Industry Lobbying and Rules of Origin in Free Trade Agreements

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Abstract

The configuration of rules of origin in free trade agreements (FTAs) arouses spirited lobbying campaigns that mostly escape public attention. This article argues that rules of origin are critical to mobilizing domestic coalitions in favor of FTA formation. However, the beneficiaries of FTAs differ in their preferences over rules of origin: industries with large returns to scale need stricter rules of origin to gain scale economies in an FTA, while industries with multinational supply chains prefer lenient rules of origin to accommodate global sourcing. An econometric analysis of rules of origin in NAFTA finds more restrictive rules of origin the larger the returns to scale and the higher the external trade protection, and more permissive rules of origin the greater the participation in offshore production. Because NAFTA has been a model for more recent FTAs, the article provides a foundation for understanding the motives to protect free trade in other cases. (13,862 words)

Keywords: free trade agreements; rules of origin; NAFTA; trade lobbying; economies of scale; non-tariff barriers.

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Introduction

Free trade agreements (FTAs) are appearing at a frenzied pace: 106 FTAs have entered into effect since 1995 and more than half, fifty-five in all, were notified to the World Trade Organization (WTO) in the last three years.[1] To some analysts, this proliferation of FTAs threatens to fragment the trading system into competing economic blocs. Particular concern has focused on rules of origin– the methods to determine which goods qualify for free trade privileges in an FTA. For example, Barton et al. caution that "bilateral arrangements could ultimately undermine interest in more global trade relations… [and] strict rules of origin may exacerbate the diversion of trade that arises from such preferential access."[2] Gilpin considers regionalization "a very important challenge to the WTO trade regime" because FTAs "invariably employ industry-specific 'rules of origin' to restrict imports."[3] Mansfield and Milner suggest that FTAs are more protectionist than customs unions, "since elaborate rules of origin and content requirements are necessary to enforce [an FTA]."[4]

Scholarship in political economy and media reports alike have, until recently, regarded rules of origin as obscure devices to prevent the transshipment of goods within an FTA. That rules of origin are more political than generally recognized should be clear from the debate on the Central American Free Trade Agreement (CAFTA) in the U.S. Congress, when a last-minute deal stipulating that Central American trousers must have pockets and linings sewn in the United States to qualify for duty-free imports secured the support of six House Republicans, the decisive margin in a 217-215 vote on the treaty's

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[1] These numbers were compiled from a list of FTAs notified to the WTO in "Regional Trade Agreements: Facts and Figures," http://www.wto.org/english/tratop_e/region_e/summary_e.xls.

[2] Barton et al. 2006, xii.

[3] Gilpin 2000, 109.

[4] Mansfield and Milner 1999, 616.

ratification.[5] But while rules of origin have become more salient with the spread of FTAs, there remains little systematic analysis of their political and economic determinants. Theoretical work in economics suggests motives for FTAs to include restrictive rules of origin, but these models are mostly untested.[6] In political science, Destler notes, scholars "specializing in trade politics have been slower to focus on the issue."[7]

This article begins to fill these gaps. Rules of origin, like other trade barriers, create rents and redistribute income. As a result, theories of the political economy of trade protection account for some of the influences on rules of origin at the industry level. For example, producers that anticipate adjustment costs from trade liberalization in an FTA have incentives to press for restrictive rules of origin to mitigate their losses. Politically, industries that are concentrated economically and geographically, large industries spread across many electoral districts, and industries with institutionally powerful representatives may be expected to wield the influence to secure tough rules of origin. However, these factors do not fully explain the political economy of rules of origin; it is important to also understand how the design of rules of origin affects the gains that accrue to beneficiaries of an FTA. Specifically, industries with large returns to scale are likely to prefer stringent rules of origin because foreign entry fragments the FTA market, inhibiting concentration and cost reduction, while industries in which stages of production stretch across borders are likely to favor lax rules of origin to accommodate global sourcing outside the FTA. Because rules of origin can be crafted to protect the gains of the winners from an FTA as well as to compensate losers, their design is critical

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[5] "White House Makes Deals for Support of Trade Pact," *New York Times*, 26 July 2005, 3.

[6] Krishna and Krueger 1995; Krueger 1999; Cadot, Melo, and Olarreaga 2001; Duttagupta and Panagariya 2003.

[7] Destler 2006, 183.

to building domestic coalitions on behalf of an FTA.

The article tests these propositions in an analysis of rules of origin in the North American Free Trade Agreement (NAFTA). Using a two-stage Tobit model with instrumental variables to control for the effects of preexisting trade barriers, I examine how returns to scale, multinational supply chains and industry-level political influence condition rule of origin restrictiveness. The analysis finds that NAFTA rules of origin were more stringent the higher the level of trade protection and the larger the returns to scale, and more permissive the greater the involvement in cross-border production. In these models, surprisingly, geographically concentrated and large, politically decentralized industries received less restrictive rules of origin. Thus, hypotheses about the politics of who gets protected appear to explain tariff and non-tariff barriers more effectively than rules of origin, at least in the case of U.S. industries under NAFTA.

These findings are significant in three ways. First, the article's analysis of rules of origin illuminates the political economy of FTAs and has important implications for the politics of FTA ratification. Though it is widely recognized that FTAs combine liberalization with protection, prior research has not appreciated how freeing trade while simultaneously restricting it is critical to mobilizing coalitions for the formation of FTAs. My argument suggests that tough rules of origin help to neutralize dissent from highly protected industries and win the support of industries with large returns to scale, but risk alienating industries with multinational supply chains. Second, the article distinguishes domestic factors in an important policy area that has not been previously examined: rules of origin. Recent studies of the politics of trade focus on domestic cleavages and coalitions, yet many critical policy issues are not well explained in terms of the variables in these models. Increasingly, the ability to produce globally through outsourcing and foreign direct investment (FDI) and opportunities to exploit economies of scale in production influence the trade preferences of industries. Third, the spread of FTAs adds urgency to scholarly debates about the effects on the global trading system. In analyzing

the determinants of protectionist provisions in NAFTA, the article provides groundwork for explaining the severity of rules of origin in other cases.

The next section explains why rules of origin have become a critical policy issue and details the various methods for assigning origin in an FTA. The third section reviews recent scholarship on the political economy of trade protection. The fourth section develops the main hypotheses, which are that industries have incentives to seek restrictive rules of origin the greater their trade protection and the larger the returns to scale in production, while industries with multinational supply chains will tend to prefer permissive rules of origin. The fifth section describes the variables and methods for analyzing rules of origin in NAFTA. The sixth section presents the results of the empirical models. The conclusion considers the implications for the political economy of FTAs.

Rules of Origin: What They Are and How They Work

Origin is a simple matter when goods are produced entirely in one country from inputs made and supplied in that country. Today, however, wholly national production is rare: increasingly, companies produce internationally and trade inputs across borders. With the globalization of production, many goods are manufactured and assembled in discrete steps in separate countries, and inputs often are supplied from locations outside the home market. In systems of "multi-stage production," different stages of manufacturing are shared among foreign affiliates or outsourced to contractors located abroad, and inputs can come from anywhere. The larger the number of countries involved in the production process, the harder it is to define and verify the origin of goods.

If trade is unrestricted, or if restrictions apply equally on a most-favored nation (MFN) basis, then the origin of goods is immaterial. Only when imports are regulated and import limits discriminate among sources of supply is a "differentiating mechanism"

required.[8] In two sets of circumstances, these conditions are fulfilled and origin matters. First, when the products of certain countries receive preferential treatment, as in an FTA, customs authorities must discern origin to determine eligibility for trade preferences. In this case, preferential rules of origin specify which goods are indigenous to the territory of FTA members ("originating" countries) so that goods from outside ("non-originating" countries) cannot be exported to the least protected market and transshipped within the FTA. Second, customs agents must discern origin to administer antidumping and countervailing duties, safeguards, and country-specific quotas, otherwise merchandise from countries targeted by such measures can evade detection via transshipment through countries not subject to the same restraints. Thus, non-preferential rules of origin are designed to thwart the circumvention of trade remedy laws.

The proliferation of FTAs together with the globalization of production has made rules of origin more prominent. Moreover, while FTAs have been spreading, "traditional, producer-based protectionism"[9] has been on the decline. Tariff bindings and constraints on trade remedies in the WTO make it difficult for countries in an FTA to raise existing trade barriers or establish new ones against non-members, shifting attention to other policy measures. The global trade regime therefore motivates domestic groups to expend lobbying effort to influence the design of rules of origin.

The absence of WTO discipline adds to the temptation to manipulate rules of origin. The General Agreement on Tariffs and Trade (GATT) left it to "each importing member country to determine, in accordance with the provisions of its law… whether goods do in fact originate in a particular country."[10] This omission was not addressed until the Uruguay Round Agreement on Rules of Origin– but this agreement covers only

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[8] Hirsch 2002, 176.

[9] Destler 2006, 177.

[10] United Nations 1947, 3-4.

non-preferential rules of origin. WTO members therefore seem to prefer that FTA rules of origin remain outside the trade regime's legal structure.[11]

Generally countries use three methods for assessing origin.[12] Most common is substantial transformation, which confers origin to the country in which the last substantial transformation occurs– "substantial" meaning "a new and different article of commerce" in U.S. trade law. Initially it was left to administrative authorities to decide on a case-by-case basis where a product had been made "new and different," and inconsistencies in the rules and their application led countries to define substantial transformation in terms of changes in tariff classification based on the internationally standardized Harmonized Tariff System (HTS). HTS classifies products into twenty-one sections arranged by two-digit chapter, four-digit heading, six-digit subheading, and eight-digit item. This method confers origin if the processing of materials from a non-originating country changes the product's HTS code at the specified statistical level.

Because the HTS nomenclature was not created to assist origin determinations, rules of origin often include an additional requirement– either a value content percentage test or a specified technical process test.[13] These rules can be applied individually, but typically they are used in conjunction with a change in tariff classification. A value content percentage test stipulates a minimum share of final value that must be produced in originating countries to qualify for preferential treatment. The NAFTA rule of origin for automobiles is an example: in this case, a change in tariff heading due to processing in a NAFTA country is not sufficient to confer origin; automobiles also must contain at

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[11] Hirsch 2002, 183-184.

[12] This discussion draws from Palmeter 1993, 326-334; and LaNasa 1996, 629-636.

[13] Also, exceptions to the change in tariff classification rule may exclude the use of non-originating inputs from a specific subheading, heading, or chapter.

least 62.5 percent originating materials.[14] A technical process test confers origin when a specific stage of manufacturing occurs in originating countries. For instance, European Community (EC) standards for semiconductors require that wafer diffusion– the process of attaching integrated circuits to a silicon chip– occur in the EC to prevent Asian affiliates from evading external trade barriers by performing back-end assembly and testing locally.[15] In NAFTA, the "yarn forward" or "triple transformation" rule stipulates that apparel can be traded freely only if all stages of production from yarn to fabric to cloth occur within North America.

The complex and technical nature of rules of origin offers opportunities for lobby groups to influence their structure. Rules of origin are susceptible to industry capture for three main reasons. First, negotiators need not set a single standard: rules of origin can vary across products, as the preceding description of methods suggests. The ability to differentiate rules of origin to a product's special characteristics allows trade negotiators to devise carefully crafted measures that please FTA producers. In turn, this creates incentives for industries to press for rules of origin that suit their needs. Second, rules of origin are obscure: understanding their effects requires expertise in the technical processes of manufacturing a given product and familiarity with the relevant portion of the HTS code. If trade negotiators lack the technical background to grasp the practical

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[14] Defining a value content test is not as simple as setting a percentage figure: negotiators must decide whether the price of components should be traced through to the final product or instead "rolled up" to 100 percent for components that surpass the value content test and "rolled down" to 0 percent for non-originating components. NAFTA stipulates alternative ways to calculate North American content– "net cost" and "transaction value"– and the percentage value content rule differs depending on which method is used. On the complexity of automobile rules of origin and the challenges they have posed for customs authorities, see Cantin and Lowenfeld 1993.

[15] Hufbauer 1990, 40-41.

differences between alternative methods, they are likely to rely on industry representatives for advice on how to define the necessary tests. Third, information asymmetries bias lobbying to favor industry interests: the average citizen simply does not comprehend terms such as "diffusion" and "triple transformation." As a result, "those who benefit directly are deeply engaged, while others affected only marginally tend to stay on the sidelines."[16]

The result is a political setting that favors industries with a strong stake in how rules of origin are designed, weakens the position of trade negotiators in their interaction with industry lobbies, and marginalizes those who bear the costs of restrictive rules of origin. Cooper explains:

> [T]he need for rules of origin creates a playground for protectionist interests… Outsiders, such as academics or journalists, have a hard time paying serious attention to them, and even the negotiators quickly lose interest… You can be sure that the folks that are most intensely interested have scrutinized every line, indeed have written many lines, and they come to dominate the process.[17]

As Canadian Trade Minister Michael Wilson bluntly told Parliament when discussing the NAFTA treaty: "Rules of Origin are very, very complex. You don't want to know about them. They're terrible things to deal with."[18]

In short, rules of origin, like all redistributive trade measures, are regulations that policymakers manipulate in response to domestic pressures. Moreover, their complex and technical nature, which obscures how many or to whom rents have been

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[16] Destler 2006, 179.

[17] Cooper 2004, 22.

[18] Simpson 1994, 33.

redistributed, elegantly satisfies Magee, Brock, and Young's "principle of optimal obfuscation."[19] Whether new forms of protection such as rules of origin respond to the same influences as tariffs and non-tariff barriers remains unknown, however. It is to this issue that the analysis now turns.

The Political Economy of Trade: Who Gets Protected?

Studies of the political economy of trade protection focus on two sets of considerations: what do industry groups want and how are they organized? What industry groups want is based on the distributional effects of trade: in the short run, when factors of production are relatively fixed, import-competing specific factors prefer more trade protection than export-oriented specific factors.[20]

Because the trade preferences of industries have been extensively developed, recent contributions examine group organization. Busch and Reinhardt propose that industry mobilization increases with geographic concentration because spatial proximity reduces collective action problems; consistent with this hypothesis, they show that the incidence of non-tariff barriers in the United States increases with geographic concentration.[21] Others counter that the distribution of an industry's firms and workers across political boundaries matters more than their closeness to one another because groups must be spread across many electoral districts to influence representatives in

[19] Magee, Brock, and Young 1989, chap. 18.

[20] Hiscox 2002; Alt and Gilligan 1994; Milner 1988. The Grossman-Helpman "protection for sale" model formalizes this effect in terms of the inverse import penetration ratio, which is exports divided by imports. Grossman and Helpman 1994. For empirical tests, see Goldberg and Maggi 1999; Gawande and Bandyopadhyay 2000.

[21] Busch and Reinhardt 1999.

majority-rule systems.[22] McGillivray, for example, suggests that large, dispersed industries wield greater influence over legislators than politically concentrated industries, though her empirical test reveals higher tariffs for both types of groups.[23] Also important is the location of industry in relation to institutional sources of power such as majority party status, seniority, and committee assignments, because representatives can use agenda control and committee membership to channel protection to favored groups (particularly where parties are weak). In this vein, Hansen finds that industries represented by Democrats on the House Ways and Means Trade Subcommittee are more likely to gain protection in trade remedy decisions.[24]

These insights on the political side of the 'who gets protected' question inform the empirical analysis of rules of origin later in the article because they are relevant to forms of redistribution other than tariffs and non-tariff barriers. On the preferences side, however, distinctions between import-competing and export-oriented provide little insight into what type of rule of origin industries will want. Economic models of rules of origin illuminate rent-seeking motives for both import-competing producers and exporters. Cadot, de Melo, and Olarreaga show that rules of origin can compensate losers of trade liberalization in an FTA by insulating the more protected market from downward price pressure after the removal of tariffs against FTA partners.[25] In Krishna

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[22] Rogowski 1987. This observation leads Rogowski to conjecture that moderately concentrated industries exert the most protectionist pressure on the U.S. Congress because such industries will be dispersed enough to have a presence in many districts, but concentrated enough to overcome free riding. Rogowski 2002.

[23] McGillivray 2004, chap. 2. This effect, McGillivray argues, is present in electoral systems with weak parties; coalition building is not important in strong-party systems, where party leaders will direct protection to industries in marginal districts.

[24] Hansen 1990; see also McGillivray 2004, 78-79.

[25] Cadot, Melo, and Olarreaga 2001.

and Krueger, tough rules of origin encourage finished goods producers to shift from low-cost suppliers outside the FTA to high-cost FTA suppliers, creating "hidden protection" for intermediate goods.[26] Moreover, finished goods producers gain protection if foreign rivals forgo cheaper sources of supply outside the FTA and buy from high-cost FTA suppliers to satisfy the rule of origin. Krueger surmises: "a rule of origin may be a device through which producers of final goods and those of intermediate goods can be induced to support an FTA."[27]

FTAs, generally speaking, reduce protection by eliminating tariffs for import-competing producers; at the same time, they enhance protection by establishing tariff preferences for exporters.[28] In principle, rules of origin can mitigate the losses from reduced protection for import-competing producers and accentuate the gains from enhanced protection for exporters. Import-competing producers benefit from a stringent rule of origin, but only in proportion to their level of trade protection; if they are unprotected, a tough rule of origin will have little effect. Outcomes for exporters are also contingent: intermediate exporters gain to the extent that the rule of origin induces finished goods producers to buy more inside the FTA; exporters of finished goods gain to the extent that the rule of origin induces foreign competitors to shift production or supply chains to the FTA. There is no predictable relationship between industry trade patterns and rule of origin restrictiveness.

Illuminating the political economy of rules of origin requires hypotheses about the motives for organized groups to lobby to influence rules of origin in observable ways–

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[26] In addition to maintaining existing protection against outsiders, rules of origin also "export" protection to FTA members– even if these countries have no tariffs on the intermediate good– to the extent that they induce FTA producers to buy more inputs inside the FTA. Krishna and Krueger 1995.

[27] Krueger 1999, 99.

[28] Grossman and Helpman 1995.

specifically, testable propositions that identify what types of producers are likely to push for restrictive rules of origin and what types of producers tend to prefer permissive rules of origin. The next section lays out an analytical framework to understand the incentives to embed protection in an FTA.

Protecting Free Trade: Theory and Hypotheses

Rules of origin can be thought of as varying along a continuum of trade restrictiveness. Different points on the continuum have different effects on the production strategies of firms using non-originating materials[29] because the severity of rules of origin influences private choices about the location of investment, processing, and assembly, and where to procure intermediate inputs and raw materials.

At one end of the range, a permissive rule of origin allows trade deflection: firms using non-originating materials can export to the least protected market and transship duty-free inside the FTA. At the point on the continuum where the rule of origin prevents trade deflection, the effect is to induce firms using non-originating materials to source more inputs inside the FTA. Toward the other end of the range, a prohibitive rule of origin leads firms using non-originating materials to forgo the benefits of tariff preferences in the FTA because compliance is too costly. At the extreme, only goods wholly produced in the FTA can be traded freely.

Which effect dominates depends on several factors; the same rule of origin may produce different outcomes in different circumstances. Generally, firms using non-originating materials will take three considerations into account: the opportunity cost of not complying; the effect of complying on production costs; and the administrative cost

[29] Rather than calling these "foreign firms" or "firms outside the FTA," I prefer a longer but more precise term since firms indigenous to an FTA can use non-originating materials, and rules of origin are based on the use of non-originating materials, not the nationality of the producer.

of complying.

The opportunity cost of not complying is a function of the tariff preference lost by producing with too many non-originating materials. When external tariffs are low, the penalty of not complying is small. The higher the external tariff rate, the greater the incentive to satisfy the rule of origin to save on tariff payments.

The effect of complying on production costs depends on the input share of non-originating materials and differences in factor costs outside versus within the FTA. A rule of origin that is strict enough to prevent trade deflection creates incentives for firms using non-originating materials to buy more inputs in the FTA to qualify for free trade privileges. Krishna explains, "[t]he carrot, preferential treatment, is obtained only by jumping through hoops, namely, meeting origin requirements."[30] For firms headquartered outside the FTA, this involves FDI to set up production facilities inside the FTA, expanding the output of affiliates already established in the FTA, or contracting with local suppliers to purchase inputs. If firms headquartered inside the FTA use too many non-originating materials, they too must increase production locally or buy more inputs from FTA suppliers to satisfy the rule of origin.

Shifting production and/or procurement to satisfy a rule of origin tends to raise production costs. Firms using non-originating materials do so because they are cheaper than FTA substitutes; it follows that giving up cheaper inputs from outside the FTA means producing them in a higher-cost area or paying more to buy them from FTA suppliers. A stringent rule of origin, like any trade-related performance requirement, elevates costs by inducing firms to buy "overpriced locally produced inputs" or sell "unprofitable exports."[31] Moreover, as other producers respond to the same incentives to source more inputs inside the FTA, demand increases, pushing up intermediate goods

[30] Krishna 2006, 32.

[31] Caves 1996, 222.

prices further. Thus, higher input costs are the price of free trade eligibility for firms using non-originating materials.

Administrative costs are an added expense of rules of origin. Compliance costs for change in tariff classification rules of origin average 3 percent of product values.[32] Value content percentage tests are more onerous, as firms must maintain extensive accounting records and inventory management to trace the value of non-originating inputs through the entire supply chain. At the margin, changes in exchange rates, labor costs, or the price of materials can affect the origin determination.[33] Overall compliance costs for NAFTA rules of origin are estimated at 6 percent ad valorem– larger than the average tariff preference of 4 percent.[34] The effect of high compliance costs is that firms using non-originating materials may find it cost effective to pay the tariff. In theoretical models, a shift occurs– the price of inputs stops rising and begins to fall, and imports of non-FTA inputs stop declining and begin to rise– at the threshold where high documentation costs outweigh the benefits of obtaining FTA privileges.[35]

This discussion provides the foundation for testable hypotheses about the political economy of rules of origin. The theoretical analysis focuses on three critical factors in industry lobbying on rules of origin: the size of the returns to scale in production; the extent to which producers in the FTA engage in multi-stage production, where different stages of the production process cross borders; and the level of trade protection toward countries outside the FTA.[36]

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[32] Palmeter 1993, 332.

[33] LaNasa 1996, 632-634.

[34] Anson et al. 2005.

[35] Krishna 2006.

[36] My analytical framework is consistent with the specific factors approach (see Hiscox 2002), but it adds causal variables that are not included in standard trade models– the returns to scale in production and the

Returns to Scale

The returns to scale in production are important to industry preferences on rules of origin because the benefits of an FTA depend on the extent to which producers are able to gain scale economies as an enlarged market is opened.[37] An FTA helps producers gain scale economies in two ways. First, free trade creates incentives to concentrate production for the entire FTA market at one location. If some economies of scale remain unexploited, expanding output or consolidating previously fragmented operations reduces unit costs, and the benefits of restructuring after an FTA is formed increase the larger the returns to scale. Second, FTAs retain trade barriers against non-FTA countries. This allows producers in the FTA to fully internalize the cost-reduction effects of access to a larger, preferential market– as long as new entry does not fragment this market.

However, the factors that help FTA producers gain scale economies– an enlarged, integrated market with barriers against outside imports– also create inducements for outsiders. Entry by foreign competitors enables these rivals to share in the benefits of free trade, inhibiting FTA producers from capturing the gains. When returns to scale are large, the increased market share of foreign rivals prevents FTA producers from concentrating production and fragments the market, pushing them up their cost curves.[38] FTA producers with large returns to scale will be reluctant to undertake costly

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the degree to which manufacturing processes are specialized across countries.

[37] This discussion assumes that certain goods can be made more cheaply when they are produced on a larger scale. Thus, while all producers in a country face the same supply function for industry-specific factors, production costs also depend on the size of the inputs employed: factor costs and the scale of output together determine productivity. Returns to scale are represented as the slope of the curve that relates average costs to the scale of production, or the elasticity of unit costs with respect to scale.

[38] For a model of excess entry leading to reduced economies of scale, see Horstmann and Markusen 1986.

restructuring if new entrants cannot be prevented from seizing the benefits; if they expect foreign entry to fragment the market, they may oppose the FTA.

Rules of origin provide a means to restrain entry by rivals based outside the FTA. Foreign rivals that choose to satisfy the rule of origin must pay an entry fee– the cost of sourcing more expensive local inputs– to earn free trade privileges, channeling rents to FTA producers. The high cost of complying with a restrictive rule of origin will deter some foreign competitors from producing or sourcing more inside the FTA, particularly when returns to scale are large, because entry will not be cost effective unless it occurs on a large scale. This preserves market shares for FTA producers and enhances their ability to exploit scale economies. Excluding outsiders from sharing in the benefits of an FTA also limits free riding in lobbying campaigns, making it easier to mobilize domestic coalitions in favor of FTA formation. This leads to the first hypothesis:

> Hypothesis 1: industries will lobby for tougher rules of origin the larger the returns to scale in production.

Multi-Stage Production

Multi-stage production, where different stages of manufacturing cross national borders, affects industry preferences on rules of origin because FTA producers that import inputs or perform processing and assembly overseas risk losing free trade privileges if they use too many non-originating materials. The function of rules of origin is to discriminate against firms that do not substantially transform their goods, generate a specified share of final value, or perform certain technical processes inside the FTA. Generally intensive use of non-originating materials will be more prevalent among non-FTA firms. But FTA producers may have supply chains outside the FTA as well.

Dependence on multi-stage production is likely to restrain rules of origin, even when external trade protection is high or returns to scale are large. Multinational firms

closely integrated with foreign affiliates tend to resist protectionist impulses because trade barriers disrupt intra-firm trade and imported inputs.[39] Outsourcing to unaffiliated foreign suppliers has the same effect: global sourcing requires minimal barriers to trade across the borders that connect the supply chain's links. Frequently, FTA firms using non-originating materials have large sunk costs in terms of capital expenses for plant and equipment, and information, search, and negotiation costs for identifying production sites abroad or contracting with foreign suppliers. This makes lobbying for hospitable rules of origin preferable to restructuring supply chains after an FTA is formed.

As a result, FTA firms using non-originating materials will want to be sure that their goods are not excluded from free trade privileges. To the extent that outsourcing and intra-firm trade are internal to an FTA, producers in the FTA may be able to easily satisfy a tough rule of origin. But multi-stage production in an FTA often involves trade with countries outside it. The greater the use of non-originating materials in production, the harder it is for a restrictive rule of origin to differentiate FTA producers from outsiders. To the extent that supply chains extend beyond the home market, particularly to countries outside the FTA, producers in the FTA will prefer a lenient rule of origin to accommodate multi-stage production. Thus, the second hypothesis is:

> Hypothesis 2: industries will lobby for permissive rules of origin the more that producers depend on multi-stage production, particularly when stages of production are located outside the FTA.

External Trade Protection

External trade protection influences industry preferences on rules of origin for two reasons. The first is trade deflection: industries with high tariffs have incentives to lobby

[39] Helleiner 1977; Milner 1988.

for rules of origin that prevent outside imports from entering via lower-tariff FTA partners. The second is circumvention: industries with antidumping and countervailing duties, safeguards, quotas, and the like have incentives to lobby for rules of origin that prevent outsiders from producing inside the FTA to evade these non-tariff barriers. Though the effects are the same, I discuss each separately.

Starting with tariffs, "an FTA could be highly liberalizing, as the lowest tariff would apply to each category of imports" if there were no rules of origin.[40] By blocking trade deflection, rules of origin segment FTA markets and prevent prices in the FTA from equalizing. As the previous section noted, this can generate rents for both intermediate and finished goods producers. Protection of intermediate goods is augmented because the barrier to trade among FTA members encourages firms using non-originating materials to perform more processing and assembly in the FTA. This increases consumption and raises prices for locally-made intermediate goods, providing "hidden protection" for producers of inputs. Finished goods producers gain enhanced protection– indirectly– because it is costly for firms using non-originating materials to give up cheaper sources of supply and produce and/or procure more inputs locally. Thus, FDI and outsourcing inside the FTA raise the costs of rival finished goods producers, who must pay more for their inputs to satisfy the rule of origin. Krueger notes, "[t]he price to the final producers of receiving that protection, however, is that they must share part of it with producers of intermediate goods in the FTA"[41]

Producers facing lost tariff protection in an FTA therefore have incentives to use rules of origin to mitigate adjustment costs (particularly when blocking its formation is improbable) and maximize the benefits of the FTA. The key factor is not whether producers export inside the FTA or compete with imports from outside it– rules of origin

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[40] Krishna and Krueger 1995, 150-151.

[41] Krueger 1999, 99.

can protect import-competing producers and exporters alike. What matters is how high tariffs are, because the rents that rules of origin sustain depend on trade protection. This suggests that industries will tend to seek more stringent rules of origin the higher the tariff rates on their products.

Non-tariff barriers affect the demand for rules of origin similarly. According to Smith, "pressure for restrictive rules of origin is greater in industries characterized by significant non-tariff barriers to trade."[42] In this case, the risk for FTA producers is circumvention of national non-tariff barriers by foreign competitors, since most non-tariff barriers are country-specific. As an example, suppose the United States imposes antidumping duties on cathode-ray picture tubes imported from Japan, and that Mexico has no non-tariff barriers on cathode-ray tubes from any source. In a simple way, Japanese producers could try to circumvent U.S. antidumping duties by exporting cathode-ray tubes to Mexico and transshipping them to the United States; indeed, this can occur whether or not the United States has an FTA with Mexico. An FTA, however, gives foreign competitors an added inducement for circumvention: if the rule of origin is sufficiently lax, Japanese producers could export cathode-ray tubes to Mexico, undertake further processing there (for example, incorporating the picture tubes into televisions), and export the televisions from Mexico to the United States, thereby evading the antidumping order *and* trading freely in the FTA.

Officially, FTA rules of origin are unrelated to the administration of trade remedy laws: separate "marking rules" determine country of origin in cases where products are made in multiple locations or composed of imported inputs. This means that origin for FTA privileges technically does not entitle a product to evade national non-tariff barriers that are not applied against FTA partners. But as a practical matter, there are several reasons why FTAs enhance the risk that outsiders will attempt to circumvent the non-

[42] Smith 1993, 90.

tariff barriers of FTA members. First, many FTAs only require self-certification of country of origin by the manufacturer or the importer, creating opportunities for cheating. Second, there is no common enforcement of antidumping and countervailing duty orders, safeguards, or quotas in FTAs, which makes it difficult for national authorities to trace the value of non-originating materials in products imported from FTA partners. Third, as more and more imported merchandise contains foreign inputs, national authorities face greater complexity administering separate customs regimes for FTAs and trade remedy laws. As a result, products satisfying FTA rules of origin are more likely to pass country of origin marking requirements.

These considerations suggest that FTA rules of origin are critical to preserving the protective effect of national non-tariff barriers. Because tough rules of origin create higher compliance costs for firms using non-originating materials, domestic industries with significant non-tariff barriers therefore have incentives to lobby for restrictive rules of origin: the higher the compliance costs, the more likely it is that outsiders will decline to produce and/or buy more inside the FTA. This leads to the third hypothesis:

> Hypothesis 3: industries will lobby for restrictive rules of origin the higher their level of external trade protection, that is, the higher the tariffs and the greater the incidence of non-tariff barriers on their products.

The three main hypotheses now can be summarized: the larger are the returns to scale in an industry, the more restrictive are the rules of origin; the more that an industry depends on multinational supply chains, the more permissive are the rules; and the greater the external trade protection, the more restrictive are the rules. The rest of the article tests these hypotheses in an econometric analysis of rules of origin in NAFTA. Though the welfare and trade effects of rules of origin have been analyzed, there are no empirical studies of their industry-level determinants. The next two sections fill this gap.

Empirical Analysis of NAFTA Rules of Origin

This section begins by describing the variables and data used in the empirical analysis of rules of origin. Then, I explain the methods employed and the models tested.

Variables and Data

The dependent variable in the analysis, *NAFTA Origin Rule*, is derived from Estevadeordal's index of rule of origin restrictiveness.[43] Because the severity of rules of origin cannot be observed, Estevadeordal categorizes different rules of origin based on three assumptions: restrictiveness increases the larger the required change in tariff classification; a change in tariff classification with a value content test is more restrictive than one with no such test; and a technical process test is the most restrictive of all.[44] The coding ranges from one (least restrictive) to seven (most restrictive), as shown in Table 1.

Figure 1 displays the distribution of NAFTA rules of origin for 5,021 six-digit HTS tariff lines.[45] About three-quarters of all products must change tariff heading or tariff chapter to attain originating status. Another 9 percent require value content tests and 13 percent require technical process tests. For the data analysis in this section, the rule of origin index value was averaged over all HTS products in a four-digit Standard Industry Classification (SIC) code.[46] The units of analysis are four-digit SIC industries.

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[43] Estevadeordal 2000.

[44] Data on preference utilization rates (the percentage of U.S. imports from Mexico claiming NAFTA eligibility) verify that this coding is consistent with estimated compliance costs. Carrère and Melo 2006.

[45] NAFTA rules of origin appear in Annex 401: Specific Rules of Origin, http://www.dfait-maeci.gc.ca/nafta-alena/ann-401-en.asp.

[46] In the construction of this variable, I experimented with various weighting methods to scale the rule of origin index by trade flows in the aggregation into SIC codes. However, I use the unweighted average

The hypotheses in the theoretical section suggest that three variables are critical to industry lobbying on rules of origin: the size of the returns to scale, the extent of participation in multi-stage production, and the level of external trade protection in the country under examination.

To measure *Returns to Scale*, I calculate variations in value added per worker in plants of different sizes from data in the *1992 Economic Census* to estimate the slope of U.S. industry cost curves.[47] In this measure, values at or near zero indicate constant returns to scale, while positive values indicate economies of scale and negative values indicate diseconomies of scale. The first hypothesis predicts a positive association between *Returns to Scale* and *NAFTA Origin Rule.*

Multi-stage production is measured as trade under the Offshore Assembly Program (OAP) as a share of total shipments.[48] *Offshore Assembly* effectively measures multi-stage production because it includes subcontracting between unaffiliated parties (offshore outsourcing) and trade between affiliated firms (intra-firm trade). The second

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because the most appropriate weight (U.S.-Mexico bilateral trade, U.S.-Canada-Mexico trilateral trade, or total U.S. trade) is not apparent.

[47] Each observation is generated by regressing the logarithm of value added per worker relative to all plants in an industry on the logarithm of workers per plant for different plant size classes. The coefficient on the logarithm of workers per plant in this regression is the elasticity of unit costs with respect to scale. For a description of this measure, see Hufbauer 1970, 178-179.

[48] Special provisions in the U.S. Tariff Code (HTS 9802.00.60 and HTS 9802.00.80) enable companies importing merchandise previously exported for foreign processing to exclude the domestic content of these products from their tariff assessment and pay duties only on the value added abroad. *Offshore Assembly* uses foreign value added (that is, import value minus U.S. content) in the numerator and industry shipments in the denominator. OAP trade data, which were provided to the author on request, are from Feenstra, Hanson, and Swenson 2000.

hypothesis expects *Offshore Assembly* to be negatively associated with *NAFTA Origin Rule.*

To capture the level of external trade protection, I measure both tariffs and non-tariff barriers. *MFN Tariffs* is duties collected divided by U.S. imports for all countries that were not part of an FTA with the United States.[49] Non-tariff barriers are more difficult to quantify. The analysis uses *NTB Coverage*, a coverage ratio measuring the percentage of imports in an industry that are subject to a non-tariff barrier in the U.S. market.[50] The data are from the United Nations Conference on Trade and Development (UNCTAD), which reports the incidence of "core non-tariff measures" at the six-digit HTS level.[51] In my construction of *NTB Coverage*, the data on non-tariff measures were weighted by U.S. imports for all products in a four-digit SIC code such that:

$$NTB\,Coverage = \frac{\sum_{i=1}^{n}\left(NTM_i * M_i\right)}{\sum_{i=1}^{n}\left(M_i\right)}$$

In this formula, NTM_i is the proportion of tariff lines covered by core non-tariff measures in the HTS product code indexed by i and M_i is the value of imports of the product. The third hypothesis predicts that both *MFN Tariffs* and *NTB Coverage* will be positively

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[49] In addition to trade with Mexico and Canada, trade with Israel is excluded from this measure due to the U.S.-Israel FTA of 1985.

[50] Studies using this measure include Trefler 1993; Goldberg and Maggi 1999; and Gawande and Bandyopadhyay 2000. Busch and Reinhardt 1999 instead use a binary dependent variable based on whether non-tariff barriers cover more or less than half of all imports in an industry, but this measure sacrifices valuable information.

[51] UNCTAD 1995a. In the UNCTAD data, non-tariff measures are organized into three categories: quantity restrictions, finance measures, and price control measures. In all there are 33 sub-categories of non-tariff measures. For a description of these data, see UNCTAD 1995b.

associated with *NAFTA Origin Rule.*

The observed variable *NTB Coverage,* it must be acknowledged, is an imperfect measure of the underlying variable of interest, the restrictiveness of non-tariff barriers. All non-tariff measures are alike in the UNCTAD data, so it is impossible to account for variation in severity. However, Trefler calculated tariff coverage ratios and found a 0.78 correlation with tariff rates, suggesting that an ordinal ranking of industries by *NTB Coverage* tracks the unobservable restrictiveness of non-tariff barriers.[52]

Finally, the empirical models incorporate control variables to capture the political mobilization and institutional influence of industries. Including these effects is critical to account for the policymaking process, which may or may not satisfy industry demands. *Industry Concentration* is the share of total shipments made by the four largest firms. *Geographic Concentration* is industry concentration across geography from Busch and Reinhardt.[53] Because concentrated groups are thought to be less prone to free riding and therefore better able to gain trade protection, *Industry Concentration* and *Geographic Concentration* should be positively associated with *NAFTA Origin Rule.* McGillivray counters that the influence effect of political dispersion outweighs the mobilization effect

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[52] Trefler 1993, 156. In addition, *NTB Coverage* does not account for the proportion of non-tariff barriers applied to Mexico and Canada. Overall this figure was not large: Mexican products accounted for 2.3 percent of U.S. antidumping orders and 8.5 percent of countervailing duty orders from 1984 to 1993, and Canadian products accounted for 5.4 percent of antidumping orders and 8.5 percent of countervailing duty orders. These figures were calculated from case lists in the supplement to Destler 2005, "A Note on the Underlying Data on Trade Cases," http://www.iie.com/publications/chapters_preview/3829/atpguide.cfm. Moreover, trinational review of trade remedy decisions reduced the incidence of antidumping and countervailing duties against FTA partners (see Goldstein 1996), so U.S. industries could anticipate growing risks of circumvention as time went on.

[53] Busch and Reinhardt 1999.

of geographic and industrial concentration in electoral systems with weak parties. To capture the political strength of industries in electoral geography, *Electoral Concentration* is a Herfindahl index of industry concentration across electoral districts; *Industry Size* is total employment in the industry; and *Large, Decentralized Industries* is an interactive term specified as the inverse of *Electoral Concentration* divided by *Industry Size.*[54] If large and politically dispersed industries are more likely to gain trade protection, then *Electoral Concentration* will be negatively associated with *NAFTA Origin Rule* and *Industry Size* and *Large, Decentralized Industries* will be positively associated with *NAFTA Origin Rule.* Finally, the analysis includes two variables to capture the institutional advantages of agenda control: *Democratic Leadership* and *Republican Leadership* are the number of Democratic (Republican) Party leaders and committee chairs in the House of Representatives with the industry in their district.[55] If more senior representatives are able to channel protection to favored industries, then both variables will be positively related to *NAFTA Origin Rule.*

Methods of Analysis

The estimation of the empirical models must address two methodological issues: first, the potential endogeneity of *MFN Tariffs* and *NTB Coverage* as regressors, and second, censoring in the observed values on the dependent variable, *NAFTA Origin Rule.*

Beginning with the endogeneity issue, some of the factors conditioning the

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[54] McGillivray 2004, 85-87. To map county employment into Congressional districts, employment data were estimated as the midpoint of the reported interval range in cases where the actual figure was suppressed to maintain confidentiality, and counties with more than one Congressional district were assumed to be homogenous in terms of industry employment across districts.

[55] This measure is a count of the number of representatives with more than 250 workers in the industry in their district. See Hansen 1990, Appendix A.

restrictiveness of rules of origin also condition the incidence of tariff and non-tariff barriers. To correct for potential bias in the estimates for *NAFTA Origin Rule* due to endogeneity, this study uses instrumental variables.[56] In this method, exogenous factors influencing *MFN Tariffs* and *NTB Coverage* but not *NAFTA Origin Rule* are included as instruments in the first-stage estimates and then predicted values for *MFN Tariffs* and *NTB Coverage* are entered in the second-stage equations for *NAFTA Origin Rule.* In the reduced-form equations for *MFN Tariffs* and *NTB Coverage,* the exogenous factors and the direct influences on *NAFTA Origin Rule* all appear as instruments. By design, the first-stage equation is over-determined in that it includes variables affecting *NAFTA Origin Rule* that may not be theoretically relevant to *MFN Tariffs* or *NTB Coverage.* But the purpose of the first-stage estimation is not to test hypotheses about the determinants of tariff and non-tariff barriers, but rather to utilize factors correlated with these measures to produce unbiased estimates for *NAFTA Origin Rule.*

In the empirical analysis in the next section, I estimate separate reduced-form equations for *MFN Tariffs* and *NTB Coverage* using the same set of exogenous variables. In the reduced-form equations, I distinguish *Intermediate Imports,* which is the consumption share of imports in product codes containing the word "parts" in the description, and *Finished Imports,* which is the consumption share of total imports minus parts imports.[57] *Export Dependence* is exports as a share of industry shipments. *Hourly Wage,* which is the average hourly wage of production workers in the industry, and *R&D Employment,* the percentage of workers in the industry employed in research and development, are measures of skill-intensity. *Capital-Labor Ratio,* which is capital expenditures divided by payroll, is a measure of factor use. The last three variables

[56] Baum 2006, chap. 8.

[57] Schott 2004.

capture elements of comparative costs not reflected in trade patterns.[58]

Table 2 shows the variables in the analysis, including the exogenous instruments (placed beneath the dashed line), and their measurement. Appendix A reports descriptive statistics and Appendix B lists the sources for the data.[59]

The second methodological issue is censoring in the observed values on the dependent variable. Like the index from which it is derived, *NAFTA Origin Rule* takes on a minimum of one and a maximum of seven. With limited dependent variables, the linear regression model is inappropriate; ordinary least-squares will generate predicted values for *NAFTA Origin Rule* less than one and greater than seven. Censoring is also present in the instrumented variables, *MFN Tariffs* and *NTB Coverage*, which by construction cannot be less than zero or greater than one. To correct for censoring, the data analysis uses the censored regression or Tobit model.[60]

The Tobit model was designed for situations in which negative values on the dependent variable have been censored, so that observed limit values signify either a true

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[58] Other variables tried in alternative specifications of the first-stage model, for which results are not reported, include *Capital Intensity* (capital expenditures as a share of value added), *Labor Intensity* (payroll as a share of value added), *Scientists and Engineers* (the employment share of scientists and engineers), and alternative measures of skill-intensity (the percentage of total wages paid to non-production workers) and factor use (capital expenditures and wages, respectively, as a share of total expenditures for capital, labor, materials, and energy). The models reported in the next section are those that produced the largest number of statistically significant exogenous instruments without excessive collinearity.

[59] A collinearity matrix is not included but is available from the author. In the models, the highest pairwise correlation between independent variables is 0.450 for *Capital-Labor Ratio* and *Hourly Wage.*

[60] Baum 2006, chap. 10. The method of analysis is the two-limit Tobit model, where observations are censored at the bottom and the top of the range. For *NAFTA Origin Rule*, there are 363 uncensored observations, 0 left-censored observations at 1.00, and 18 right-censored observations at 7.00.

value or censoring.[61] Written formally, the Tobit specification is:

$$y_i^* = x_i\beta + \varepsilon_i$$

But y is only observed such that:

$$y_i = y_i^* \text{ if } y_i^* > c$$

$$y_i = c \text{ if } y_i^* \leq c$$

In the analysis in this article, the dependent variable *NAFTA Origin Rule* is an observable outcome of industry lobbying for rules of origin of different types; the latent variable rule of origin restrictiveness is not observed. However, the observed y_i could have assumed values less than c: even if some industries lobbied for a lenient rule (for example, free transshipment or no origin required for FTA treatment), y_i is censored to the lower limit c because a change in tariff item is the least restrictive origin rule in the NAFTA treaty.[62] Unlike wages, hours worked, or automobile expenditures, dependent variables that are not appropriate for Tobit analysis,[63] values less than c for *NAFTA Origin Rule* are not inconceivable. Moreover, because *NAFTA Origin Rule* is not restricted to integer values due to averaging across products, model estimation cannot use Probit. Thus, I conclude that two-limit Tobit is the correct model.[64]

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[61] Sigelman and Zeng 2000, 167-170.

[62] Gawande and Hansen make this point about non-tariff barrier coverage ratios: in the absence of data on foreign export subsidies, negative values for trade restrictiveness are bounded at zero. Gawande and Hansen 1999, 123.

[63] Maddala 2001, 335-336.

[64] As a robustness check, the statistical significance of the independent variables is the same in ordinary least-squares regression as in Tobit. These results are not presented, but are available from the author.

Results of the Tobit Models

The presentation of the results begins by evaluating the first-stage models for *MFN Tariffs* and *NTB Coverage,* and then discusses the results of the second-stage models for the dependent variable of interest, *NAFTA Origin Rule.*

First-Stage Estimates for MFN Tariffs and NTB Coverage

In the first part of the analysis, *MFN Tariffs* and *NTB Coverage* are a function of the explanatory factors that influence *NAFTA Origin Rule* and a set of exogenous factors important to the political economy of trade protection but not directly related to *NAFTA Origin Rule.* The purpose of the first-stage regression is not to test specific hypotheses about the determinants of tariff and non-tariff barriers, but simply to verify that the model specification is reasonable, the fit good, and the instruments valid.

Table 3 displays the first-stage Tobit estimates for *NTB Coverage.* In these models, five of the six exogenous instruments are significant at the .05 level. Non-tariff barriers are less prevalent in industries with high levels of *Intermediate Imports,* as expected. *Export Dependence* and *Hourly Wage* also are negatively associated with *NTB Coverage,* suggesting that a strong export orientation and less labor-intensive production reduce the incentives for trade protection. The negative sign for *R&D Employment* indicates that industries specializing in the production of intellectual property have less need for trade protection. The positive sign for *Capital-Labor Ratio* is counterintuitive, however, as it indicates that capital-intensive industries have more non-tariff barriers, controlling for the other instruments.

Table 4 presents the first-stage Tobit estimates for *MFN Tariffs.* In this case, three of the exogenous instruments are consistently significant at the .05 level. The most important determinants of tariffs are *Finished Imports*, *Export Dependence,* and *Hourly Wage. Capital-Labor Ratio* is marginally significant, but *Intermediate Imports* and *R&D*

Employment are not significant.

Comparing the two sets of models in Table 3 and Table 4, tariffs are higher and non-tariff barriers more prevalent in geographically concentrated industries, consistent with Busch and Reinhardt.[65] Industries that are concentrated across electoral districts also have higher tariffs and more non-tariff barriers, a result that counters McGillivray's theoretical expectations, but *Large, Decentralized Industries* receive higher tariffs as well (though not more non-tariff barriers).[66] *Returns to Scale* has a negative effect on *NTB Coverage* in Table 3, indicating that industries with large returns to scale tend to have fewer non-tariff barriers. Surprisingly, involvement in *Offshore Assembly* leads to more non-tariff barriers. Neither *Returns to Scale* nor *Offshore Assembly* is statistically significant in the models for *MFN Tariffs* in Table 4, however.

In sum, the first-stage models produce several valid exogenous instruments. The explanatory power of the instruments in the reduced-form equations indicates that the relationship between external trade protection and *NAFTA Origin Rule* in the second-stage models is purely the influence of the instrumental variables on *MFN Tariffs* and *NTB Coverage*, and therefore that the estimated coefficients are unbiased.

Second-Stage Estimates for NAFTA Origin Rule

In the second-stage estimates for *NAFTA Origin Rule*, the predicted values for *MFN Tariffs* and *NTB Coverage* in the first stage are entered as fixed regressors. In my interpretation, the instrumented forms of external trade protection capture basic motives for stringent rules of origin to prevent non-participants in an FTA from evading extant tariffs and non-tariff barriers. In addition to incentives to maintain external trade protection, however, considerations such as large returns to scale and involvement in

[65] Busch and Reinhardt 1999.

[66] McGillivray's model of U.S. tariffs in 1979 produces the same outcome. McGillivray 2004, 86.

multi-stage production enter industry calculations to seek rules of origin of varying restrictiveness. Thus, while some of the factors that influence tariffs and non-tariff barriers affect rules of origin as well, there are distinct variables conditioning each.

Table 5 displays the second-stage Tobit estimates for *NAFTA Origin Rule* using *NTB Coverage* as the instrumented variable. Comparing the three models, all of the variables representing industry preferences and organizational abilities have the same signs and significance levels. The Wald test statistic, reported at the bottom of Table 5, rejects the null hypothesis of no endogeneity at the .001 level in all specifications. Instrumenting for *NTB Coverage* therefore appears appropriate.

The results in Table 5 conform to theoretical expectations for the key independent variables. Notably, *Returns to Scale* is positively signed and statistically significant in all of the models: rules of origin were more stringent the larger the returns to scale, all else equal. This result supports the article's first hypothesis that producers with significant economies of scale will have incentives to block outsiders from gaining FTA privileges. The statistically significant negative sign for *Offshore Assembly* verifies that involvement in multi-stage production reduces interest in strict rules of origin. The instrumented variable *NTB Coverage* is positively signed and significant as well: as expected, industries with widespread non-tariff barriers received more stringent rules of origin to prevent circumvention by exporters outside the FTA.

The estimates for the control variables yield two interesting results. First, *Geographic Concentration* has a statistically significant negative effect on *NAFTA Origin Rule.* This indicates that while some industries with restrictive rules of origin (such as textiles) may have been spatially localized, generally geographic concentration was associated with more lax rules of origin. Second, the three proxy variables for political influence in the second model– *Electoral Concentration, Industry Size,* and *Large, Decentralized Industries*– are negatively signed, with the last of the three statistically significant at the .05 level. This result is counterintuitive in that the industries thought to

have the greatest electoral advantages received less restrictive rules of origin. Finally, rules of origin were more restrictive in industries located in the districts of Democratic House leaders and more permissive in industries located in the districts of Republican House leaders, though neither variable is statistically significant.

Table 6 shows the results for *NAFTA Origin Rule* with *MFN Tariffs* as the instrumented variable. As in the previous set of models, the results are robust to the inclusion of control variables and the Wald test statistic rejects the null hypothesis of no endogeneity at the .001 level in all specifications. *Returns to Scale* is again positively signed and significant, as the first hypothesis anticipates, and *Offshore Assembly* is negatively signed and significant, consistent with the second hypothesis. *MFN Tariffs* also exert strong influence on rules of origin, as the third hypothesis predicts: industries with higher tariffs received more restrictive rules of origin to block the use of Mexico (and Canada) as an "export platform" to the United States. Rules of origin also were more permissive in *Large, Decentralized Industries.* The other political and institutional variables are not statistically significant.

Interpreting the substantive impact of the Tobit coefficients in Table 5 and Table 6 requires additional manipulation. Unlike ordinary least-squares coefficients, which measure the marginal effect on *y* of a discrete change in *x*, the coefficients in the censored regression model incorporate the marginal change in the observed *y* for observations above the limit and the change in the probability of an observed *y* being above the limit.[67] As a result, substantive interpretation depends on the type of outcome– observations at the limit and observations above the limit– corresponding to the different components of the Tobit likelihood function.[68] In the case of *NAFTA Origin Rule,* there are no

[67] McDonald and Moffitt 1980.

[68] In two-limit Tobit there are three components to account for left-censoring, right-censoring, and no censoring.

observations at the lower limit and only eighteen (4.7 percent of the sample) at the upper limit. Marginal effects for non-limit values therefore offer more useful information about the impact of the independent variables than changes in the predicted probability of limit outcomes. Obtaining marginal effects for non-limit outcomes involves scaling the Tobit coefficients by the sample proportion of non-limit observations: the marginal effect is the coefficient multiplied by the probability of a non-limit outcome.[69]

Instead of reporting a single marginal effect for the key independent variables, Table 7 displays predicted outcomes for *NAFTA Origin Rule* with discrete changes in *Returns to Scale, Offshore Assembly, NTB Coverage,* and *MFN Tariffs* individually, holding other independent variables at their mean values. These figures reveal the largest marginal effects for external trade protection: *NAFTA Origin Rule* increases by 1.93 as *NTB Coverage* changes from low to high and 1.19 as *MFN Tariffs* changes from low to high. Given that a one point increase in the rule of origin index is equivalent to adding a value content test to the change in tariff classification requirement, this is a substantial change. The impact of *Returns to Scale,* though not as large, is considerable: as *Returns to Scale* increase from low (diseconomies of scale) to high (moderately large returns to scale), the rule of origin index increases by 0.55 in Table 5 and 0.31 in Table 6. By comparison, the effect of *Offshore Assembly* is smaller, as a shift from low to high changes *NAFTA Origin Rule* by -0.29 in Table 5 and -0.14 in Table 6. Because the "high" figure for *Offshore Assembly* (0.032) falls in the 95th percentile of a skewed distribution, multi-stage production appears to have restrained rules of origin primarily in the few industries heavily engaged in offshore assembly.

Overall, the Tobit models strongly support the hypotheses in the article's analytical section. Controlling for external trade protection, rules of origin tend to be more stringent the larger the returns to scale at the industry level (hypothesis 1), while

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[69] Greene 1999.

involvement in multi-stage production limits the restrictiveness of rules of origin (hypothesis 2). Finally, industries highly protected with tariffs and non-tariff barriers tend to receive tougher rules of origin (hypothesis 3).

These findings illuminate two important elements of industry lobbying on NAFTA rules of origin. First, the effect of large returns to scale explains why some low-tariff U.S. industries were so insistent on tough rules of origin. For instance, automobile executives strenuously complained when the value content rule was set lower than their desired 65 percent, to which a perplexed deputy U.S. Trade Representative responded: "We're talking about a 2.5 percent difference on a 2.5 percent tariff."[70] For U.S. firms, the value content test was critical to compel foreign rivals to source major components in NAFTA so that Japanese assemblers could not satisfy the rule of origin at the same production costs in the period while U.S. firms restructured to gain economies of scale. Moreover, German and Korean automakers that were not already established in North America would be more restrained from entering if they had to achieve large-scale production of expensive components such as power trains.

Second, the empirical models demonstrate how the global supply operations of firms in industries heavily involved in multi-stage production acted as a brake on tough rules of origin. Computer equipment and electronic components are two such examples: firms traded intensely with Mexican and Asian suppliers, and they objected to rules of origin that would penalize sourcing outside NAFTA. IBM reportedly "had a fit" over a plan to require North American production of motherboards, screens, and hard drives for computers.[71] Instead, rules of origin were left flexible, and NAFTA countries agreed on a low common MFN tariff– an externally liberalizing outcome.

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[70] Mayer 1998, 142-143.

[71] Cameron and Tomlin 2000, 90.

Conclusion

FTAs, unlike customs unions, leave national tariffs and non-tariff barriers toward nonmembers unchanged. Because external trade protection is not part of the agreement, industry pressure is diverted into influencing how fast internal trade barriers come down and what goods qualify for FTA privileges. But while industries have tried persistently to manipulate rules of origin in NAFTA and other FTAs, to date there has been no systematic analysis of the industry-level determinants of rules of origin.

The theoretical approach in this article suggests that the design of rules of origin is critical to forging coalitions between prospective winners of an FTA and neutralizing opposition from industries that expect losses. Notably, the factors that motivate support for an FTA are not the same as the factors that motivate support for strict rules of origin: industries with large returns to scale need relatively stringent rules of origin to gain scale economies in an FTA, while industries engaged in multi-stage production need accommodating rules of origin to permit sourcing outside the FTA.

Understanding domestic compromises between liberalizing and protectionist interests illuminates the political economy of FTA formation. Explaining motives to protect free trade, however, requires attention to variables omitted from standard trade models. The origin of goods is straightforward and trivial when production is national rather than global and returns to scale are constant instead of variable. Current policy issues such as rules of origin are not easily explained in terms of models of trade in end products made wholly in one country subject to constant returns to scale. This article shows how increasing returns to scale and multi-stage production interact to determine a new form of trade protection that is growing in importance: rules of origin.

Two problems are left for future research. First, the analysis assumes that rules of origin are domestically determined, but the preferences of other countries in the negotiations and bargaining at the country level are likely to matter as well. Interstate bargaining is important to FTA rules of origin because compromises and trade-offs of

national preferences to reach an agreement may weaken the influence of domestic interests. In NAFTA, for example, Canada pushed to moderate some of the toughest rules of origin to preserve incentives for foreign firms to invest in North America. Strategic interaction among countries may take on even greater importance where power is evenly distributed across FTA members. Future research should address how interstate bargaining influences FTA provisions such as rules of origin.

A second unresolved puzzle is the policymaking process that aggregates industry demands. In NAFTA, rules of origin were less restrictive in geographically concentrated and large, politically dispersed industries– precisely the industries thought to be most influential at gaining trade protection. One explanation for this anomaly is that existing theories are limited to cases where the legislature makes trade policy, or where legislative principals closely control bureaucratic agents. In trade negotiations involving the United States under Fast Track rules, however, legislative influence is indirect and occurs mostly at the delegation and ratification stages. The effect is that "trade negotiators look for particularized benefits they can offer important industries in exchange for their support."[72] In this setting, influential industries may not be geographically concentrated, large and politically dispersed, or located in the districts of institutionally powerful representatives. Rather, industries important to potential veto points– specific legislators whose votes are needed for ratification, as the example of textile rules of origin in CAFTA illustrates– are likely to be favored.[73] Future research should examine how

[72] Destler 2006, 179. As one trade official explains, "[w]e sit down and evaluate who will be pissed off or will support this" so members of Congress can be persuaded that "we have all these important sectors on board, and the sensitive sectors are quiet." Cameron and Tomlin 2000, 167.

[73] Similarly, the introduction of the yarn-forward rule of origin in NAFTA induced six members of North Carolina's house delegation to support ratification in 1993 after opposing Fast Track in 1991. Destler 2006, 180-182.

provisions such as rules of origin affect the political viability of FTAs to determine the number and type of legislative votes that actually hinge on these special forms of trade protection.

Appendix A. Sources of Study Variables

Dependent Variable

NAFTA Origin Rule: Rules of origin index values for six-digit HTS product codes are from data provided to the author from Estevadeordal 2000. HTS product codes were matched to SIC codes using a concordance file at: http://www.som.yale.edu/faculty/pks4/files/international/concordance_8901.asc.

Independent Variables

NTB Coverage: Coverage ratios for six-digit HTS product codes were compiled from UNCTAD 1995a. Import weights are from USITC Interactive Tariff and Trade Dataweb, http://dataweb.usitc.gov. These data were matched to SIC codes using the concordance file cited in the previous entry.

MFN Tariffs: U.S. tariff rates were calculated from USITC Interactive Tariff and Trade Dataweb, http://dataweb.usitc.gov.

Offshore Assembly: OAP trade is from data provided to the author on request from Feenstra, Hanson, and Swenson 2000. Shipments are from U.S. Department of Commerce 1997.

Returns to Scale; Industry Concentration; Industry Size; Hourly Wage; Capital-Labor Ratio: Calculated from U.S. Department of Commerce 1997.

Geographic Concentration: Busch and Reinhardt 1999. These data are available at:

http://userwww.service.emory.edu/~erein/research/#geocon.

Electoral Concentration; Democratic Leadership; Republican Leadership: Industry employment at the county level was compiled from U.S. Department of Commerce 1994. Counties were aggregated into Congressional districts using an electoral district mapping file for the 102nd Congress provided to the author from Ladewig 2006.

Intermediate Imports; Finished Imports: Import values are from Schott 2004. These data are available at: http://www.som.yale.edu/faculty/pks4/files/international/parts_imports_7201_20040413.dta. Shipments are from U.S. Department of Commerce 1997.

Export Dependence: Exports were compiled from USITC Interactive Tariff and Trade Dataweb, http://dataweb.usitc.gov. Shipments are from U.S. Department of Commerce 1997.

R&D Employment: Calculated from an Occupational Employment Statistics data file provided to the author by Michael Soloy of the U.S. Bureau of Labor Statistics.

Appendix B. Descriptive Statistics.

Variable	*Mean*	*Std. dev.*	*Min.*	*Max.*
NAFTA Origin Rule	4.876	1.111	2.000	7.000
NTB Coverage	0.182	0.299	0.000	1.000
MFN Tariffs	0.046	0.041	0.000	0.268
Returns to Scale	0.074	0.090	-0.296	0.440
Offshore Assembly	0.008	0.027	0.000	0.308
Industry Concentration	0.400	0.206	0.000	0.940
Geographic Concentration	0.436	0.108	0.194	0.790
Electoral Concentration	0.036	0.042	0.003	0.375
Industry Size (10^{-4})	3.698	5.232	0.070	43.990
Large, Decentralized Industries (10^{3})	-0.005	0.018	-0.264	-0.000
Democratic Leadership	2.157	3.309	0.000	28.000
Republican Leadership	2.272	3.407	0.000	27.000
Intermediate Imports	0.016	0.036	0.000	0.294
Finished Imports	0.138	0.175	0.000	1.000
Export Dependence	0.139	0.144	0.000	1.385
Hourly Wage	10.638	2.916	4.957	21.260
R&D Employment	0.009	0.014	0.000	0.082
Capital-Labor Ratio	0.199	0.198	0.014	1.698

Table 1. Coding for *NAFTA Origin Rule*

Index Value	*Description*
1	Change in tariff item (8-digit HTS)
2	Change in tariff subheading (6-digit HTS)
3	Change in tariff subheading + value content test
4	Change in tariff heading (4-digit HTS)
5	Change in tariff heading + value content test
6	Change in tariff chapter (2-digit HTS)
7	Change in tariff chapter + technical process test

Table 2. Variables, Measurement, and Expected Signs

Variable	*Measurement*	*Expected sign in second-stage model*
NAFTA Origin Rule	Rule of origin restrictiveness	DV
NTB Coverage	Non-tariff barrier coverage ratio	+
MFN Tariffs	Duties collected as a share of imports for all countries except Mexico, Canada, and Israel	+
Returns to Scale	Elasticity of value added per worker with respect to plant size	+
Offshore Assembly	Foreign content of imports under HTS Chapter 9802 divided by the value of shipments	–
Industry Concentration	Percentage of shipments by the four largest firms	+
Geographic Concentration	Industry concentration across geography	+
Electoral Concentration	Industry concentration across electoral districts	–
Industry Size	Industry employment	+
Large, Decentralized Industries	Interaction of *Electoral Concentration* and *Industry Size*	+
Democratic Leadership	Number of Democratic leaders with the industry in their district	+
Republican Leadership	Number of Republican leaders with the industry in their district	+
Intermediate Imports	Imports of parts divided by consumption (shipments plus imports minus exports)	
Finished Imports	Imports of finished goods divided	

	by consumption (shipments plus imports minus exports)	
Export Dependence	Exports divided by the value of shipments	
Hourly Wage	Average hourly wage of workers	
R&D Employment	Percentage of workers employed in research and development	
Capital-Labor Ratio	Capital expenditures divided by payroll	

Table 3. First-Stage Tobit Estimates for *NTB Coverage*

Variable	*Model 1*	*Model 2*	*Model 3*
Returns to Scale	-0.470**	-0.350*	-0.474**
	(0.161)	(0.165)	(0.162)
Offshore Assembly	1.455**	1.573**	1.472**
	(0.513)	(0.541)	(0.514)
Industry Concentration	-0.110	-0.148	-0.113
	(0.073)	(0.091)	(0.077)
Geographic Concentration	0.746***		0.745***
	(0.129)		(0.131)
Electoral Concentration		1.453**	
		(0.561)	
Industry Size		0.000	
		(0.003)	
Large, Decentralized Industries		2.408	
		(1.566)	
Democratic Leadership			-0.001
			(0.007)
Republican Leadership			-0.000
			(0.007)
Intermediate Imports	-0.576*	-0.722*	-0.580*
	(0.287)	(0.324)	(0.280)
Finished Imports	0.129*	0.128	0.115
	(0.065)	(0.072)	(0.064)
Export Dependence	-0.160*	-0.203*	-0.144*
	(0.073)	(0.082)	(0.072)
Hourly Wage	-0.022***	-0.024***	-0.022***
	(0.005)	(0.005)	(0.005)
R&D Employment	-2.191**	-2.754***	-2.281***
	(0.712)	(0.795)	(0.701)

Capital-Labor Ratio	0.218***	0.224***	0.220***
	(0.056)	(0.062)	(0.055)
Constant	0.144	0.473***	0.148
	(0.078)	(0.055)	(0.079)

Note: Cell entries are two-limit Tobit coefficients, with a lower limit at 0 and an upper limit at 1. Standard errors are in parentheses. Exogenous instruments appear below the dashed line. $N = 381$.

***p < .001 **p < .01 *p < .05

Table 4. First-Stage Tobit Estimates for *MFN Tariffs*

Variable	*Model 1*	*Model 2*	*Model 3*
Returns to Scale	-0.041	-0.028	-0.039
	(0.021)	(0.022)	(0.021)
Offshore Assembly	0.009	0.028	0.011
	(0.067)	(0.071)	(0.067)
Industry Concentration	0.005	-0.002	0.003
	(0.010)	(0.012)	(0.010)
Geographic Concentration	0.085***		0.079***
	(0.017)		(0.017)
Electoral Concentration		0.192**	
		(0.072)	
Industry Size		-0.000	
		(0.000)	
Large, Decentralized Industries		0.436*	
		(0.201)	
Democratic Leadership			0.002
			(0.001)
Republican Leadership			-0.002*
			(0.001)
Intermediate Imports	-0.018	-0.036	-0.027
	(0.049)	(0.050)	(0.048)
Finished Imports	0.047***	0.046***	0.043***
	(0.011)	(0.012)	(0.011)
Export Dependence	-0.050***	-0.055***	-0.046***
	(0.013)	(0.013)	(0.013)
Hourly Wage	-0.006***	-0.006***	-0.006***
	(0.001)	(0.001)	(0.001)
R&D Employment	-0.048	-0.118	-0.096
	(0.129)	(0.132)	(0.127)

Capital-Labor Ratio	0.023*	0.021	0.025*
	(0.010)	(0.011)	(0.010)
Constant	0.066***	0.104***	0.070***
	(0.010)	(0.008)	(0.010)

Note: Cell entries are two-limit Tobit coefficients, with a lower limit at 0 and an upper limit at 1. Standard errors are in parentheses. Exogenous instruments appear below the dashed line. $N = 379$.

***p < .001 **p < .01 *p < .05

Table 5. Second-Stage Tobit Estimates for *NAFTA Origin Rule* using *NTB Coverage*

Variable	*Model 1*	*Model 2*	*Model 3*
NTB Coverage	4.220***	3.587***	4.459***
	(0.930)	(0.754)	(0.975)
Returns to Scale	3.292**	2.445**	3.462**
	(1.028)	(0.864)	(1.059)
Offshore Assembly	-9.624**	-8.584**	-10.207**
	(3.031)	(2.818)	(3.139)
Industry Concentration	0.623	0.604	0.686
	(0.422)	(0.468)	(0.457)
Geographic Concentration	-2.304*		-2.616*
	(1.078)		(1.124)
Electoral Concentration		-5.677	
		(2.962)	
Industry Size		-0.005	
		(0.013)	
Large, Decentralized Industries		-18.326*	
		(7.526)	
Democratic Leadership			0.062
			(0.040)
Republican Leadership			-0.051
			(0.039)
Constant	4.612***	3.923***	4.660***
	(0.340)	(0.268)	(0.364)
Log likelihood	-523.6	-535.8	-521.0
Wald χ^2	29.01***	35.70***	30.34***
Wald test of exogeneity	19.43***	19.65***	19.49***

Note: Cell entries are two-limit Tobit coefficients, with a lower limit at 1 and an upper limit at 7. Standard errors are in parentheses. $N = 381$.

***$p < .001$ **$p < .01$ *$p < .05$

Table 6. Second-Stage Tobit Estimates for *NAFTA Origin Rule* using *MFN Tariffs*

Variable	*Model 1*	*Model 2*	*Model 3*
MFN Tariffs	14.272***	13.737***	15.455***
	(3.334)	(3.287)	(3.520)
Returns to Scale	1.767*	1.523*	1.845*
	(0.732)	(0.692)	(0.739)
Offshore Assembly	-4.509*	-4.184*	-4.673*
	(2.071)	(2.069)	(2.101)
Industry Concentration	0.200	0.194	0.261
	(0.296)	(0.356)	(0.319)
Geographic Concentration	-0.154		-0.299
	(0.627)		(0.637)
Electoral Concentration		-2.985	
		(2.275)	
Industry Size		-0.001	
		(0.011)	
Large, Decentralized Industries		-16.604**	
		(6.003)	
Democratic Leadership			0.023
			(0.030)
Republican Leadership			-0.012
			(0.030)
Constant	4.022***	4.036***	3.982***
	(0.250)	(0.241)	(0.273)
Log likelihood	246.7	240.2	250.9
Wald χ^2	32.11***	36.50***	35.20***
Wald test of exogeneity	13.51***	11.15***	15.08***

Note: Cell entries are two-limit Tobit coefficients, with a lower limit at 1 and an upper limit at 7. Standard errors are in parentheses. $N = 379$.

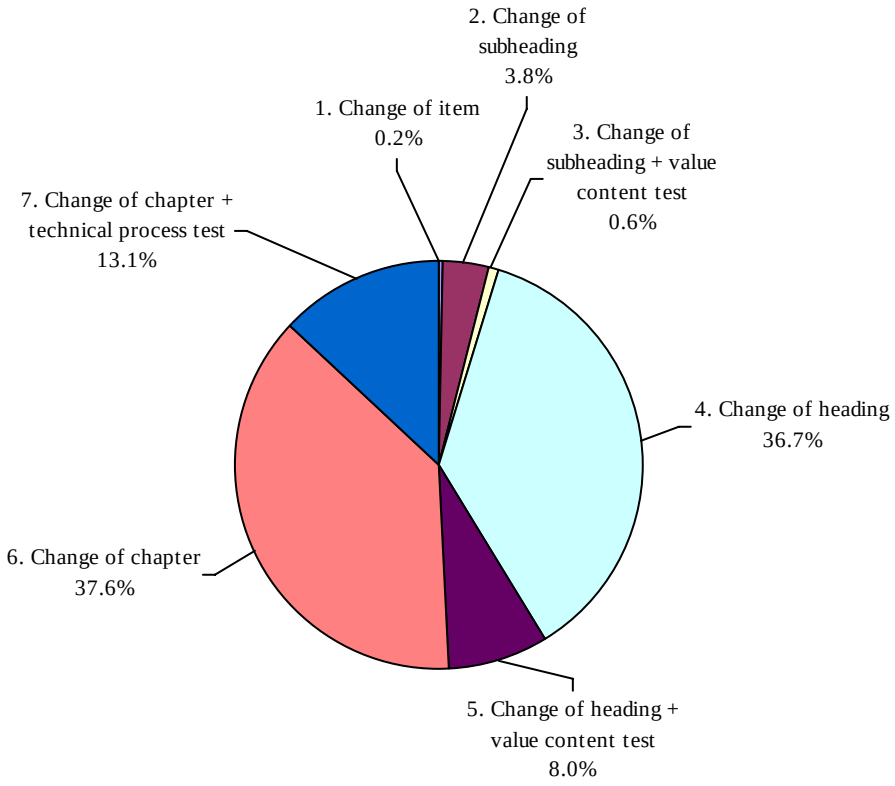
***$p < .001$ **$p < .01$ *$p < .05$

Table 7. Marginal Effects for Key Independent Variables

Value of:	*Predicted value for NAFTA Origin Rule*	
Returns to Scale	*Table 5*	*Table 6*
Low (-0.018)	4.54	4.64
High (0.166)	5.08	4.95
Change from low to high	0.55	0.31
Offshore Assembly	*Table 5*	*Table 6*
Low (0.000)	4.88	4.83
High (0.032)	4.59	4.69
Change from low to high	-0.29	-0.14
NTB Coverage	*Table 5*	
Low (0.000)	4.11	
High (0.486)	6.04	
Change from low to high	1.93	
MFN Tariffs		*Table 6*
Low (0.005)		4.20
High (0.088)		5.39
Change from low to high		1.19

Note: Categories for *Returns to Scale*, *Offshore Assembly*, *NTB Coverage*, and *MFN Tariffs* are values at one standard deviation below the mean (low) and one standard deviation above the mean (high). Predicted values for *NAFTA Origin Rule* are averages across the three models in Table 5 and Table 6, conditional on non-limit outcomes, with all other variables held constant at their mean values.

Figure 1. Distribution of NAFTA Rules of Origin



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