Protection as Targeting: Why Governments Protect Declining Industries

ABSTRACT

A key question for trade policy is why governments so often protect declining industries. The argument presented here is that governments protect declining industries in order to target benefits to particular places. Protection raises the domestic price of a good, increasing output and employment. In expanding industries, in which firms operate near full capacity, additional output will be supplied by new firms, whose location is uncertain. Declining industries, by contrast, have unused capacity that can be used to expand output at existing firms, whose location is determined ex ante. Thus decline enables governments to target benefits effectively and governments are biased towards protecting declining industries. Further, the declining industries that offer the greatest potential for increasing local employment will be the most likely to gain protection. This prediction is confirmed by data on trade barriers in the U.S., even when controlling for industry fixed effects and campaign contributions.

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I. **INTRODUCTION**

In late 2012, steel producer ArcelorMittal announced plans to close two blast furnaces at its steel plant in Florange, a town in Lorraine, the former steel-making heartland of France. Those furnaces had earlier been mothballed and their permanent closure would mean the loss of 629 jobs. The next day, Arnaud Montebourg, the Minister for Industrial Recovery, vented his frustration with ArcelorMittal and its CEO, Lakshmi Mittal in direct and scathing language. “We no longer want Mittal in France,” he said, “Mittal’s lies since 2006 are overwhelming…he’s never kept his word.”

The French government was ultimately unable to prevent the threatened closures, but the Minister’s comments typify the intense desire of many governments to sustain declining industries and to prevent or reverse job loss. Three factors stand out in the account of the Florange episode that are standard in such attempts. First, the number of jobs involved, at 629, was small compared to overall job losses in France each year or to the loss of manufacturing jobs in particular. Second, the desire to stem job losses in declining industries is present across the partisan divide. Third, and among the industries that experience decline, certain sectors, like steel and autos, are perennial targets for assistance. This manuscript aims to explain the general phenomenon looking at support to declining industries through trade protection. Why, in other words, do governments of all partisan stripes routinely protect declining industries, despite the relatively limited number of jobs involved, and why do certain industries win out?

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2 Davis and Haltiwanger (1999) cite two studies for France finding a net job loss of 0.8 percent for French manufacturing from 1985-1991. With French manufacturing employment at approximately 2.9 million in 2011, the loss of 629 jobs at Florange was a very small part of the total.
3 Hollande’s counterpart on the right, Nicolas Sarkozy, had considered temporary nationalization of another ArcelorMittal facility in the town of Gandrange, in 2008.
The literature relating protection to decline is extensive and generally identifies decline as the loss of plants, workers or capital, often in response to a falling world price for the good produced by that industry. Independent of the particular definition, industries that would be categorized as “declining” feature prominently in the list of protected industries. Lee and Swagel (1997) write that “even after accounting for industry- and country-specific effects, nations tend to protect industries that are weak, in decline, politically important, or threatened by import competition,” (Lee and Swagel, 1997, 372). These findings support those from earlier empirical analysis, in individual country cases and cross-nationally (see Marvel and Ray (1983); Ray and Marvel (1984); Ray (1991)). Indeed, scholars have coined a term for this empirical regularity – the “losers’ paradox” (Baldwin and Robert-Nicoud (2007)). The paradox is so named because, by definition, domestic production is falling in the “losing” or declining industries that are protected – the industry is shedding firms, workers and capital. As such, protection is provided just as the ratio of consumer costs (in the form of higher prices) to benefits to those producing the good gets worse. Moreover, and as reviews of the literature highlight, protection of any type is a relatively inefficient way to compensate the losers from international competition (Rodrik (1995); Alt et al. (1996)). Thus, and in protecting declining industries, policymakers are generating unnecessary welfare costs and focusing on sectors in which the net welfare costs of their policy are worsening over time.

Why might politicians redistribute in this way? A classic literature on the political support function (Hillman (1982)), argues that policy-makers compensate workers for lost employment and wages in import-competing industries. These authors, however, cannot explain why policy-makers would use the relatively inefficient
mechanism of trade protection to do so (see also Corden (1974)). The existence of alternative policies that support worker adjustment and retraining, including broad unemployment insurance, suggests that the policy choice is explained by more than altruism or insurance motives. We must also explain, in other words, why governments would use protection as the means by which to compensate affected workers.

The mechanism proposed here departs from this line of scholarship and from contemporary models of endogenous protection (Grossman and Helpman, 2004), in its focus on the electoral incentives to protect, separate from the role of contributions by special interest groups. These incentives derive from the desire of political parties to reinforce the partisan loyalties of government districts or, in other cases, to woo independent voters in districts they could potentially win. The relevance of these incentives is that they encourage policymakers to target benefits to particular places.

Given the focus on geographic targeting, the theoretical framework, described in greater detail in a theoretical appendix, is a model in which two parties compete in multiple electoral districts. The model thus conforms to features of a majoritarian political system. It could also, however, apply in PR systems if parties compete in multiple districts and draw support unevenly across those districts. The formal derivation is shown for two, underlying models of electoral competition, from Persson and Tabellini (1999) and Grossman and Helpman (2005). In either model, a government policymaker prioritizes the welfare of certain districts, and uses trade policy to ensure that benefits flow disproportionately to those districts.4

4 The reference to the two models helps to clarify that results are not dependent on a particular depiction of the legislative or electoral process and allows the discussion to focus on core intuitions separate from particular modeling choices.
The innovation of the paper is to highlight the challenges that legislators face in directing benefits to particular districts and the role played by fixed capital in enabling policymakers to do so via trade protection. The core argument is that decline allows policymakers to target the benefits of protection to a subset of favored districts because it fixes the location of the additional jobs and output that flow from that protection.

Workers are assumed to gain from protection because they possess “fixed factors” that are used in producing the protected good and which enable them to capture economic rents. For individual workers, who rarely derive a large share of income from capital, fixed factors include firm-specific or sector-specific skills, often learned on the job. A skilled steel-worker, for instance, could reasonably expect to earn higher wages, or “rents,” in a steel firm than he or she would garner in alternative employment. Workers will not be able to earn these rents unless they can apply their skills in combination with fixed capital (eg: at a steel plant). In the absence of local firms, and fixed capital, trade protection will not provide local benefits to workers.\(^5\) Thus, the geographic incidence of benefits depends on the location of firms.

When policy-makers protect an industry they raise the domestic price of the good (or goods) it produces. This price increase, in turn, can trigger the entry of new firms into the industry. As those firms enter, the benefits of protection (in terms of new jobs and higher wages) will be created at locations that are unknown, or uncertain, \textit{ex ante}. Policy-makers will not be able to predict precisely where these benefits will accrue. Because of the uncertain location, trade policy is far less valuable as a way to target benefits when it is used to benefit industries in which new firms are likely to enter as

\(^5\) Individual workers could recapture rents if they gained employment at a firm in a different district, but this would not create direct benefits for the district (I do not consider remittances).
prices rise. By contrast, declining industries offer more efficient targeting. Because the industry is in decline, many firms will have excess capacity. If offered protection, these firms will be able to expand output and employment in place with little chance that benefits will be diffused across newly entering firms. Thus, and while the protection of declining industries might appear inefficient from a welfare perspective, it offers a surprisingly efficient mechanism for geographic targeting.\(^6\)

In order to link decline, conceptually, to this targeting, we must integrate industry dynamics, via firm entry and exit, into an existing model of trade policy. The analysis that follows incorporate firm entry and exit into the two baseline models from Persson and Tabellini (1999) and Grossman and Helpman (2005). Based on this extension to standard models, I explain how entry and exit produce a bias towards declining industries so long as policy-makers wish to target benefits to any subset of districts, offering a resolution to the “losers’ paradox” described above.

The remainder of the paper proceeds as follows. After additional review of the literature on protection to declining industries in Section II, I present the core intuition of the model, focusing on the role of firm entry and exit, and describing the main arguments graphically. I isolate three propositions that follow from firm entry and exit and which structure our predictions on protection and declining industries. In Section III, I test the predictions that flow from those results using data on trade barriers for the US and describe the results of the modeling exercise. Section IV considers the wider implications of the analysis.

\(^6\) Thus the argument relies on an asymmetry in information, as in Krueger (1990) and Fernandez and Rodrik (1991) but relates the informational asymmetry to location.
II. MODELING PROTECTION WITH MULTIPLE DISTRICTS

A. Literature

The pre-eminent, recent contribution to the literature on the political economy of trade policy is the “Protection for Sale” (or PFS) model, due to Grossman and Helpman (1994). This model explains protection across industries as a function of the contributions that industry lobbies offer, if an industry is organized. The optimal tariff level, by industry, equalizes the marginal costs to welfare against the benefits of campaign contributions to the policy-maker. Among industries that organize, tariffs should go to industries with lower imports and higher domestic output, so that benefits to domestic firms and workers, and thus campaign contributions, are larger compared to the welfare costs. Thus the PFS model, on its face, suggests that protection should not go to the declining industries for which domestic output is shrinking.

Empirical testing (by Gawande and Bandyopadhyay (2000) and Goldberg and Maggi (1999)) has confirmed the core predictions of the model for organized industries (where the level of contributions is used to categorize industries as organized or not). That analysis, however, has also generated results that are not easily explained within the model. First, and while protection for industries that do not lobby should be negative, with import subsidies or export taxes (see Grossman and Helpman (1994, p. 842)) there is no industry for which such negative protection is observed. Indeed, there is no significant difference in the coverage of non-tariff barriers across industries that are categorized as organized and those that are not in the data analyzed by Gawande and

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7 This review cannot do justice to a large and important literature on endogenous protection. Readers are directed to the review by Gawande and Krishna (2003).
Bandyopadhyay.\textsuperscript{8} Those findings show that industries can do well in the quest for protection, even when they are far less active in supplying campaign funds.\textsuperscript{9} Moreover, and among industries that are \textit{not} classified as organized, the incidence of trade barriers is found to rise with import penetration, meaning that higher protection is awarded just where the welfare costs are highest.

Theoretical work on the “losers’ paradox” has developed explanations for protection to declining industries that are close to the Protection for Sale framework. Baldwin and Robert-Nicoud (2007) present a model in which only “losing” industries lobby. Expanding industries (those characterized by a high or rising price) do not lobby because the gains from protection are dissipated by the arrival of new entrants, which reduces the domestic price. Thus, politicians favor losing industries because only these industries make contributions.\textsuperscript{10} Along related lines, Acemoglu and Robinson (2001) model “inefficient redistribution” as a dynamic process in which groups that are currently powerful put in place long-lived assistance programs to group members (eg: farmers) in order to maintain the strength of their group even as world prices fall.

Each of these accounts, however, faces empirical or theoretical challenges. While the consideration of dynamics in the work by Acemoglu and Robinson (2001) would help to explain why industries that currently look weak have secured favorable treatment, protection to declining industries often begins precisely when they start to shed workers.

\textsuperscript{8} A difference of means test showed no difference in coverage in the replication data that is generously available from Kishore Gawande.
\textsuperscript{9} See also Ludema et al (2010), who find that verbal opposition from import-competing firms reduces the likelihood of tariff suspension, even when the firms involved do not spend funds on formal lobbying.
\textsuperscript{10} For a related analysis, see Cassing et al (1986). Magee et al (1989) also relate decline to lobbying in their discussion of the “compensation effect” and connect additional lobbying to the reduced opportunity costs of this activity given lower returns to fixed factors in the declining sector.
or market share. While declining industries might also invest more resources in lobbying (Brainard and Verdier (1994, 1997)), analysis of campaign contributions by political action committees (PAC’s) in the U.S., described in more detail in Section III, indicates that industry contributions fall as output goes down, so that decline is associated with lower contributions from an industry. Thus the empirical findings described in the introduction do not sit easily with a theory that relies on industry lobbying for its motivation. I turn next to the exposition of a mechanism that is based on electoral incentives and considers the role of firm entry and exit in determining how and when policymakers can target benefits to particular districts.

B. Entry, Exit and the Gains from Protection

Either of the two baseline models used in the analysis starts with an expression of the relationship between domestic prices and protection. In brief, protection raises the domestic price of the protected good, $p_g$. More specifically, the domestic price, $p_g$, deviates from the international price, $p^*$ (which is assumed exogenous) through the effect of the trade policy instrument for good $g$, or $t_g$, so that $p_g = p^* + t_g$.

The second component of the baseline model is the description of how fixed factors are distributed across electoral districts. These districts are assumed identical in consumption patterns but differ in the shares they hold of the fixed factors. The share

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11 Caves et al (2002), for instance, report that steel has been a major beneficiary of protection since 1969, following substantial increases in import competition.

12 This relationship between protection and the domestic price is most consistent with the use of a tariff or export subsidy (for positive $t_g$), and import-subsidy or export tax (for negative $t_g$). Even non-tariff barriers, however, are expected to raise the domestic price, usually by restricting competition from low-cost substitutes, with recent empirical work estimating the ad valorem tariff equivalent of non-tariff barriers (see, for example, Carrère and de Melo (2011); Kee, Nicita and Olarreaga (2009)). As such, and while the discussion below will often refer to tariffs, the price assumption is assumed to apply for all trade policy instruments.
owned by residents of any district $j$ of the fixed factor involved in production of good $g$ is given by $\alpha_{j,g}$ and there are three districts. Across districts, the factor shares add to one for any good, $g$, and the districts are identical in their overall level of factor “wealth”, so that across goods, the shares for any district add up to one.\textsuperscript{13} The model is generalizable to any $n$ number of districts that is finite and odd. The districts in which production of a good is concentrated have an allocation of fixed factor $g$ that is above the average (or the expected factor share for each district), so that $\alpha_{j,g} > \frac{1}{3}$ and $\{\alpha_{j,g} - \frac{1}{3}\} > 0$.

With multiple districts, policymakers will supply protection under certain conditions depending on $\alpha_{j,g}$. The decision to protect will depend on the electoral importance of the district and the choice of good to protect will depend on the factor shares, $\alpha_{j,g}$. In the Grossman and Helpman (2005) model, the majority party seeks to maximize welfare in those districts that voted for the government (so long as there is at least one minority district) and disregards the welfare of citizens elsewhere. To do this, the incumbent party protects industries that are over-represented in government districts because the local benefits to producers, given returns to fixed factors, exceed the local welfare costs. Industries that are over-represented in government districts receive tariffs or export subsidies (while industries that are under-represented can face import subsidies or export taxes).

In the Persson and Tabellini (1999) model, districts are differentiated by their ideological affinity for one of the two parties. Given the underlying heterogeneity of preferences across districts, electoral victory is assured to whichever party can win the swing district or districts by offering the highest policy and material inducements to

\textsuperscript{13} In other words, and if a district has an overweight in one factor, it should have an underweight in another.
voters in those districts. In the version of the model presented in the online appendix, I assume that it is illegal (and impossible) for parties to offer direct cash transfers. Given the barriers to payments, parties use trade policy in order to generate benefits in the swing districts that contain large percentages of centrist voters. Both parties will offer protection to industries in these districts, if those industries are sufficiently concentrated, because (once again) local benefits in terms of returns to fixed factors exceed the local welfare costs of consumption foregone. In this instance, protection for the industry producing good $g$ will rise as $\left( \alpha_{2g} - \frac{1}{3} \right)$ grows (where district 2 is the swing district) because the industry is particularly concentrated in the district and trade protection will generate greater gains for local producers.

These baseline models reflect different motivations for policymakers: simple loyalty of a “citizen candidate” type in Grossman and Helpman (2005) and pure office-seeking in Persson and Tabellini (1999). Given the different mechanisms at work, the implications for patterns of inter-industry protection differ across the two models. Under Grossman and Helpman (2005), the favored industries will vary according to which party is in power and where their voters are grouped. Trade policy will be volatile, shifting with incumbency. By contrast, the Persson and Tebellini (1999) model suggests that trade policy will be very consistent, with both parties favoring the same set of districts and industries. What is general to both models, though, is that policymakers prioritize the welfare of a subset of electoral districts. As a result, and in both models, over-representation of industries in relevant districts, indicated by $\left\{ \alpha_{jg} - \frac{1}{3} \right\} > 0$, the share of the fixed factor relative to the average for all districts, motivates higher protection.
The shares of fixed factors, $\alpha_{j,g}$, depend on the presence of fixed capital which in turn is related to firm entry and exit.\textsuperscript{14} It is therefore important to understand how firms decide to invest in fixed capital (for entry) or close (for exit). This topic has been extensively treated in a literature on investment under uncertainty, with the most comprehensive analysis due to Dixit and Pindyck (1994). Dixit and Pindyck consider the value of investing in fixed capital or waiting when the path of future prices is uncertain. The value of waiting is that information is updated; owners hold an option to invest and can decide on the best strategy after learning the next period’s price. The actual decision to invest will depend on the value of retaining this option compared to the expected stream of revenues when and if the option is exercised. The solution to the firm’s decision problem is a trigger price, denoted $P^H$ (H is for “high”) at which any firm will exercise the option and invest. There is an analogous lower price, $P^L$, at which firms decide to exit, closing existing plants.\textsuperscript{15}

Entry and exit affect optimal trade policy by changing the location of fixed factors, $\alpha_{j,g}$. Entry, in turn, depends on whether domestic prices (including the trade policy instrument $t_g$) exceed $P^H$. When the prevailing domestic price (including tariffs), $p_g$ is below $P^H$, good $g$ will be produced at existing plants; beyond the trigger price, $P^H$, additional production will be supplied by new firms.\textsuperscript{16} To see how incentives for protection change when the domestic price exceeds $P^H$, I examine the benefits of production at existing firms and at new firms. I do so first under the assumption that new

\textsuperscript{14} I assume that fixed factors decay rapidly when and if fixed capital exits.

\textsuperscript{15} The model was initially developed assuming a single firm, but the fuller treatment by Dixit and Pindyck (1994) shows the same behavior in a competitive industry.

\textsuperscript{16} The cost advantage of new firms, for whom average total cost falls with output, suggests that they are dominant in additional supply and may displace existing firms. I assume that the marginal cost curve is upward sloping for individual firms so that they cannot produce all the additional output that occurs with an increase in $p^*$. 
firm entry into any district is random, so that the chance of a new firm entering a district is equal to $\frac{1}{3}$. Next, I consider how the predictions change when entry is correlated with the existing allocation of fixed factors, $\alpha_{j,g}$.

**Proposition One: For new firms, the optimal level of protection is generally zero.**

The proof of this proposition is relatively simple and is not formally derived in the online appendix. For new firms, the expectation of entry into each of any of the three districts is one-third. This is because, under random entry, and of the three districts has an equal chance of a new firm locating within its borders. Uncertainty over the location of new entrants affects tariff-setting in predictable ways. With random entry, the expected over-representation by new firms in any district is given by $\left(E(\alpha_{j,g}) - \frac{1}{3}\right) = 0$.\(^{17}\) In other words, and because new firms are not, ex ante, concentrated in any one district there is no benefit from protecting them. They cannot be expected to favor either incumbent or swing districts and, as such, protecting new firms offers no benefit in either the Grossman-Helpman or the Persson-Tabellini model. Rather, and because new firms are assumed equally distributed among districts, the expected producer gains from protection are always outweighed by consumer losses. For new firms, then, the optimal level of protection is zero.

Because the expected benefit of protection to newly entering firms is zero, the policy-maker has no incentive to set a trade policy instrument, $t_g$, that raises the domestic price $p_g$ above the trigger price for entry, $P^H$. It is not that politicians dislike new firms or

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\(^{17}\) Existing firms might seek higher tariffs in return for commitments to expand production capacity at existing sites, but such commitments are not credible until investments are sunk.
consciously discriminate against them. Rather, protecting new firms offers no political benefit while generating deadweight loss. This sets a “no-entry” constraint on the optimal tariff the policymaker will set, in that \( t_g \) will not rise above the level that would bring in new firms, so that \( (p^* + t_g) \leq P^H \).

An important consideration is whether the constraint holds when location decisions across firms in the same industry are correlated, rather than random. If the location of new firms can be predicted relatively well, and if new firms cluster around existing industrial concentrations, then new firms can also serve to target benefits. The degree to which this holds is an empirical question. In a recent literature, Ellison and Glaeser (1997) operationalize a measure, \( \gamma \) (or gamma), of firm co-location probability, indicating the additional likelihood (over random entry) of seeing a firm from industry \( x \) in a given area if other firms are present.\(^{18}\)

The \( \gamma \) measure of firm co-location affects the expectations that policymakers could hold about the location of new firms that would enter the industry if domestic prices rise above \( P^H \). Estimates of \( \gamma \), from Ellison and Glaeser’s 1994 working paper indicate that the probability of co-location is rarely large. The mean level of \( \gamma \), for manufacturing industries as a whole is 0.051, the median is 0.026 and for industries at the 75\(^{th} \) percentile it is 0.059. At the median, therefore, the expected fixed factor share in any district for new firms, \( E(\alpha_{j,g}^{new}) \) is equal to \( \left(\frac{1}{3} + 0.026 \times (\alpha_{j,g} - \frac{1}{3})\right) \). At these levels, the expected share of fixed factors for new firms will not deviate far from one-third (its

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\(^{18}\) The co-location probability, \( \gamma \), stems from the comparative advantage of the location or from spillovers from firm agglomeration. See Ellison and Glaeser (1994) p. 13.
level under random entry) even when the concentration of an industry in a district, given by \( \{ \alpha_{f,g} - \frac{1}{3} \} \), is large and an industry is strongly clustered.\(^{19}\)

The upper trigger price, \( P^H \), is still likely to function as a meaningful constraint, in other words, because the probability of co-location is rarely high enough to make protection for new firms valuable. Further, and even when \( \gamma \) is sufficient to justify protection, the optimal tariff for newly entering firms will always be lower than that for existing firms so long as \( \gamma < 1 \). This follows because, so long as \( \gamma \) is less than one, the clustering of new firms at existing locations will be less than the clustering of existing facilities. There will be some regression towards the mean. As such, and even when policy-makers would choose to protect existing firms, based on the over-concentration of the industry in a given district, the benefits of protection to new firms will be less than the benefits of protecting currently producing firms. Because, and given empirical estimates of \( \gamma \), the optimal level of protection for new firm is likely to be far below the level for existing firms, there is a discontinuity in the optimal \( t_g \) that policymakers will set at \( P^H \). In most cases, the trade policy instrument, \( t_g \), that policymakers would want to set at \( P^H \), and which applies to new firms, is below the \( t_g \) that raises domestic prices sufficiently to bring in those new firms. As such, and for almost all industries, \( P^H \) is a stopping-point for policymakers, marking a level of tariff from which policymakers have no incentive to protect further. Thus, and even when the spatial distribution of newly entering firms is non-random, I treat \( P^H \) as a ceiling on the highest tariff that policymakers will want to set.

\(^{19}\) “Fur goods” is the most locally concentrated industry with a \( \gamma \) of 0.63 followed by wines and brandy at 0.48.
Proposition Two: Given the no-entry constraint on $t_g$, higher protection goes to declining industries that have experienced falling world prices.

Because policymakers do not, in general, gain from pushing domestic prices above $P^H$, they will set trade policy as a constrained optimization. They will decide on the optimal $t_g$, in other words, subject to the condition that the price for good $g$, inclusive of $t_g$, is less than or equal to $P^H$. The formal solution to a constrained optimization is given by the Kuhn-Tucker conditions but a more intuitive explanation is given in Figure 1. Given the constraint, the optimal tariff must satisfy the condition that $(p^* + t_g) \leq P^H$ so that, re-arranging, $t_g \leq P^H - p^*$. The tariff will never be so large that it pushes prices above $P^H$. Whenever the constraint “binds,” the policymaker will set a tariff determined by the upper price at entry and the world price, so that $t_g = P^H - p^*$. As the world price $p^*$ falls, the “room” for raising tariffs increases.

This constraint generates a bias in the industries that will receive larger tariffs. Declining industries, by definition, are those in which $p^*$ has fallen to the vicinity of $P^L$. Domestic prices have fallen so far that firms exit rather than entering.\(^{20}\) In the absence of the constraint, policymakers would have protected any and all industries that were over-represented in the districts they want to benefit. The limited attraction of protecting new firms, however, means that whenever the policymaker would have wanted to set a high level of protection, they are now constrained and actual, observed protection will depend on $p^*$. Declining industries loosen the constraint on the tariffs the policymaker will set because the world price for their goods, $p^*$, has already fallen. As such, the tariffs that are granted to declining industries should also be higher. Not all declining industries

\(^{20}\) By contrast, a growing industry attracts entrants so that $p^*$ must be close to $P^H$. 
would have been candidates for protection because they may not have been clustered in favored districts. However, and among the industries that would have been protected, the observed tariff, \( t_g \), will be higher for industries with falling \( p^* \). \(^{21}\)

Equally, downward shocks to price, \( p^* \), are associated with increases in tariffs. When the constraint is binding, the effect of a price decline is to allow a one-to-one increase in tariffs, since \( \frac{\partial t_g}{\partial p^*} = -1 \) (from differentiating \( t_g = P^H - p^* \), the term determining tariffs at the constraint, with respect to price). Thus, a fall in prices may trigger a nearly compensating rise in tariffs, the phenomenon modeled by Hillman (1982).

This discussion might imply that declining world prices will always trigger rising protection, with declining industries benefiting to the extent that they are clustered in districts to which the policymaker wishes to direct benefits. This prediction, however, ignores the considerable fixed costs associated with proposing and winning trade protection. From the point of view of Members of Congress, these fixed costs derive from the time required to provide supportive testimony for the relevant industry to the International Trade Commission (see Caddel, forthcoming, on the role of such testimony in decisions on Countervailing and Anti-dumping duty and Schiller (1995) and Wawro (2001) on the opportunity costs of Members’ time). From the point of view of the industries that petition for trade protection, the fixed costs attach to the legal and technical inputs required to submit a petition to the International Trade Commission, including the fees of expert witnesses to demonstrate dumping or trade subsidies (see

\(^{21}\) A downward secular trend in \( p^* \) will also raise the upper trigger price for an industry, as potential investors will await larger price increases before entering a hostile price environment. This further increases the potential for protection to declining industries.
Olson (2004)). Given these fixed costs, my expectation is not that protection will be observed whenever prices fall, but that protection will be forthcoming when prices fall and when the benefits supplied by protection are likely to be larger than the fixed costs of securing that legislation. Those benefits depend on the extent to which industries are clustered, but also on the magnitude of the tariffs that can be applied without triggering either exit or entry, the topic to which I turn next.

**Proposition Three:** Price declines are more likely to generate protection when industries are characterized by a greater range of prices, $P^L - P^H$, between firm entry and exit.

The distance between $P^L$ and $P^H$ is known as the “range of hysteresis.” It indicates the range of prices within which production takes place at existing firms. This range is driven by the costs of firm entry (and exit). It is larger where the sunk costs of entry are higher because the costs of a potential re-entry deter firms from leaving even when prices are low.

The bottom end of this range, $P^L$ is relevant for the policymaker because once prices reach $P^L$, firms start to close. As this happens, the fixed capital in firms that exit can no longer be used to channel benefits to local workers. Thus $P^L$ sets the lower bound of prices from which the policymaker can direct benefits to particular places with certainty using trade policy.\(^22\)

Equally, if the government imposes tariffs greater than the range $P^L$ to $P^H$, new firms will enter and some of the benefits of trade policy will accrue to newly entering firms, at unknown locations. Thus, it is only in the range $P^L$ to $P^H$ that trade policy

\(^{22}\) The policymaker could wait for prices to fall below $P^L$, and then set a higher $t_p$, but if they do so, the geographic incidence of fixed factors will again change, following a probabilistic process of firm closure, and this will mean that the geographic incidence of benefits is uncertain.
benefits can be directed to specific districts with certainty and this range of hysteresis determines the maximum tariff that can be used for geographic targeting. The advantage for industries that have a wide range $P^L$ to $P^H$ is that they offer the potential for targeting significant benefits to particular districts using the existing distribution of fixed capital. The larger the range, the greater the tariff, $t_g$, that can be set before new firms enter.

Other industries may also see dramatic declines in price. However, when they do, and if the range of hysteresis is small, then a large number of firms will exit the industry. Adjustment will take place at the “extensive margin”, via the closure of firms rather than through a reduction in capacity utilization at existing firms. Policymakers may wish to aid these firms, but the benefits that can be provided by protecting them are also small. A real-world example would be the shoe industry or apparel and the graphical depiction is show as industry Q in Figure Two. The highest feasible tariff that policymakers can set in this industry is $\bar{t}_Q$, which occurs when world prices fall to the point at which firms otherwise exit and brings domestic prices up to the point where new firms would be just about to enter. The problem for industry Q is that investment (and disinvestment) is so responsive to price that firms react to falling world prices by closing shop rather than, say, reducing employment by half. By the time an apparel (or shoe) factory has laid off even 25-50 workers it may also, if its owners are rational, have decided to close. Thus, the highest additional or marginal benefit that interested policymakers can generate in given districts, under the current spatial distribution of fixed capital, and using trade policy is just 25-30 workers per firm. Firms in this industry may plead for protection, and probably do, but will receive smaller tariffs than other
industries because the fixed capital they operate cannot be used as the launching pad for directing significant material benefits to particular districts.\textsuperscript{23}

Next, I consider the case of an industry, like chemicals or steel, with a large range of hysteresis $P^L$ to $P^H$, indicated in the bottom half of Figure Two as industry R and with a higher maximum feasible tariff, $\tilde{t}_R$. As with the case of the Arcelor Mittal steel plant at Florange, fixed capital in this industry does not exit and enter easily. Arcelor Mittal had mothballed its blast furnaces at the facility, but had not earlier sought to close them. The advantage of protection to this industry is that, as price falls, firms will individually decrease employment and output, to reduce variable costs, but will not exit easily.\textsuperscript{24} They are down, but not “out.” Depending on the amount by which $p^*$ has fallen, legislators can supply tariffs that are large enough to generate sizeable increases in local output and employment at existing firms, all without triggering entry or exit. For example, and in the Florange case, the government could “save” 629 jobs if it could supply sufficient incentives for Arcelor Mittal to retain the blast furnaces in operation. Although tiny in comparison to national shifts in employment, those 629 jobs would be of significant importance to the local economy and would have a meaningful effect on local welfare. Thus the mechanism outlined above in Proposition Two should be seen most clearly in industries with a large range $P^L - P^H$. Industry R, in other words, should be more likely to receive tariffs in response to declining world prices than industry Q. This is because industry R offers the potential for generating larger welfare increases, in

\textsuperscript{23} Industries with a low range of hysteresis, $P^L$ to $P^H$, might attempt to use the threat of bankruptcy or exit to attract tariffs. However, such threats are not fully credible because they are not costly and governments may be disinclined to provide tariff protection to industries in which firms are not viable.

\textsuperscript{24} These industries are also characterized by higher variance in their capital-labor ratio over time, as firms adjust variable factors, like labor, but retain fixed capital. Results available from author.
the form of additional output and employment, at locations that can be predicted with certainty from the existing location of fixed capital in the form of firms.

While policymakers are unlikely to know $P^H$ and $P^L$ in such precise terms, they possess shorthand and heuristic understandings of the mechanism set out above. What politicians need to, and can, know is that there is a factory in their district that has recently laid off 100 or more workers and could re-employ those workers again if prices rose to their earlier level. Protection to the goods supplied by that firm then creates 100 jobs with certainty. What firms with a large range of hysteresis, $P^L - P^H$, offer is captive capital that does not leave easily and can absorb a large number of additional workers when and if protection is applied.

The propositions set out above imply a set of testable hypotheses that are developed from the baseline models from Persson and Tabellini (1999) and Grossman and Helpman (2005). However, these hypotheses also take into account the role of firm entry and exit and the desire to policymakers to target benefits using existing fixed capital. Because decline increases the ability to target benefits, using protection, it is expected that we will see more protection as prices fall. Further, and because industries with a higher range of hysteresis offer the potential to generate large, local benefits, it is expected that we should be most likely to see protection in these industries when and if prices fall. These intuitions support the following hypotheses, which are tested in the subsequent section:

H1: Protection will rise as world prices fall and will be higher in declining industries that have seen falling prices.
H2: The effect of decline will be larger for industries characterized by a greater range of hysteresis from $P_L$ to $P_H$.

These hypotheses assume a political determination of trade policy. While that policy, at least in the U.S., is decided by agencies that are ostensibly neutral and independent, the literature on those agencies stresses that communications from Members of Congress can have a significant effect (see Caddel, forthcoming). While industries initiate requests for this form of duty, elected officials appear to influence the likelihood of success. Further, and while the work of the ITC is governed by law, the legal framework also embodies the preferences of elected policymakers to protect industries that can show meaningful “injury” and thus supply significant additional employment if they are protected. Although day-to-day policy decisions are delegated, in other words, the outcomes for protection are still decided within a political framework, so that hypotheses 1 and 2 are expected to apply to observed outcomes. This is the contention that is tested in the next section, examining whether the number of trade barriers awarded in any given year is greater for industries in decline and whether the marginal effect of decline is higher for industries with a larger range of hysteresis, $P_L$ to $P_H$.

III. Empirical Analysis

In this section, I test the hypotheses set out above for the U.S. case. This is a country setting that is consistent with the majoritarian features of the benchmark models, and where the phenomenon of protection to declining industries was first established. Even in this case, though, empirical testing of Hypotheses One and Two encounters
significant challenges. The first is to obtain data on protection by industry with sufficient
time variation to allow us to observe how trade policy responds to decline. Moreover, it
is important to use data on the non-tariff barriers (or NTB’s) that Bown and Crowley
(2012) describe as “the means through which industrialized countries have most
predominantly implemented new trade restrictions since the 1980’s” (see also
Bombardini (2008) on the use of NTB’s in empirical analysis). For these reasons, I use
the World Bank/Bown data set on Anti-Dumping (ADD) and Countervailing (CVD)
duties as the main source of data on the dependent variable and match duties to the 1987
classification of four-digit SIC industry codes.\textsuperscript{25} In that data, we observe 229 cases in
which an ADD was imposed and can be matched with a four-digit SIC industry code and
78 similar cases for CVD’s, with duties matched fairly reliably from 1982 on.\textsuperscript{26}

The second empirical challenge is to operationalize and measure the key
explanatory variables: decline and the range of hysteresis, P^L to P^H. Because of the large
number of products produced at any given facility within a four-digit SIC code, there is
no standard price measure listed in even the most detailed data set of industry conditions
(see for instance, the NBER/CES: Bartelsman, Becker, Gray Manufacturing Industry
database (Bartelsman, Becker and Gray (2000)).\textsuperscript{27} Thus, and rather than identify decline
from the time path of world prices, I turn to the quantity effects on inputs and output
noted in Section I. In particular, I measure decline in both employment and output. The
data source for both is Bartelsman, Becker and Gray (2000) where the real value of sales

\textsuperscript{25} The source for this data is the World Bank’s Temporary Trade Barriers Database which houses the data
compiled by Chad Bown. Trade barriers were assigned to SIC codes using Pierce and Schott (2009).
\textsuperscript{26} Each observation of an AD or CVD was then summed by SIC code and year to create a panel data set of
counts of duties per industry and year.
\textsuperscript{27} Available at \texttt{http://www.nber.org/nberces/}. Although the data set includes industry-specific price
deflators, these are estimated based on the cost of industry inputs.
is used as a proxy for output.\textsuperscript{28} The negative of the percentage growth rate in employment and output is used as the key measure of \textit{decline} and is lagged by one year in all estimations.\textsuperscript{29} The end point of the NBER/CES data, 2005, establishes the end date for the sample so that the model is estimated for the years 1982 to 2005.

The last empirical issue is how to measure the interval $P_L$ to $P_H$, the range of hysteresis. I focus specifically on measures of the sunk costs of firm entry. As Dixit and Pindyck (1994) stress, the greater the sunk costs, the more cautious firms will be about entry (and exit) resulting in a greater range $P_L$ to $P_H$. I measure sunk costs for each four digit SIC code using the approach developed by Sutton (1991, Chapter Four) who bases his estimates on the total fixed capital required for set-up of a minimally efficient firm.\textsuperscript{30} Sunkness is assumed to be proportional to set-up costs across industries, so that the measure of set-up costs provides a measure of sunk costs that preserves ordering across industries.\textsuperscript{31} I also generate a dummy variable for industries with high sunk costs of entry: $\textit{high\_sunk}$. This variable identifies all industries with set-up costs of more than $120 million in 1992 dollars for a plant of minimally efficient size and includes approximately eleven percent of 1992 four-digit SIC industries. Among the industries that are categorized as having a high level of sunk costs are iron and steel products, other primary metals, chemicals, autos, aircraft and household appliances.

\textsuperscript{28} There is no direct, volume measure of output. As such, employment is the most direct, quantitative measure of decline.
\textsuperscript{29} The lag is used to avoid reverse causation from trade barriers to economic changes and because duties are imposed (if at all) approximately one year following a request for a new investigation.
\textsuperscript{30} Data on fixed capital comes the NBER/CES firm productivity data set and data on firms and output by employment class and four-digit SIC code comes from the five-yearly Census of Manufacturers. Data from 1992 was used in this analysis.
\textsuperscript{31} In earlier work, Ghosal (2003) finds similar results using either this measure or estimates derived from data on resale value and rental equipment, as in Kessides (1990).
One of the key questions for analysis is whether this measure of sunkness captures the mechanism described above, so that industries with high sunk costs are less likely to see firm exit and more likely to have unused capacity when an industry declines. It is therefore reassuring that the capital-labor ratio is much more variable in industries with a high level of sunkness, implying that labor is far more variable than capital in these industries. Indeed, the coefficient of variation in the capital-labor ratio is three to four times larger in industries for which high_sunk is equal to one and this difference is significant at any level of probability.

Once defined, the dummy for high sunk costs is used to create an interaction term for the impact of decline in industries with a large range of prices P_L to P_H between firm exit and entry or decline*high_sunk. The use of a simple interaction term increases the clarity of results and ease of interpretation. However, and in order to show that the findings are not related to the particular values chosen for the dichotomization, I also present results from a model estimated using the interaction of decline and the continuous measure of sunkness.

Since the dependent variable (on temporary trade barriers) is panel count data, with a large number of observations of zero and over-dispersion of count data around the mean, the appropriate functional form is the negative binomial. In the negative binomial model, the number of duties imposed by industry and year, y_{it}, follows a Poisson process after conditioning on the explanatory variables x_{it}, and unobserved heterogeneity, δ_i (or the dispersion parameter indicating how counts are dispersed around the conditional mean).

The conditional mean count of duties imposed by industry and year is given by:

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32 The negative binomial model is thus a mixture of a Poisson and gamma functional form where the gamma function is used to model the dispersion of counts around the conditional mean.
$E(y_{it}|x_{it}) = \exp(x_{it}\beta)$ \quad and where

$$x_{it}\beta = \beta_0 + \beta_1 year + \beta_2 \text{decline} + \beta_3 \text{decline} \ast \text{high_sunk} + \beta_4 \text{high_sunk} + \epsilon$$

The model is estimated with fixed industry effects to capture unobserved, industry-specific factors that may contribute to winning protection.\textsuperscript{33} A trend term (year) is included to capture secular trends in trade policy. Since a decline of greater than zero means a fall in output or employment, positive estimates for $\beta_2$ and $\beta_3$ imply that protection rises as output and employment fall. Further, the total conditional effect of decline for industries that are characterized by high sunk costs (and a greater range $P_L$ to $P_H$) is equal to $\beta_2 + \beta_3$.

The results of estimating this model are presented in Table One. Because the total effect of decline for industries with high sunkness is often of interest, Table Two reports the total conditional effect $\beta_2 + \beta_3$ for different estimations, and its degree of significance. Finally, and because the conditional mean is exponential, the coefficients can be interpreted as semi-elasticities. For example, the coefficient of 4.87, on $\beta_3$ in Column I of Table One indicates that a fall of one percent in employment for the previous year and for industries with high sunk costs is associated with a 4.87 percent increase in the number of duties, over and above what would have been expected for that industry in general.

\textsuperscript{33} The fixed effects model is estimated using data on the 81 four-digit SIC industries for which over-time variation in trade barriers is observed. The results from a fully pooled estimation are different only in that the dummy variable for high entry costs is positive and significant.
The results reported in Table One are clear in their implications. The estimated effect of decline for most industries is small and insignificant. The effect of decline for industries with high sunk costs is neither, however, and the estimated effect of decline is significantly higher for those industries than for others.

How substantively important is the total conditional effect shown by $\hat{\beta}_2 + \hat{\beta}_3$ for industries with high sunk cost and a large range of hysteresis $P^L$ to $P^H$? For the baseline model, the total conditional effect is given in Column I of Table Two. Given the interpretation of coefficients as semi-elasticities, the results indicate that each one percent drop in employment is expected to raise the predicted number of temporary trade barriers by nearly five percent (or 4.76 percent) while each one percent fall in output is expected to increase barriers by 2.41 percent.\textsuperscript{34} For industries with high sunk costs, employment fell by just over three percent per year on average over the sample period, with a standard deviation of over eight percent. Thus, an eleven percent fall in employment, which would be approximately one standard deviation above the mean rate of decline, would increase the expected level of trade barriers by fifty-two percent. No other variable in the negative binomial model is significant and while the effect of sunkness on its own is positive, it cannot be estimated with any precision.

I turn next to a series of robustness checks. These checks confirm that the findings are not vulnerable to minor changes in model specification or sample data, but also address alternative explanations for the observed results. The first such check is to test whether the finding has general applicability or is driven by the inclusion of steel, as a heavily protected industry, in the sample. Columns III and IV of Table One show the

\textsuperscript{34} The total conditional effect for employment is calculated as $4.87 - 0.11 = 4.76$ and for output as $1.90 + 0.51 = 2.41$. 

26
baseline model estimated excluding all of the separate steel industries collected under SIC-3 code 331 (Blast Furnace and Steel Products). While the exclusion of the steel sector reduces the overall significance, the estimated effect of decline remains much greater for industries with high sunk costs and the total conditional effect of falling employment is also significant. The results suggest that the theory is generally applicable and does more than retrofit a theorized mechanism to the well-known case of steel.

The substantive results described above are not reliant on a particular dichotomization of the dummy variable for industries with high sunk costs, and are broadly similar when the baseline model is re-estimated using the continuous measure of sunkness interacted with *decline*. Just as with the dummy, the interaction term is always significant.\(^{35}\) Figures Three and Four show how the estimated semi-elasticity of trade barriers (given by \(\hat{\beta}_2 + \hat{\beta}_3\)) varies with the level of sunkness. The effect of decline only becomes significant once the level of sunk costs exceed $200 billion in 1992 dollars, while the marginal effect of decline in employment is always higher and more significant than is the analogous effect of decline in output. Because the line showing the estimated semi-elasticity is overlaid over a histogram of sunk costs across industries, it can be seen that the effect of decline (even in employment) is not relevant for most industries, but is significant for the seven percent of four digit SIC categories with the highest sunk costs, including chemicals, primary metals (including steel), and electronic and transport equipment.

Next, I assess whether the estimated results are due to a correlation between high sunk costs and geographic concentration, which raises the variance of the \(\alpha_{jg}\) shares of an industry in local employment and output. A higher variance of \(\alpha_{jg}\) in turn raises the

\(^{35}\) Results available from author.
likelihood of over-representation of an industry in at least one district, and increases the tariffs that policymakers would set in the unconstrained model described in Section II. To test this alternative explanation, I include a measure of expected geographic concentration, following Ellison and Glaeser (1994, 12), in the baseline model. Results are shown in Columns V and VI Table One. The results on decline interacted with sunk costs are unaltered, suggesting that they are not an artifact of the relationship between high sunk costs, average firm size, and geographic concentration.

A more serious objection is that the results are spurious, driven not by political incentives to target benefits to certain places, but by the ability of firms in some industries to surmount barriers to collective action that inhibit petitioning for ADD’s and CVD’s. Those barriers include the fixed costs to petitioning that are described by Olson (2004, p. 10). Petitioners must also show that they represent at least 25 percent of the affected industry (Jones, 2007). Because the benefits of ADD’s or CVD’s are general to the industry, while the costs are borne only by petitioning firms, free riding is a dominant strategy for many firms. Larger firms are considered more likely to petition because their greater level of output means that they internalize a larger part of the benefits of protection. Since a high level of sunk cost, however, is also associated with firm size, it is conceivable that the reported results reflect the factors that select firms into petitioning rather than the factors motivating policymakers to supply protection.

To take account of this alternative explanation, I control for the factors that have been theorized to affect petitioning behavior and have been found to affect observed protection. Bombardini (2008) argues that a mean-preserving spread in the distribution

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36 Expected geographic concentration is a function of firm concentration and γ, with data from both drawn from Ellison and Glaeser (1994). Results available from author.
of firms by size generates a higher number of large firms that are individually capable of mounting a petition. Thus, she uses the standard deviation of firm size within an industry as a measure of ability to overcome collective action problems and finds that the standard deviation of firm size is indeed significant in explaining the coverage of non-tariff barriers (and predicts a higher coverage ratio).  

Following the same method as Bombardini (2008), I measure the standard deviation of firm size for each industry using data from the Census of Manufactures for 1992 and I include this measure in the baseline model. In addition, and because industry contributions (through PAC’s) also indicate an industry’s ability to overcome the problem of collective action, I also control directly for total annual contributions by industry by year and three-digit SIC code. Results are reported in Table Three. The total conditional effect of declining employment for industries with high sunk costs is once again given in Table Two.

What Table Three and the reported results in Table Two confirm is that the results described earlier are not due to alternative explanations in which industries with higher sunk costs are also more likely to petition for trade barriers. The coefficient on the variable for firm size dispersion is positive and significant, as in Bombardini (2008), but the interaction term remains significant. Indeed, the estimated effects, for shocks to either employment or output are remarkably robust to the inclusion of the controls for an industry’s ability to undertake collective action, varying little in either size or

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37 Gawande and Magee (2013) use a similar approach, looking at the size of the largest firm in an industry.
38 Data on contributions by PAC are from James Snyder (original source is the Federal Elections Commission). For PAC’s connected to the manufacturing sector, assignment to three digit SIC code is done via matching to firm data on the Orbis database. This data is then used to generate data on total real contributions by industry per year.
significance, and the coefficient on campaign contributions is negative and insignificant.\footnote{Results were also robust to the inclusion of a measure of firm concentration by industry, based on a 50 firm Herfindahl index. Results available from author.}

These results suggest that the observed effect of sunkness, in interaction with decline, is not an instance of spurious correlation, driven by an association between sunkness, firm size and the likelihood that an industry will be able to mount a petition. We might still, however, be concerned that the high fixed costs of petitioning for ADD’s and CVD’s create the conditions for sample selection bias. Only the firms that foresee some possibility of success will mount a petition and, because the factors that drive that expectation are private, there is likely to be unobserved heterogeneity in the error term between firms in industries that petition and others.

Given this concern, I also estimate a model in which the dependent variable is the coverage ratio of non-tariff barriers other from ADD’s and CVD’s by SIC four-digit industry for three different years in the 1990’s (1993, 1995 and 1999).\footnote{While TRAINS data by HS line exists for other years, the data for those additional years is so similar to suggest that there is no time variation. Data from 1996 is excluded because of inconsistencies that suggest partial data coverage.} The original data source is UNCTAD’s TRAINS data set.\footnote{I thank Daniel Kono for this data.} These data are far less affected by sample selection issues because the costs of petitioning are lower for the main alternative to ADD’s and CVD’s (the Section 201 safeguard measures).\footnote{Petitioners under this section do not have to prove unfair trade practices, or connect injury to the actions of a given country, or show that they account for over 25 percent of the affected industry (Jones (2007)).} The $\hat{\beta}_2$ coefficient in this case indicates the predicted change in coverage for a given percent change in employment or output. Since protection should rise as conditions worsen the expected sign on the coefficients $\hat{\beta}_2$ and $\hat{\beta}_3$ is negative. The coefficient on the interaction term, $\hat{\beta}_3$, indicates the expected, additional effect of decline for industries with high sunk costs and
a higher range $P^L$ to $P^H$. Since the model is linear, and is estimated with fixed effects (and with dummy variables for 1995 and 1999) the main effect for high sunk costs, high sunk, cannot be separately estimated because it too is fixed over time.

Results are shown in Table Four and are substantively similar to those reported in Table One. Declines in employment and output have negligible and insignificant effects for most industries. For industries with high sunk costs, however, the estimated effect of employment and output on the coverage ratio is much larger and for employment the effect is significantly different. The total conditional effect of employment for industries with high sunk costs, as a proxy for the range $P^L$ to $P^H$, is also significant (at the five percent level). Each one percent drop in employment is expected to raise the coverage ratio for non-tariff measures, apart from ADD and CVD barriers, and in industries with high sunk costs, by just above 0.2 percent (with a mean coverage ratio of about 14 percent and a median of zero). The empirical results, in other words, do not seem to be an artifact of the particular provisions governing the administration of ADD’s and CVD’s and are also observed for trade remedies in which the entry costs of petitioning are relatively favorable to broad industry participation.

IV. CONCLUSIONS

The desire to target benefits to particular districts is one of the deep forces of majoritarian politics and the starting premise of the baseline models by Grossman and Helpman (2005) and Persson and Tabellini (1999). One contribution of the current work has been to point out that this targeting is hard. Legal prohibitions against vote buying
prevent the naked use of cash transfers. Instead, policymakers may turn to available policy instruments that contain the promise of relatively precise targeting. Even when individual policy decisions are delegated to agencies, such as the US’s International Trade Commission, the legal framework for those agencies assures that outcomes are consistent with the underlying, political equilibrium. Politicians work hard to generate benefits, and avert losses, in known places.

The question of why governments protect declining industries has not been convincingly answered within existing scholarship. The argument here is that, in turning to trade policy, it is not that legislators wish to benefit particular industries per se or to compensate workers for specific types of risk. Rather, and in an effort to direct benefits to districts, the use of trade policy is valuable when it can assure benefits in particular places. The existence of spare capacity in declining industries solves a key problem of geographic uncertainty and offers more precise targeting than comprehensive policies towards risk, including unemployment insurance. While the precise pattern of inter-industry protection that is seen will vary depending on the structure of political incentives, the tendency towards protecting declining industries is general and depends only on incentives to prioritize the welfare of some districts over others.

The theory set out above, however, also indicates the conditions under which this effect holds and explains why it is that protection in advanced, industrialized democracies is relatively rare and often focused on the same, small, sub-set of industries (Goldstein and Gulotty (2012)). It is in industries (like steel and autos) where the range of hysteresis is sufficiently large, and the additional employment that can be generated with existing

43 Bradford (2006) also models the response of trade policy to unemployment, but without motivating the use of trade policy over other instruments.
capital is sufficiently valuable, that we observe new trade barriers when current prices are low. Thus the theory explains why industries like steel win numerous trade barriers while the telephone apparatus industry (SIC 3661) – previously a major employer – lost over fifty percent of its workforce from 1988 to 2003 and received just one temporary trade barrier and footwear, as a whole, underwent wrenching contractions and received no AD or CVD duties whatsoever during the sample period.

Can the theory help us to explain other empirical findings related to trade protection? For instance, the observed, anti-cyclical tendency in trade policy, whereby protection rises as output and employment fall is consistent with the theory presented here since recession is also associated with industrial decline (Bown and Crowley, 2012, Bohara and Kaempfer, 1991, Ray, 1987, Hansen, 1990, O’Halloran, 1994). Second, the model sheds light on the observed bias against exporting industries in trade policy, especially given the documented association of exporting with employment growth (Bernard and Jensen (1999)). Governments support exporters, often through the tax system (Desai and Hines, 2000), but heavily protected exporting industries, including agriculture and shipbuilding, are associated with a fixedness of capital that pins down the location of additional employment – the exact mechanism highlighted here.

Considered more broadly, the analysis shows the leverage to be gained from integrating industry dynamics, via firm entry and exit, into political economy models.44 This approach would mean an integrated analysis of trade policy as just one of the tools by which legislators target benefits and would draw attention to the different policies that are used to encourage firm entry as well as to prevent exit. Southern legislators, for

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44 In related work, Magee et al (2005) consider the related effects of job creation and destruction, which differs by industry, on contributions to different types of PAC’s.
instance, used municipal bonds to lure textile firms and manufacturing jobs to their region in the fifties and sixties (Cobb (1993)). State and local governments award approximately $80 billion in tax incentives each year in order to recruit companies and therefore discriminate in favor of growing sectors.45 A theme of the analysis above is that policymakers do not think in terms of what they want to do with trade policy but how to remain elected. The bias in trade policy towards declining industries does not reflect an intrinsic bias towards those interests but, instead, a symbiosis between decline and trade policy in generating local benefits at existing firms.

The analysis here is a first step in exploring the interaction between industry dynamics, trade policy, and electoral incentives in producing protection for declining industries. Much remains to be done in order to clarify which districts policymakers will target under different electoral systems and thus what exact pattern of protection we should see when and if world prices decline. Nonetheless, this analysis marks a first step that enables us to understand why it is that governments ever reward decline and why certain kinds of declining industry frequently win protection. When and if we can go further in describing how firm entry and exit change the incentives to protect, we may be able to give a coherent account of trade policy across different polities, and to explain the remaining pressures for protection, even among wealthy democracies.

FIGURES

Figure One: World Prices and the Feasible Range for $t_g$

![Diagram of world prices and the feasible range for $t_g$.]

Figure Two: The Range of Hysteresis $P^L$-$P^H$ and Feasible Trade Policy

![Diagram illustrating the range of hysteresis $P^L$-$P^H$ and feasible trade policy.]

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Figure Three: The Effect of Sunk Costs on the Estimated Response of Trade Barriers to Declines in Employment

NB: Left-hand vertical axis shows magnitude of the semi-elasticity as sunk costs vary. Right-hand vertical axis shows percentage of four-digit SIC industry codes for each category of sunk costs.

Figure Four: The Effect of Sunk Costs on the Estimated Response of Trade Barriers to Declines in Output

NB: Left-hand vertical axis shows magnitude of the semi-elasticity as sunk costs vary. Right-hand vertical axis shows percentage of four-digit SIC industry codes for each category of sunk costs.
Table One: Negative Binomial Model for Count of ADD or CVD Duties Imposed by industry per year, 1982-2005

<table>
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<th>Explanatory Variables</th>
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<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
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<td></td>
<td>(0.89)</td>
<td></td>
</tr>
<tr>
<td>Output Decline t-1 * High Sunk</td>
<td>1.90</td>
<td></td>
<td>1.43</td>
<td></td>
<td>1.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.27)</td>
<td></td>
<td>(1.94)</td>
<td></td>
<td>(1.27)</td>
<td></td>
</tr>
<tr>
<td>High Sunk Costs</td>
<td>0.652</td>
<td></td>
<td>-0.59</td>
<td></td>
<td>-0.31</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td>(0.72)</td>
<td></td>
<td>(0.80)</td>
<td></td>
<td>(0.82)</td>
<td></td>
</tr>
<tr>
<td>Geographic Concentration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.40</td>
<td>-1.82</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(8.29)</td>
<td>(8.05)</td>
</tr>
<tr>
<td>N</td>
<td>1944</td>
<td>1944</td>
<td>1872</td>
<td>1872</td>
<td>1944</td>
<td>1944</td>
</tr>
<tr>
<td># Groups</td>
<td>81</td>
<td>81</td>
<td>78</td>
<td>78</td>
<td>81</td>
<td>81</td>
</tr>
<tr>
<td>Wald $\chi^2$</td>
<td>12.44**</td>
<td>9.01*</td>
<td>6.62</td>
<td>3.77</td>
<td>12.51**</td>
<td>9.13</td>
</tr>
</tbody>
</table>

NB: Standard errors are in parentheses. *** indicates that a coefficient is significant at the one percent level of confidence, ** that it is significant at the five percent level of confidence and * that it is significant at the ten percent level of confidence. The negative binomial model is estimated with fixed effects. Columns I and II show the baseline model estimated using declines in employment and output respectively. Columns III and IV present results from estimating the model on all industries except those under SIC 331 (Blast Furnace and Steel Products). Columns V and VI present results from a model that includes a control for expected geographic concentration.
### Table Two: Total Conditional Effect of Shock if in High Setup Cost Industry

<table>
<thead>
<tr>
<th>Shock Type</th>
<th>Employment</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Variant</td>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td></td>
<td>4.76***</td>
<td>4.56***</td>
</tr>
</tbody>
</table>

NB: Model Variant I above is the baseline estimation shown in the first two columns of Table One. Model Variant II shows the results controlling for standard deviation of firm size within industry and III with controls for PAC contributions.
Table Three: Negative Binomial Model for Count of ADD or CVD Duties Imposed per year with Controls for Size Dispersion of Firms and Real Annual Contributions, 1982-2005

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Control for Size Dispersion</th>
<th>Control for Contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-1.53</td>
<td>1.75</td>
</tr>
<tr>
<td></td>
<td>(21.08)</td>
<td>(21.53)</td>
</tr>
<tr>
<td>Year</td>
<td>0.00</td>
<td>-0.00</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>Employment Decline (t-1)</td>
<td>-0.09</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>(1.07)</td>
<td>(1.11)</td>
</tr>
<tr>
<td>Empl. Decline (t-1)*High Sunk</td>
<td>4.66***</td>
<td>5.05***</td>
</tr>
<tr>
<td></td>
<td>(1.79)</td>
<td>(1.85)</td>
</tr>
<tr>
<td>Output Decline (t-1)</td>
<td></td>
<td>0.65</td>
</tr>
<tr>
<td></td>
<td>(0.88)</td>
<td>(0.90)</td>
</tr>
<tr>
<td>Output Decline (t-1)*High Sunk</td>
<td>1.63</td>
<td>1.80</td>
</tr>
<tr>
<td></td>
<td>(1.27)</td>
<td>(1.29)</td>
</tr>
<tr>
<td>High Sunk Costs</td>
<td>-1.34</td>
<td>0.751</td>
</tr>
<tr>
<td></td>
<td>(1.06)</td>
<td>(0.734)</td>
</tr>
<tr>
<td>Size Dispersion of Firms</td>
<td>0.01**</td>
<td>0.01*</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>PAC Contributions</td>
<td></td>
<td>-0.115</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.192)</td>
</tr>
<tr>
<td>N</td>
<td>1944</td>
<td>1800</td>
</tr>
<tr>
<td># Groups</td>
<td>81</td>
<td>75</td>
</tr>
<tr>
<td>Wald (\chi^2)</td>
<td>16.50***</td>
<td>13.41**</td>
</tr>
</tbody>
</table>

NB: *** indicates that a coefficient is significant at the one percent level of confidence, ** that it is significant at the five percent level of confidence and * that it is significant at the ten percent level of confidence. The negative binomial model is estimated with fixed effects. Measure of size dispersion of firms is the standard deviation of firms by size within each industry in 1992, divided by one thousand, as in Bombardini (2008).
Table Four: Panel Regression Fixed Effects Model for Coverage Ratio of Non-Tariff Measures not including ADD or CVD Duties for 1993, 1995 and 1999

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>All 1987 SIC-4 Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
</tr>
<tr>
<td>Dummy for 1995</td>
<td>-0.01</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
</tr>
<tr>
<td>Dummy for 1999</td>
<td>0.022*</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
</tr>
<tr>
<td>Employment $t-1$</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
</tr>
<tr>
<td>Employment $t-1$*High Sunk</td>
<td>-0.27**</td>
</tr>
<tr>
<td></td>
<td>(0.11)</td>
</tr>
<tr>
<td>Output$t-1$</td>
<td>-0.002</td>
</tr>
<tr>
<td></td>
<td>(0.041)</td>
</tr>
<tr>
<td>Output $t-1$*High Sunk</td>
<td>-0.083</td>
</tr>
<tr>
<td></td>
<td>(0.071)</td>
</tr>
<tr>
<td>N</td>
<td>1367</td>
</tr>
<tr>
<td># Groups</td>
<td>458</td>
</tr>
<tr>
<td>F-Test</td>
<td>3.77***</td>
</tr>
<tr>
<td>$R^2$ Within</td>
<td>0.02</td>
</tr>
</tbody>
</table>

NB: *** indicates that a coefficient is significant at the one percent level of confidence, ** that it is significant at the five percent level of confidence and * that it is significant at the ten percent level of confidence. The model is estimated with fixed effects.
REFERENCES


Jones, V.C., 2007, Trade Remedies: A Primer. CRS Report for Congress.


