_L I_i \alpha_i N h'_i(\bar{p}_i) - \pi(p_i)]}{(a + \alpha_L) p_i^* m'_i(p_i)}$$

We can rewrite this condition as

$$(14) \frac{t_i^o}{1 + t_i^o} = \frac{(I_i - \alpha_L) + [I_L I_i \alpha_i N h'_i(\bar{p}_i) - \pi(p_i)]}{a + \alpha_L} \left( \frac{z_i^o}{e_i^o} \right) \quad \text{for } i = 1, 2, \dots, n$$

where  $z_i^o = y_i(p_i^o) / m_i(p_i^o)$  is the equilibrium ratio of domestic output to imports and

$e_i^o = -m'_i(p_i^o) p_i^o / m_i(p_i^o)$  is the elasticity of import demand or of export supply.

The expression for the equilibrium trade tax is identical to the result in GH except for the behavioral term in square brackets. All the insights from the GH framework are carried over. First, suppose that the lobby  $i$  is not organized, i.e.  $I_i = 0$ . Then the optimal policy is an import subsidy or an export tax. In other words, unorganized sectors receive domestic prices *below* world prices. Similarly, organized sectors (i.e.  $I_i = 1$ ) receive import tariffs and export subsidies, thus obtain domestic prices *above* world prices. Second, the distortion imposed (subsidy or a tax) declines as the government places more weight on social welfare, expressed through the parameter  $a$ . Third, the size of the distortion is positively related to the ratio of domestic output to imports,  $z_i$ . If the level of domestic output of an organized sector is high, for a fixed level of import demand elasticity, then the lobby has more to gain from a marginal increase in the domestic price. The contribution schedule will reflect this and the equilibrium protection level will be higher.

The behavioral term, on the other hand, introduces important implications for trade policy. One consequence of the GH model is that if all sectors are organized (i.e.  $I_i=1$  for all  $i$ ) and everybody is represented by a lobby group ( $\alpha_L=1$ ), then there is free trade in equilibrium. The interest groups neutralize each other and the interests of the producers are exactly matched by the opposing interests of the consumers. Mitra (1999) provides one answer to why some sectors should be organized while others are not. He assumes that each sector faces different levels of exogenous fixed costs of mobilization. The benefits of organizing a lobby (in the form of higher domestic prices through import tariffs and export subsidies) are weighed against the fixed cost of lobbying. If the fixed cost is high enough for certain sectors, then they will not organize and lobby the government in equilibrium. In our setting, trade is distorted even if all everybody is represented by a lobby group (i.e.  $I_i=1$  for all  $i$  and  $\alpha_L=1$ ). If all sectors are organized, the equilibrium tariff is

$$(15) \quad \frac{t_i}{1+t_i} = \frac{I_L I_i \alpha_i N h'(\cdot)}{a+1} \left( \frac{z_i^o}{e_i^o} \right).$$

Thus, there is protection only for the sectors where the domestic price is below their reference level (i.e.  $I_L=1$ ). Furthermore, industries with smaller output and high elasticity of import demand (in absolute value) receive lower level of protection and smaller deviations from free trade.

#### **IV. World Prices and Domestic Protection**

In this section, we explore how equilibrium trade policy changes for a change in the world price of a good. This helps resolve the puzzles mentioned in the introduction and explains how the lobbying behavior responds to changes in the external economic environment. We first

show how the domestic protection level and domestic price level are related. Consider an industry where the domestic price is above the reference level. Then, under some mild assumptions, it is straightforward to show that the equilibrium tariff rate of an organized lobby is increasing in the world price—this is the implication of the GH model that we mentioned earlier. Since loss aversion does not enter the objective function of the lobby group, the standard GH effect derives the result. The reason can be easily seen from the optimal policy expression in Equation (14). Let  $\tau_i = \frac{t_i}{1+t_i}$ , then we can rewrite the equilibrium tariff expression as the following, given that  $I_L=0$ :

$$(16) \quad \tau_i = \frac{(I_i - \alpha_L)}{a + \alpha_L} \left( \frac{1}{\varepsilon_y - \varepsilon_d \frac{d_i}{y_i}} \right),$$

where  $\varepsilon_y$  and  $\varepsilon_d$  are, respectively, the elasticity of domestic supply and demand of sector  $i$  ( $\varepsilon_y > 0$ ,  $\varepsilon_d < 0$ ). An increase in world price causes a decline in the domestic demand to supply ratio ( $d_i/y_i$ ) and hence an increase in the equilibrium tariff level, assuming that the elasticities satisfy certain mild assumptions.<sup>8</sup>

Next, consider the scenario where world price is so low such that, even with protection, the equilibrium domestic price is below the reference price level. Then the equilibrium trade policy is given by

$$(17) \quad \tau_i = \frac{(I_i - \alpha_L) + [I_L I_i \alpha_i N h'(\pi(\bar{p}_i) - \pi(p_i))]}{a + \alpha_L} \left( \frac{1}{\varepsilon_y - \varepsilon_d \frac{d_i}{y_i}} \right)$$

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<sup>8</sup> For example, it is sufficient for domestic demand and supply functions to have constant elasticity.

In this case, the GH effect, as identified in the previous paragraph, still pushes the protection level to decline when the world price declines. The loss aversion effect works in the same direction due to decreasing sensitivity to losses, expressed as  $h'' < 0$ . (Note a decline in world price causes  $\pi(\bar{p}_i) - \pi(p_i)$  to increase.) Thus, in this region, the equilibrium protection moves in the same direction with the world price as well.

The key issue is what happens when the domestic price is at the reference level. Equations (16) and (17), respectively, provide the equilibrium trade policies when the domestic price is above and below the reference level. We see that expression (17) has a higher value at  $\bar{p}$  since  $h' > 0$ . This means, when the domestic price is slightly below the reference point, the protection level is higher compared to the price slightly above reference point. These are represented in Figure 1.<sup>9</sup>

The next step is to determine the relationship between the equilibrium trade policy and world prices. In Figure 1, let trade policy at points A and B be denoted as  $\tau_A$  and  $\tau_B$  respectively. Although the domestic price is identical at A and B, world prices are different since the world price is given by  $p^* = p/(1 - \tau)$ . More specifically, at the corresponding world prices, we have  $p_A^* < p_B^*$ . The relationship between world prices and trade policy for prices lower than  $p_A^*$  and higher than  $p_B^*$  is given from the discussion above. The question is what happens to protection for world prices between  $p_A^*$  and  $p_B^*$ . We know that the domestic price has to be constant at the reference level  $\bar{p}$  in this range. In other words,  $p^*/(1 - \tau) = \bar{p}$  for  $p_A^* < p^* < p_B^*$ , which means

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<sup>9</sup> The shape of the function to the right of the reference price depends on the shape of  $d_i/y_i$ . In general, it will be convex since a marginal increase in the tariff level is worth more when the industry is larger. The same intuition will hold to the left of the reference price, moreover, diminishing sensitivity to losses implies that a marginal increase in price close to the reference level is worth more than a marginal increase away from the reference price.

that the protection level will be declining in world prices. Thus, the relationship between world prices and protection exhibits the pattern in Figure 2, where the distance between  $p_A^*$  and  $p_B^*$  depends on the extent of loss aversion, the steeper is the loss aversion function, the further apart they will be.

Figure 2 provides very interesting insights about the pattern of trade policy compared to standard political economy models where there is generally a positive correlation between the world price and the protection level. Firms still receive increasing protection when the world price is high. This can be interpreted as pertaining to sectors where domestic firms are competitive in world markets and are exporters. Although exporters do not receive subsidies directly, there are other policies that target large exporters. For example, the infamous Foreign Sales Corporations tax provisions of the United States (and the replacement tax plan), which effectively provide some 6,000 companies—including some of the largest exporters such as Microsoft, Boeing, and Cisco Systems—with a tax break on up to 30 percent of export earnings, are worth a staggering \$4 billion to U.S. exporters.

As the world price declines, so does protection, until we reach  $p_B^*$ . This is a critical point since the corresponding domestic price is at the reference level  $\bar{p}$ . If the foreign price were to continue to decline, the government implements trade policies that exactly offset these negative shocks. The region between  $p_A^*$  and  $p_B^*$  reflects the price range for which the government perfectly shields domestic firms from negative world price shocks, we call this the region of *compensating protection*. The intuition is that the loss aversion effect outweighs the standard effect when the price level is not too far below the reference level, pushing the domestic price level back to its reference level. The domestic price never rises above the reference price

because agents no longer experience loss aversion when price is above  $\bar{p}$ . This feature of the model fits remarkably well with the many types of protectionist policies that are designed to maintain prices. For example, all types of quantity restrictions, such as quotas, buffer-stock systems, voluntary export restraints, safeguard measures, and other contingent protection measures, as they become more protective when world prices decline and serve to maintain a given price level.

If the world price were to fall below  $p_A^*$ , the marginal cost of protection becomes too high in terms of lost consumer surplus (recall consumer surplus is declining and concave in prices) whereas the marginal benefit is too low (since the producer surplus is increasing and convex in prices). In addition, the loss aversion exhibits declining sensitivity which operates in the same direction as the above effect. Thus, the protection starts to decline as the world price continues to fall below  $p_A^*$ . At some point, it is possible that the domestic industry disappears and so does protection.

In short, when behavioral assumptions are introduced, trade policy no longer exhibits a monotonic relationship with the world price as is predicted by the standard model. Furthermore, this structure explains some of the puzzles that had gone unexplained. In particular, the model produces an intermediate region where domestic policy is used to shelter firms falling prices. This feature is especially appealing, as in practice it is declines in the world price of a product that generate protection. And protection occurs in sectors that still have significant presence (output, employment etc.) but are not very competitive in world markets. This is apparent in many forms of contingent protection, which only bind when the world price falls. For example, voluntary restraint agreements and quotas become less binding as the world price rises, and above the price level for which the quantity restriction is not binding, there is effectively free

trade.<sup>10</sup> Such quantity restrictions are the most important forms of protection in the United States and Europe, restricting the highly protected sectors of agriculture and textiles and apparel. The other main source of protection in industrial countries is antidumping charges, which can only be initiated when import prices fall. Developing countries often maintain explicit price floors for many products. In addition, bound tariffs are set well above actual levels so that they have the flexibility to raise them when conditions worsen. Recently, many countries in Asia and Latin America have also become important users of antidumping legislation. In the next section, we examine the evolution of protection in the United States for steel, an industry which has some unique features that make it an interesting case study.

#### ***V. Some Evidence from the U.S. Steel Industry***

The U.S. steel industry is the most protected industry in the United States, together with the historically protected sectors of textiles and agriculture. Despite low MFN tariffs, the steel industry has lobbied for and received some form of protection since 1969. Table 1 documents the policies protecting U.S. steel. The industry has benefited from quantity restrictions, a trigger price mechanism, as well as antidumping duties.<sup>11</sup> In the early period, policies were clearly geared toward maintaining prices—as evidenced by the 1977 trigger price mechanism which established a minimum import price. The steel industry also has a special feature that helps us isolate loss aversion: the same type and quality of steel is produced in the United States using different technologies. The split industry provides a control since all producers benefit (lose) from a price rise (fall). Thus, the difference in their demand for protection must be due to effects

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<sup>10</sup> VRAs are still an anomaly since in general they transfer rents to the foreign producer as opposed to a tariff which keeps rents through the revenue generated.

<sup>11</sup> About half of the more than 200 antidumping orders currently in force are on imported steel.

of price changes on industry size and profitability. As we will see, only the firms that experienced losses as prices fell called for protection, while the sub-sector where technology was improving and production was growing remained silent.

Two types of producers dominate steel production, integrated firms, which use blast furnace technology to produce steel, and electric arc furnaces or so-called minimills, which use more advanced technology to convert scrap into steel products.<sup>12</sup> Until 1999, all antidumping claims in steel were filed by integrated firms. Moreover, the minimill sector did not support the antidumping charges or other forms of protection. Nucor, the first minimill (and now the leading U.S. steel producer), has historically been vocally pro trade, even in the mid-1980s when world prices plummeted.<sup>13</sup> Nucor was expanding rapidly at this time, doubling in size from 1980 to 1990. In contrast, the integrated firms underwent decline; the six main integrated producers reduced their steel making capacity from 108 to 58 million tons during this same period.

A key difference between minimills and integrated producers is their cost per ton of steel produced. Table 2 shows costs of producing cold-rolled steel in 2001 for integrated producers and minimills in the United States, as well as the production costs of major producers in the rest of the world. Minimills are clearly competitive in the world market while the integrated producers are not. Table 3 shows the profits and capacity utilization of minimills and integrated producers from 1985 to 1994, years for which data are available. The integrated producers have had periods of loss making while the minimill sector has always been profitable. Capacity

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<sup>12</sup> A third and new type of producers are rollers which turn slab into high value added steel products. Since the price of slab fluctuates with the world markets, rollers' profits are much less vulnerable to import competition because costs fall with prices. Rollers largely use imported slab as an input, implying that their gains from protection are limited, as a result we exclude rollers from this discussion.

<sup>13</sup> The Chairman and CEO of Nucor, Kenneth Iverson (credited with bringing electric arc technology to the United States and moving minimills into flat products), espoused the benefits of free trade in a detailed editorial to the *Wall Street Journal* in 1986 ( *August 21, 1986, p. 22*).

utilization shows that the minimill industry was expanding over the period, while capacity utilization in the integrated sector is highly correlated with profits.

From 1969 to 1999, price declines led to increased calls for protection only from integrated producers. During this period integrated production was declining and profits were falling as compared to minimills where output and profits were growing. Chart 1 shows the composition of U.S. demand for steel. The decline in U.S. demand led to a fall in integrated production, while minimills and imports maintained quantities. As a result, the share of demand met by integrated producers declined, while the share met by minimills and imports expanded. Overall, employment in steel declined rapidly, falling from over 500,000 employees in 1974 to roughly 200,000 in 1986.

This period of falling prices and rapid declining employment, from the early 1970s to the mid 1980s, was also the one of greatest protection. Chart 2 shows the U.S. price of steel, the European price, and the world price of steel, for hot-rolled, cold-rolled, rebar, and across all products. The gap between the U.S. price and the world price, which largely reflects protection, is largest in the early 1980s as the integrated producers were contracting.<sup>14</sup> Protection has cycled since then, with the U.S. market being protected from world price declines. On average protection has remained below its peak levels in the early 1980s.

The lower equilibrium levels of protection in the period since 1986 are consistent with the market size effect and diminishing sensitivity to losses. Since the integrated sector shrank, calls for protection slowed and were less successful. Indeed, Morck et. al. 2001 use firm-level data on lobbying in the steel industry from 1977 to 1988. They find that the likelihood of

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<sup>14</sup> Price is also affected by composition of supply as even within these categories there are important quality differences. However, the European steel consumers use steel of roughly the same quality as U.S. consumers suggesting much of the price differential is in fact protection.

lobbying is increasing in firm size and decreasing in sales growth. Thus, as the integrated sector shrank in the 1980s the demand for (and supply of) protection waned.

It is worth noting that in the recent steel crisis, the minimills have also sought protection. This is not surprising, given the falling profits that they have endured this time. For example, from 1995 to 1997, Nucor's average earnings (EBIT) were \$56/ton; from 2001 to 2003, earnings averaged only \$13 per ton.

Protection in the steel industry is not consistent with a traditional model since the initial decline in profits and output was met with increased, as opposed to decreased, protection. In addition, the traditional model cannot explain why only one type of steel producer sought protection. In our augmented model, falling prices led to losses in the integrated steel sector, resulting in a greater demand for protection. Improved technology in the minimill sector allowed profits to grow despite price declines, so the minimill industry did not require protection to prevent losses. Technology improvements in the 1980s and 1990s effectively meant that profits never fell below reference profits, even in a weak price environment (in fact, the minimills contributed to falling prices in the United States). Minimill technology, however, could not keep up with price declines during the most recent slump, and as the model predicts, the minimills began lobbying for protection.

There are alternative explanations as to why only the integrated sector called for protection. Cassing and To (2003) argue that several of the minimills opposed protection in order to signal to investors that they were low cost producers. A problem with this theory is that their strong growth and high profitability had already demonstrated that their costs were low. In addition, only in one instance did a firm officially oppose protection, a costly action, which would be required for signaling to be credible. Finally, the minimills' reversal with respect to

demand for protection in 2000 is difficult to explain using this theory. While the model does a nice job of explaining why antidumping suits may number less than would be expected, it fails to capture the dynamics of protection in the steel industry.

Another explanation has to do with convex adjustment costs. Brainard and Verdier (1997) present a political economy model where firms seek protection in order to spread out adjustment costs. Again however, this argument cannot explain the change in position of the minimills with respect to antidumping. The minimills were not contracting during in 1999/2000, so they could not have been trying to smooth adjustment. Profits had fallen sharply and expansion had at least temporarily slowed, but they were still on a growth path (Chart 1). Moreover, even the integrated firms did not use the protection granted in the 1970s and 1980s to adopt new technologies or facilitate capacity reduction, rather to a large extent rents were reflected in higher wages (Tornell 1997). This implies that the main purpose of import protection was maintaining incomes, as opposed to easing adjustment.

## ***VI. Conclusion***

We augment the Grossman-Helpman model of lobbying for protection with assumptions borrowed from behavioral economics. The G-H model is attractive because it provides micro-foundations for the abundance of lobbying and protection observed in the United States and other countries. But, by employing a standard utility function, the model cannot explain why protection should be so concentrated among declining industries. This is an area where loss aversion plays an important role, as industries are noticeably more vocal when profits fall than when they rise. We find that incorporating loss aversion and reference dependence into the lobby's utility function helps explain the structure and the dynamics of protection.

Of particular interest, the model produces an intermediate range of world prices for which a price decline leads to an offsetting increase in protection. We show that this region of compensating protection is increasing in the extent of loss aversion experienced by agents. This result provides intuition for why so many of the instruments of contingent protection that have been employed around the world, such as price floors and import quantity restrictions, focus on maintaining prices at a given level. A detailed analysis of the U.S. steel industry shows that protection has been largely driven by the desire to minimize losses and used to maintain incomes.

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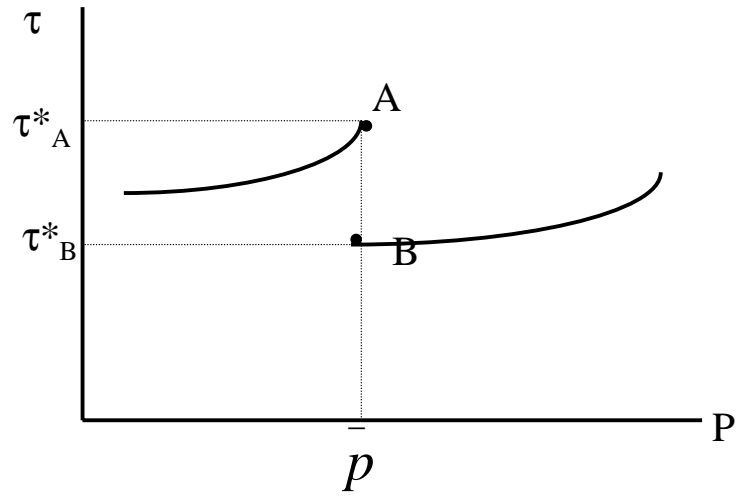
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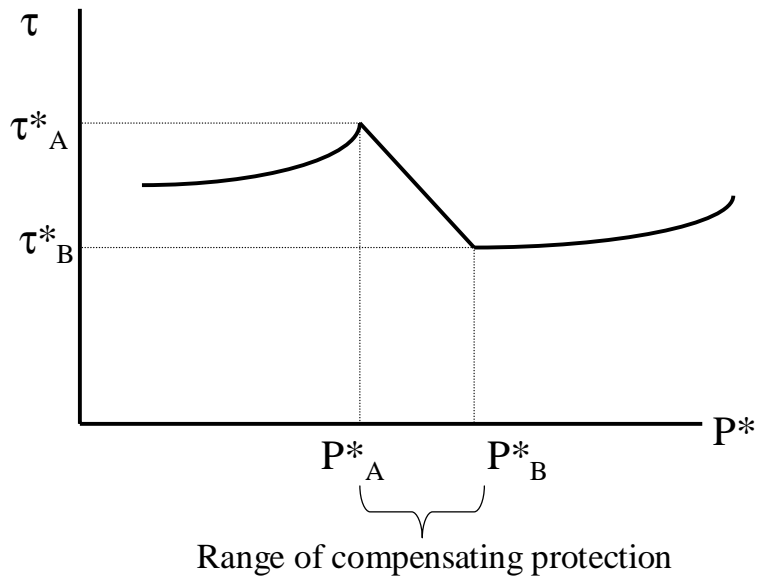
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**Figure 1: Trade Policy and Domestic Price Level**



**Figure 2: Trade Policy and World Prices**



**Table 1: A Brief History of Protection of the U.S. Steel Industry**

<b>Period</b>	<b>Type of Protection</b>
1969-1974	Voluntary restraint agreements (VRA) with Japan and the European Community (EC).
1977	Trigger Price Mechanism instituted, applying to all imports. This mechanism established a minimum price which was based on Japanese costs plus an 8 percent profit margin.
1982	61 countervailing duty petitions and 33 antidumping petitions filed against the EC.
1982-1986	A new VRA with the EC was instituted.
1984	Antidumping and countervailing duty petitions filed against non-EC countries. Escape clause petition filed. Congressional Steel Caucus proposes legislation imposing an across the board 15 % quota on steel.
1984-1989	New VRAs with all major exporters negotiated.
1989-1992	VRAs extended.
1992	Close to 70 antidumping and countervailing duty petitions filed. ITC rules favorably on about half of them.
1998-2001	Over 100 antidumping and countervailing duty petitions filed against various countries. Nearly all successful.
1998	VRA's negotiated with Russia and Brazil for hot-rolled steel. Tariffs of 18-67 percent on Japanese imports.
2002	President implements tariffs on steel imports under Section 201, including 30% tariffs on all flat-rolled products. Tariffs will last for three years.

**Table 2: Costs per ton of Producing Cold-rolled Steel (\$U.S.), 2001**

	Operating costs <sup>a</sup>	MH/tonne <sup>b</sup>	Employment cost/hour
United States (minimill)	317	1.2	38.00
United States	450	4.1	38.00
Japan	398	4.0	36.00
Germany	392	4.0	34.00
United Kingdom	371	4.1	27.60
France	385	4.2	31.50
Canada	422	4.5	26.00
Australia	322	4.9	20.75
South Korea	308	4.8	13.00
Taiwan	336	5.0	17.00
Brazil	295	5.4	10.50
Mexico	335	7.6	10.00
Russia	270	15.9	1.45
China	297	20.8	1.25
Average excluding U.S. minimills	352.38	6.87	20.54

Source: World Steel Dynamics.

Reference plant comparisons do not reflect differences in product quality.

Note: Reference plant cost figures in a number of cases are well above the costs for the lowest cost units in that particular country.

**Table 3: Profits and Capacity Utilization of the U.S. Steel Industry**

Year	Steel		Integrated		Minimills	
	Profit Rate*	Capacity Utilization	Profit Rate*	Capacity Utilization	Profit Rate*	Capacity Utilization
1985	-1.7	66	-2.9	68	3.1	64
1986	0.2	64	-1.2	64	5.1	65
1987	5.3	80	4.5	84	7.9	74
1988	8.7	89	8.1	96	9.6	79
1989	7.1	85	6.5	90	7.5	76
1990	4.8	85	2.9	88	7.1	80
1991	-0.3	74	-4.6	78	4.2	68
1992	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1993	3.4	86	1.8	87	6.6	85
1994	8.2	90	9.3	90	6.0	89

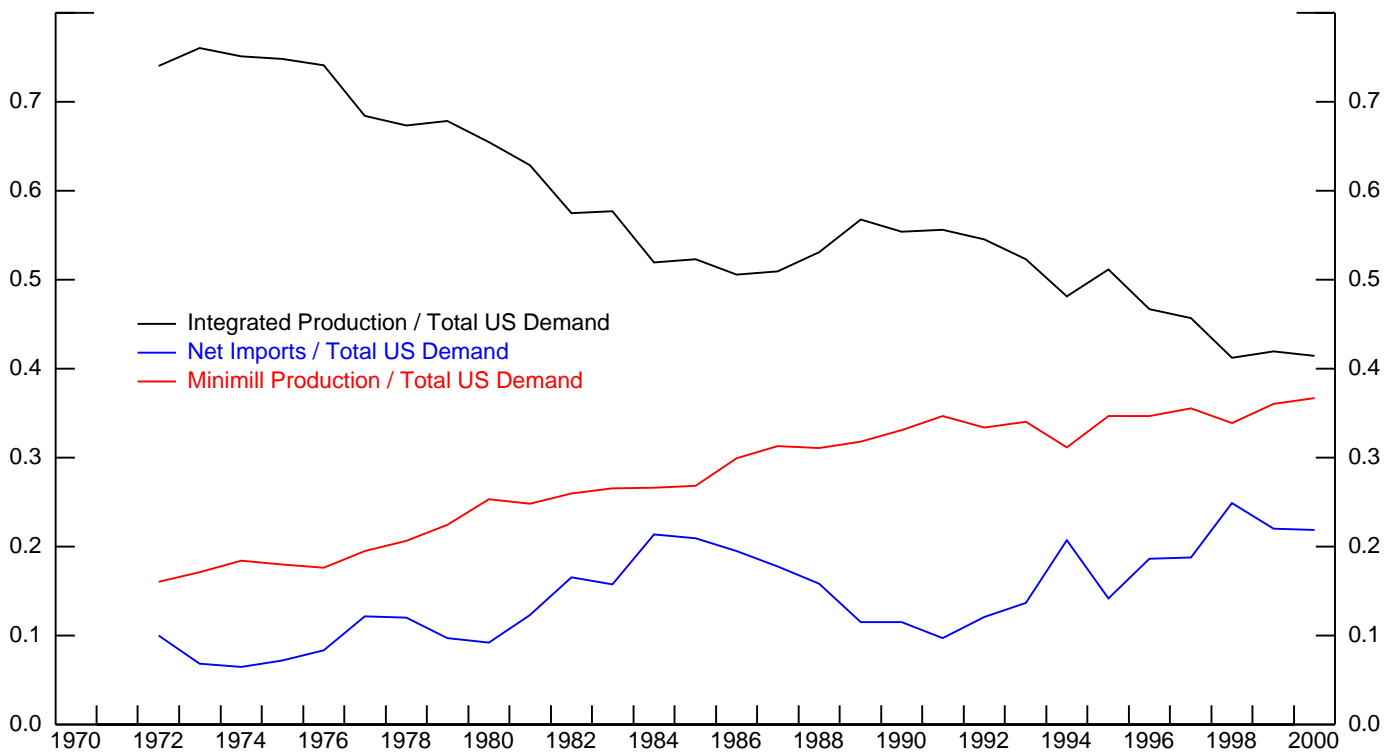
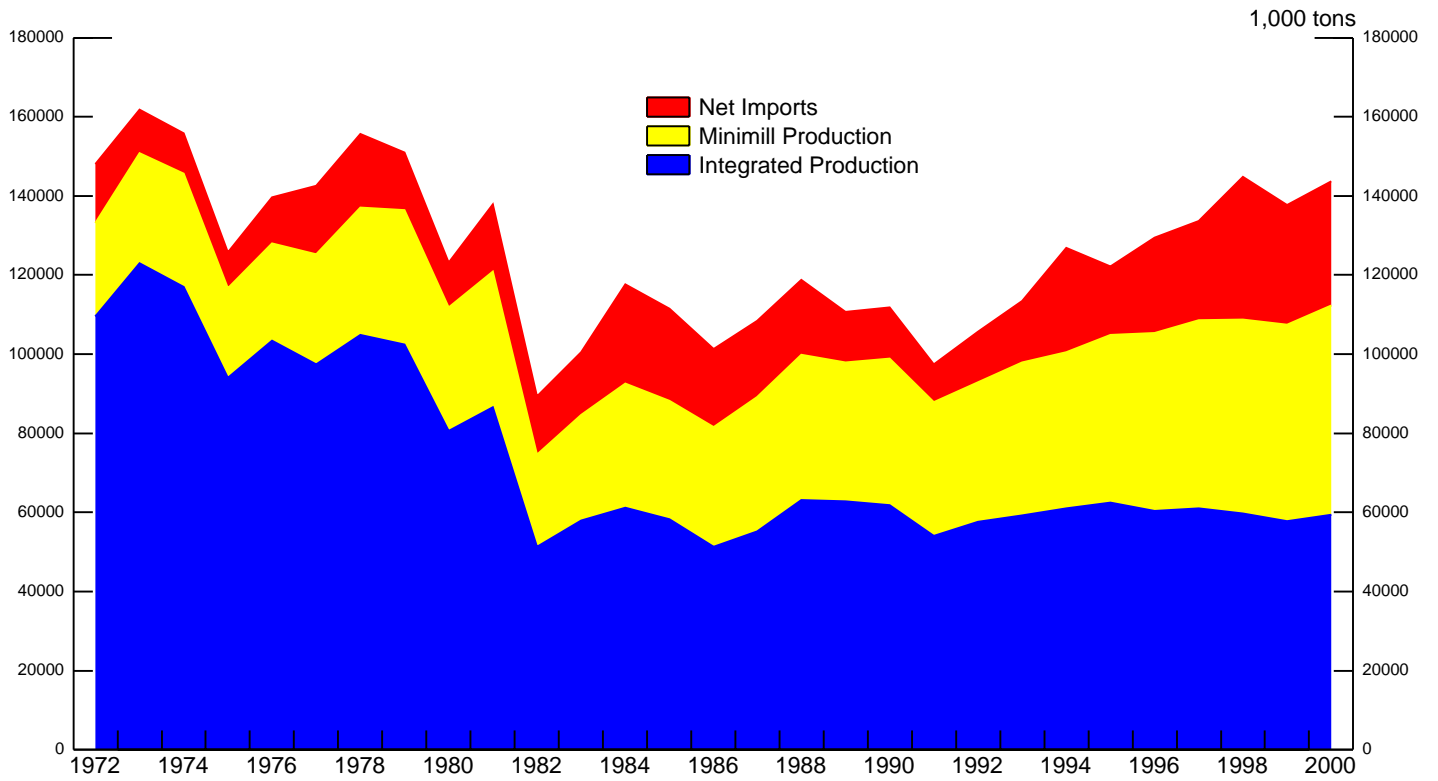
Source: USITC Semiannual Steel Reports, various years. These reports end in 1994.

\* Defined as operating income relative to total net sales, operating income is gross profit inclusive of administrative and selling costs, not including interest income.

n.a. not available.

Chart 1

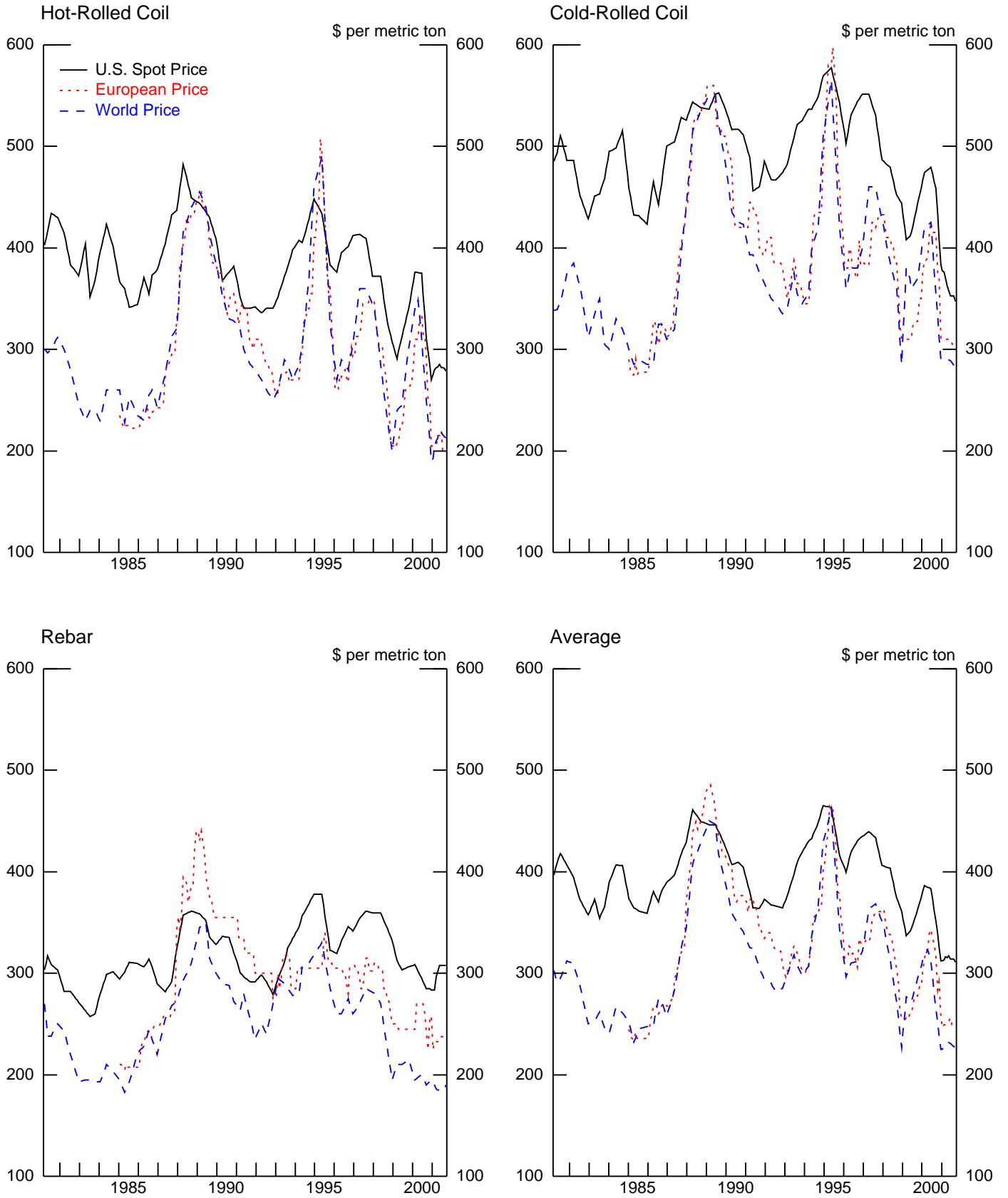
### Composition of U.S. Demand for Steel



Source: American Iron & Steel Institute, Annual Reports

Chart 2

### Prices, Various Products



Source: U.S. prices & world prices from World Steel Dynamics  
European prices from Goldman Sachs

Chart 3

### U.S. Spot Price / Foreign Price, Various Products

