Fast-Track Authority: A Hold-Up Interpretation.*

Levent Celik† Bilgehan Karabay‡ John McLaren§

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Abstract

Under Fast-Track Authority (FT), the US Congress commits to an up-or-down vote without amendments for any trade agreement presented for ratification. We interpret FT in terms of a hold-up problem. If the US negotiates an agreement with a smaller economy, businesses there may make sunk investments for the US market. At the ratification stage, the partner economy will be locked in to the US in a way it was not previously and Congress can make changes adverse to the partner, so to convince the partner to negotiate, it must first commit not to amend the agreement. FT is then Pareto-improving.

Keywords: Fast-Track Authority; Trade Policy; Hold-up; Rules of Origin; Trade Agreements.

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†City, University of London, Northampton Square, London EC1V 0HB, UK; CERGE-EI (a joint workplace of Charles University and the Economics Institute of the Academy of Sciences of the Czech Republic), Prague, Czech Republic; and National Research University Higher School of Economics, Moscow, Russia. E-mail: levent.celik@city.ac.uk. URL: https://sites.google.com/site/celiklev.

‡School of Economics, Finance and Marketing, RMIT University, Building 80, Level 11, 445 Swanston Street, Melbourne, VIC 3000, Australia. E-mail: bilgehan.karabay@gmail.com. URL: http://bilgehan.karabay.googlepages.com.

§Department of Economics, University of Virginia, P.O. Box 400182, Charlottesville, VA 22904-4182. E-mail: jmclaren@virginia.edu. URL: http://people.virginia.edu/~jem6x.

1 Introduction

A central institution of US trade policy is the practice by which Congress from time to time commits in advance not to amend a trade agreement that is presented to it for ratification, but to subject the agreement to an up-or-down vote. This institution, which delegates a portion of Congress' authority to the executive branch, has been called *Fast-Track Authority* (FT) in the past, and is often now referred to as *Trade-Promotion Authority*.

Almost all major trade agreements into which the US has entered have been negotiated under FT to some degree.[1,2] A natural question is why Congress would ever be interested in delegating any of its authority in this way. We offer a new interpretation of FT based on a hold-up problem. In brief, if the US negotiates a trade agreement with a smaller economy, then as the negotiations proceed, businesses in the partner economy may make investments to prepare to take advantage of the US market – quality upgrades to meet the expectations of the demanding US consumer, changes in packaging and adjustments to US regulations, searching for and negotiating with US partner firms to develop marketing channels, and so on. A portion of these investments are likely to be sunk and specific to the US market.[3] When the time comes for ratification of the final agreement, the partner economy will be locked in to the US market in a way it was not previously. If Congress is able to amend the agreement, it can make changes that are adverse to the partner but beneficial to the US. Given the *ex post* diminution of the partner country's bargaining power due to the sunk investments, it may well acquiesce in these changes, thereby accepting an agreement that makes it worse off than if it had never negotiated with the US at all. As a result, if the US wants to convince such a partner country to negotiate a trade deal, it must commit *first* not to amend the agreement *ex post* – the purpose of Fast-Track Authority.[4]

[1] A brief summary of FT's historical background is provided in our working paper, Celik *et al.* (2018). See also Smith (2006), Tucker and Wallach (2008), and Fergusson (2015).

[2] The only agreements negotiated without FT at all are the Canada-US Auto Pact of 1965 (Tucker and Wallach, 2008, pp. 43-45) and the free-trade agreement with Jordan (Okun-Kozlowicki and Horwitz, 2013, p. 4). However, the Trans Pacific Partnership (TPP) was negotiated without FT, under anticipation that FT would be passed by the time of the ratification process (Okun-Kozlowicki and Horwitz, 2013, p. 7). (That turned out to be correct, but it was a moot point because the executive branch eventually withdrew from the agreement.) We will return in the conclusion to the small number of anomalous cases of agreements signed without FT.

[3] We provide some examples of anticipatory sunk costs in exporting in our working paper, Celik *et al.* (2018). More examples can be found in Freund and McLaren (1999, pp. 22-24).

[4] It can be objected that Congress could always pass a repeal of its FT power immediately before the ratification is due, thus undoing the commitment. This is technically true, if the President could be persuaded

This interpretation joins a number of others suggested by other authors. Lohmann and O'Halloran (1994) suggest that FT is used to avoid a 'log-rolling' problem, in which Congress would otherwise be stuck in a bad equilibrium whereby each member votes for trade protection for other members' constituent industries in return for protection for its own. Delegation to the President is seen as a way of reaching a Pareto-superior outcome of more open trade. Conconi *et al.* (2012) suggest that FT can be a way export interests in Congress can pry trade policy influence away from protectionists in Congress and hand it to a less-protectionist executive. Celik *et al.* (2015) suggest that FT may be a way to get out of an inefficient congressional bargaining equilibrium in which each member tries to secure the maximum possible protection rents for her own constituents and to cobble together a bare protectionist majority coalition to achieve it. Amador and Bagwell (2018) suggest that Congress may delegate trade policy authority if the executive branch has superior information, for example about the foreign partner's ability to commit not to invoke hidden forms of protection.[5] Our hold-up interpretation is different than these other interpretations since it explains why the partner country government would need FT for negotiations even to begin with.[6]

This insistence is emphasized by Hermann von Bertrab, the chief negotiator for the Mexican government on the North American Free Trade Agreement (NAFTA). His interpretation of FT is that it "grew out of a perceived need to negotiate with other countries in good faith," and that "Foreign countries would otherwise hesitate even to begin the process of negotiations." (Bertrab, 1997, p. 1) More broadly, the view that partner countries need FT in order to have the 'confidence' required to negotiate a trade agreement with the US is expressed frequently by observers of the history and politics of FT.[7] As one pundit put it, "Many in Congress view Fast Track as a hammer to drive reluctant nations to the negotiating table because what's agreed to between the dealmakers cannot be changed by those

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to sign such a bill, but such a move would be extremely costly to Congress as a matter of reputation. We assume, in effect, that the reputational damage would be sufficient deterrent.

[5] Their main question is why Congress has in the past often used a tariff floor as the form of delegation, such as was often the case under the Reciprocal Trade Agreements Act of 1934.

[6] In the base case specification of Conconi *et al.* (2012), the partner government always prefers to negotiate with the US under FT, since it places US bargaining authority in the hands of the president, who is less protectionist than the congressional governing coalition that will form without FT. Nevertheless, the lack of FT is not a reason by itself for the partner government to make FT a pre-condition for negotiations. One could, however, add to that model a sunk cost of bargaining and establish some conditions under which the partner would insist on FT before negotiations begin. This would be a theory complementary to our model.

[7] See, for example, p. 34 and p. 36 of the report by Committee on Finance, United States Senate, 2007 and also Koh (1992, p. 148).

picky partisans in Congress (Guebert, 2014)."[8]

One major innovation of the current paper is to introduce such strategic considerations into a model in which the policy variables are not tariffs but rather rules of origin (ROO). This is realistic in the context of free trade agreements, since WTO rules require internal tariffs in a free-trade agreement to be set equal to zero, but ROO's can be set as part of the agreement in a restrictive manner that reduces or eliminates the benefits of tariff reductions.[9] In general, an ROO is an agreed-upon rule for which products can be considered to have originated in the countries that are parties to a free-trade agreement, and therefore are eligible to be shipped from one member country to another tariff-free.

The analysis of optimal (and equilibrium) ROO's is qualitatively quite different from the corresponding analysis of tariffs. It turns out that optimal ROO's quite often take the form of a corner solution, and when ROO's serve a protectionist function there are cases in which an increase in protectionism can worsen rather than improve the terms of trade of the country using it. These are starkly different from results obtained with tariffs (for a survey on tariffs, see McLaren, 2016). We allow for ROO's to be set differently for different industries, so both the level and the inter-industry pattern of ROO's are endogenous. We show conditions such that in equilibrium the *ex ante* optimal level of ROO's from the US point of view are not optimal *ex post*, after the partner country's firms have sunk their investments. *Ex post*, Congress would want to tighten those ROO's, extracting more rents from the partner country. This is the source of the hold-up problem that emerges, and is a major departure from the earlier FT papers, all of which focus on tariffs. In addition, we show how the hold-up problem can be qualitatively changed by strong backward and forward linkages, which is a new element to the literature.

Prior work. In formalizing our interpretation of Fast-Track Authority, we draw on a wide range of prior work. The idea that firms wishing to export to a given destination must make sunk investments to do so has been explored in many ways. Verhoogen (2008) shows

[8] This is also in line with then-White House Chief of Staff Erskine Bowles (1997) arguing that Fast Track would give the president "the credibility to negotiate tough trade deals because other nations know agreements will not be reopened provision-by-provision by Congress," and Bagwell (1997) arguing that without Fast Track the president's "ability to negotiate valuable trade agreements with foreign trading partners would be compromised."

[9] In practice, ROO's are a focus of much (perhaps most) of the contentious issues in the negotiation of free-trade agreements. Indeed, as of this writing they are the topic of major announcements regarding negotiations on NAFTA revisions (Bown, 2018). See Celik *et al.* (2018) for further examples.

that Mexican firms that begin to export to the US typically upgrade their quality of goods intended for the US market. Hallak and Sivadasan (2013) show how the need to upgrade quality for a high-income export market helps fit firm-level data on trade flows. Handley (2012) and Handley and Limão (2015) show that sunk costs to export to a specific destination can help explain the response of trade flows to uncertainty about trade policy. For example, they show that a significant portion of the trade response observed when Portugal joined the European Economic Community (EEC) can be explained by the elimination of uncertainty about EEC tariffs against Portugal.[10]

The effects of sunk costs or anticipatory investment on equilibrium policy have been studied from a number of angles. Staiger and Tabellini (1989) study time consistency of optimal policy when private resource allocation decisions are made in anticipation of policy. McLaren (1997) shows how anticipatory investment can cause a small country to suffer from a hold-up problem in liberalizing trade with a larger one, and McLaren (2002) shows how similar considerations can lead to the world dividing up into inefficient, exclusionary trade blocks rather than multilateral free trade. Maggi and Rodríguez-Clare (2007) show how similar considerations can motivate a trade agreement as a commitment device to hedge against the influence of domestic political interest groups. Chisik (2003) shows how sunk investments in an export sector can result in gradualism in bilateral trade liberalization as a way of softening incentive-compatibility constraints worsened by the hold-up problem. Chisik (2012) shows that in the presence of periodic trade wars or disputes between trade partners export-sector firms can be deterred from making sunk investments in product quality.

We also make use of tools from the literature on the effects of ROO's. Grossman (1981) studies domestic content rules, whose properties are almost identical to ROO's, while Krishna and Krueger (1995) study a simple model of ROO's, showing how equilibrium is changed qualitatively when the ROO is strict enough that firms have no incentive to comply with it. Falvey and Reed (2002) study a model of optimal tariff preferences and ROO's for a country that imports a final good and does not produce the input required for it. Ju and Krishna (2005) show that the comparative statics of equilibrium with respect to ROO's in

[10] Sunk investments and hold-up in trade are important for different reasons in the industrial-organization literature. Ornelas and Turner (2008; 2011) show how import tariffs can affect organizational form decisions by firms that need specialized inputs in a setting with incomplete contracting. For example, a tariff reduction can induce a downstream firm to integrate vertically with its foreign supplier, magnifying the effect of trade liberalization on trade flows.

a free-trade agreement have important non-monotonicities when the compliance constraint becomes binding. Duttagupta and Panagariya (2007) show how ROO's can make a free-trade agreement politically feasible (possibly at the same time making it inefficient). Overviews are provided by Falvey and Reed (1998) and Krishna (2006). Empirically, Anson *et al.* (2005) use a qualitative measure of restrictiveness of ROO's to show that more restrictive ROO's in NAFTA tend to reduce Mexican exports to the US, *ceteris paribus*. Conconi *et al.* (2018), also focussing on NAFTA, show that inputs with more ROO's attached to them tend to have lower imports into Mexico from the rest of the world, *ceteris paribus*.

We contribute to the theoretical literature on ROO's through an analysis of the *optimal profile of ROO's across industries* in a model with many industries, each of which draws inputs from many industries, which is quite different from what emerges in a model with one final good and one tradeable input.[11] One highlight is the finding that equilibrium ROO policy treats different industries very differently even if the industries are symmetric. Another is to show that the effect of ROO's can be qualitatively different in the presence of strong backward and forward linkages compared to weak ones.[12]

In the following section we lay out the model, including consumption, production, bargaining, and how ROO's work. The following three sections show how the model works under FT: Section 3 derives equilibrium conditions under FT including the form of optimal ROO policy; Section 4 shows how to calculate welfare; and Section 5 derives the full equilibrium under FT. Section 6 analyzes the equilibrium without FT. Section 7 then analyzes the choice of whether or not to use FT in the case of weak backward and forward linkages, while Section 8 discusses the case with strong linkages. The last section summarizes our results and concludes.

[11] In this regard, we do something for ROO's analogous to what Costinot *et al.* (2015) do for tariffs.

[12] The backward and forward linkages can have a profound effect on the way the hold-up problem works and even change its direction (unlike simpler hold-up models such as McLaren (1997)). As we discuss in the final section, this may help us understand some of the unusual cases in which FT does not seem to have been necessary.

2 Model

2.1 Overview.

Our model includes the US, a partner country that we will call Mexico (M), and a non-member country (N). In order to allow for US policy on ROO's to pose a potential hold-up threat, it must be the case that Mexican manufacturers produce using both North-American-produced inputs, which for concreteness we assume are produced in Mexico, and non-member produced imported inputs. In order for the ROO to have a possibility of being satisfied in non-trivial cases, it must be possible for Mexican manufacturers to substitute Mexican-produced inputs at least partially for non-member produced inputs. We allow this by specifying a Cobb-Douglas production function for Mexican manufactures that takes as arguments a composite of non-member-produced inputs, Mexican-produced inputs, and labor.

We model Mexican manufactures as produced in a monopolistically-competitive sector, which allows for the number of varieties produced to adjust to policy as an important endogenous outcome. To avoid an artificial separation between producers of industrial inputs and producers of final goods, we adopt the convenience of assuming that all manufactured goods are both final goods and inputs, just as in Krugman and Venables (1995) or Eaton and Kortum (2002). This creates a situation in which backward and forward linkages are important: An increase in demand for Mexican products can increase the range of Mexican inputs produced, lowering marginal costs for all Mexican firms. The strength of these backward and forward linkages will be an important factor in the analysis.

The inter-governmental bargaining structure is very simple. There are two periods. If Mexico agrees to negotiate, in period 1 the US executive branch makes a take-it-or-leave-it offer, which the government of Mexico either accepts or rejects.[13] At the same time, each Mexican firm decides whether or not to undertake a sunk investment in quality upgrade, which is essential to export to the US market. In period 2, if FT has been enacted, the US Congress either accepts or rejects the agreement that was struck in period 1 between the two governments, and production and consumption occur, whether there is an agreement or not.

[13] If the Mexican government had some bargaining power, that would soften the hold-up problem and shrink the region of the parameter space where FT is used.

If FT has not been enacted, then Congress may amend it;[14] if the amendments are accepted by the Mexican government, the amended agreement goes into force, otherwise there is no agreement.

2.2 Consumption.

Each individual has an identical utility function given by

$$u = \left(\frac{x_0}{\alpha}\right)^{\alpha}\left(\frac{Q}{1-\alpha}\right)^{1-\alpha},\ 0 < \alpha < 1, \tag{1}$$

where x_0 is a homogenous numeraire good, Q is a composite good and α represents the constant share of income that is spent on x_0. Let Y and P denote total spending and the aggregate price of the composite good, respectively. Solving the consumer's utility maximization problem yields

$$x_0 = \alpha Y \text{ and } Q = \frac{(1-\alpha)\,Y}{P}. \tag{2}$$

The composite good Q is represented by the analogue of the Cobb-Douglas utility function for a continuum of goods

$$\ln Q = \int_{j=0}^{1} \ln Q_j dj,$$

where Q_j represents consumption of a composite good made up of varieties of products produced by industry $j \in [0,1]$. If the set of products available in industry j is $\Omega_j \subset \Re$, then aggregate consumption in industry j is

$$Q_j = \left(\int_{i\in\Omega_j} q_j(i)^{\rho} di\right)^{\frac{1}{\rho}},\ 0 < \rho < 1,$$

which is a CES function of the consumption of different varieties of $q_j(i)$. The elasticity of substitution between varieties is given by $\frac{1}{1-\rho}$. The range of i will be endogenously determined in equilibrium.

[14] We implicitly assume that each congressional district has the same economic features, so that all members of Congress have the same preferences over policy, and so does the executive branch. See Conconi *et al.* (2012) and Celik *et al.* (2013; 2015) for legislative trade policy-making when there is conflict of interest between members of Congress.

We can derive consumer demand for a variety i in industry j, $q_j(i)$, from the minimization problem given by

$$\min_{q_j(i)} \int\limits_{i\in\Omega_j} p_j(i)q_j(i)di \text{ s.t. } Q_j = \left(\int\limits_{i\in\Omega_j} q_j(i)^{\rho} di \right)^{\frac{1}{\rho}},$$

which yields

$$q_j(i) = \left(\frac{p_j(i)}{P_j} \right)^{\frac{1}{\rho-1}} Q_j, \tag{3}$$

where $P_j = \left(\int\limits_{i\in\Omega_j} p_j(i)^{\frac{\rho}{\rho-1}} di \right)^{\frac{\rho-1}{\rho}}$ represents the aggregate price of composite industry j good, Q_j. Next, we can find the demand function for a composite industry good j, Q_j, in a similar fashion as

$$\min_{Q_j} \int\limits_{j=0}^{1} P_j Q_j dj \text{ s.t. } \ln Q = \int\limits_{j=0}^{1} \ln Q_j dj,$$

which yields

$$Q_j = \frac{PQ}{P_j}, \tag{4}$$

where the price of the composite good is given by $P = e^{\int_{j=0}^{1} \ln P_j dj}$. In addition, using equations (2), (3), and (4), we obtain

$$q_j(i) = \left(\frac{p_j(i)}{P_j^{\rho}} \right)^{\frac{1}{\rho-1}} (1-\alpha) Y. \tag{5}$$

2.3 Production.

The numeraire good is produced in the US with labor alone such that one unit of labor produces one unit of output. On the other hand, each Mexican differentiated-product manufacturing firm i produces output $q_j(i)$ following the production function

$$q_j(i) = \left(\frac{x_j(i)}{\beta} \right)^{\beta} \left(\frac{l_j(i)}{1-\beta} \right)^{1-\beta}, \; 0 < \beta < 1,$$

where $x_j(i)$ and $l_j(i)$ are respectively the amount of composite manufactured input and labor used by firm i in industry j, and β is the output elasticity of the composite input.

Accordingly, the marginal cost function for a typical Mexican firm in industry j that is not constrained by an ROO is given by

$$c = P_I^{\beta} w^{*1-\beta}, \tag{6}$$

where P_I is the cost of composite manufactured inputs and w^* is the wage in Mexico. (The case of a constrained firm will be discussed later.) The total cost of producing $q_j(i)$ units of output is then given as

$$C_j(i) = P_I^{\beta} w^{*1-\beta} \left(q_j(i) + F\right),$$

where the cost function involves $P_I^{\beta} w^{*1-\beta}$ (marginal cost) and $P_I^{\beta} w^{*1-\beta} F$ (fixed overhead cost).[15]

In order to export to the US, a Mexican firm must incur an additional fixed cost, $P_I^{\beta} w^{*1-\beta} S$, which we interpret as a quality upgrade.[16] Importantly, the quality upgrade cost is sunk; a firm must incur this cost in period 1 in order to be ready to export in period 2. The fixed cost of production is not sunk, however; a firm that has not invested in the quality upgrade can shut down in period 2, thereby avoiding all costs.

2.4 Cost of composite input.

The price index for the composite input produced by industry j is

$$P_j = \left(\int_{i \in \Omega_j} p_j(i)^{\frac{\rho}{\rho-1}} di \right)^{\frac{\rho-1}{\rho}},$$

where $p_j(i)$ is the price charged by firm i in industry j. Given the symmetry of each variety, for a purchaser of inputs from industry j in Mexico we have

$$P_j = n_j^{\frac{\rho-1}{\rho}} p_j, \tag{7}$$

where p_j is the price of any given variety in industry j and n_j is the number of varieties produced.

[15] For analytical convenience, we model the fixed cost as denominated in units of output.

[16] The assumption that a quality upgrade is necessary for export is well-founded empirically; see Verhoogen (2008) and Iacovone and Javorcik (2012).

The price of the overall composite Mexico-produced input is

$$P_M = e^{\int_0^1 \ln P_j dj}.$$

In the event that all industries price the same way, this will collapse to $P_M = P_j$ for any $j \in [0, 1]$. This will be combined with the inputs produced abroad to make up the overall composite input price.

The composite input is produced from the Mexican-produced composite and an input from the non-member country through a Cobb-Douglas production function with a weight of η on the Mexican composite,[17] so that the unit cost is

$$P_I(P_M, P_N) = P_M^{\eta} P_N^{1-\eta},\ 0 < \eta < 1, \tag{8}$$

where P_M is the price of composite Mexican input, and P_N is the price of the non-member country input, which we take as fixed. The value $\beta\eta$ shows how much of a Mexican firm's cost is made up of purchases from other Mexican firms, and can be interpreted as a measure of backward and forward linkages: The extent to which a new Mexican firm generates demand for the output of other Mexican firms, and the extent to which it provides inputs that will be useful to other Mexican firms. We will impose the following parameter restriction throughout

$$\beta < \rho. \tag{9}$$

This is the parameter region of interest because, as shown later in Proposition 8, it is where the US government would want a positive tariff (and it also guarantees stability of the equilibrium).[18]

2.5 Pricing and output per firm.

The profits of a firm that produces variety i in sector j are

$$\pi_i = p_j(i)q_j(i) - P_I^{\beta} w^{*1-\beta} \left(q_j(i) + F\right).$$

[17] More precisely, for each Mexican firm i in industry j the production function of the overall composite input $x_j(i)$ is $x_j(i) = x_{jM}^{\eta}(i)x_{jN}^{1-\eta}(i)/\left(\eta^{\eta}(1-\eta)^{1-\eta}\right)$, where x_{jM} is the composite Mexican input and x_{jN} is the composite non-member-produced input.

[18] Condition (9) is well-known in the economic geography literature as the 'no black hole' condition, for example, condition 4.45 on p. 59 of Fujita *et al.* (1999).

Since for each product both the consumer demand (from (5)) and the intermediate-input demand have constant elasticity equal to $1/(1-\rho)$, maximizing this expression with respect to $p_j(i)$ gives a constant markup of $\frac{1}{\rho}$, or

$$p_j(i) = \frac{P_I^{\beta} w^{*1-\beta}}{\rho}, \tag{10}$$

which implies the total variable profit is $(1-\rho)$ times the total revenue.

In equilibrium, each firm will receive zero profits on all sales together, but we can say more than this: Each firm must make zero profits on its domestic sales, and, on the equilibrium path, must also make zero profits on its exports. This is because in each industry there will be a subset of firms that choose to serve only the domestic market; they must be indifferent between entering and not entering, and those that incur the sunk cost to export will be indifferent between doing so and not doing so. Plugging the value of $p_j(i)$ into the profit function and using the zero-profit condition, we can calculate the quantity of variety i produced for the domestic market in Mexico as

$$q_j(i) = \frac{\rho}{1-\rho} F.$$

2.6 Equilibrium marginal costs.

Marginal costs for a Mexican manufacturer are a function of the endogenous Mexican wage and input prices as well as the variety of inputs available. Since a range of those inputs are produced by those same Mexican manufacturers, Mexican marginal cost is defined by a recursive relationship. Using equations (6), (7), (8) and $P_M = P_j$ for any $j \in [0,1]$ in equilibrium, we obtain

$$c = \left(p_j n_j^{\frac{\rho-1}{\rho}} \right)^{\beta\eta} P_N^{\beta(1-\eta)} w^{*1-\beta},$$

where, as before, p_j is the price of a typical variety. Solving for p_j and using $p_j = c/\rho$, we derive

$$c = \left(\frac{n^{\frac{\rho-1}{\rho}}}{\rho} \right)^{\frac{\beta\eta}{1-\beta\eta}} \left(P_N^{\beta(1-\eta)} (w^*)^{1-\beta} \right)^{\frac{1}{1-\beta\eta}}. \tag{11}$$

Ceteris paribus, marginal costs for any Mexican firm are lower the more of them there are, since that expands the variety of inputs available. On the other hand, marginal costs are higher, the more expensive are the inputs from the non-member country and the higher is the Mexican wage. The latter has an amplified effect as indicated by the exponent $\frac{1}{1-\beta\eta}$ because any factor that raises marginal costs for any one firm by 1%, holding domestic input prices constant, will cause that firm to raise its price by 1%; but this will happen to all firms at the same time, so that every domestic input price will rise. Consequently, marginal costs will rise by more than 1%. The multiplier $\frac{1}{1-\beta\eta}$ is increasing in the strength of linkages, and is closely related to what Bartelme and Gorodnichenko (2015) call the 'average output multiplier,' which they measure for a wide range of countries. They show that it is strongly correlated with a country's level of development, a fact that will be useful to keep in mind in interpreting results later and to which we will return in the Conclusion.

To put this magnification effect into sharper relief, note that a 1% rise in the wage will directly increase any one firm's marginal cost by $(1-\beta)\% < 1\%$, but the magnification effect results in a larger increase, taking a limit of unity as $\eta \to 1$. Indeed, if η is close enough to 1 and β is close enough to ρ, the marginal cost will be proportional to $\frac{w^*}{n}$.

It should be noted that equilibrium in a model of this sort is generically inefficient despite the fact that in simple Dixit-Stiglitz models of monopolistic competition the number of firms is typically efficient in equilibrium. This is so since the backward and forward linkages in this model create a positive externality from entry; it lowers marginal cost for all firms, as can be seen from equation (11). Nevertheless, in making its entry decision, a firm does not take into account this productivity benefit it confers on all other firms. This is the core market failure behind the multiple equilibria in Krugman and Venables (1995), for example. Later, we will see (Proposition 3) that if the linkages are strong enough, a policy that forces Mexican manufacturers to buy more domestic inputs can even raise Mexican welfare, because it helps to correct this market failure.[19]

2.7 Trade policy: Tariffs and ROO's.

There is an *ad-valorem* tariff of τ on all imports into the US, and a corresponding tariff of τ^* on imports into Mexico. We take these Most-Favored-Nation (MFN) tariffs as exogenous. They are accompanied by ROO, which we specify here.

[19] An interesting extension of this model would allow for subsidies in Mexico to address these inefficiencies. In effect, we will be implicitly assuming that the Mexican state is not able to implement an industrial subsidy policy, perhaps because it is revenue-constrained.

In practice, ROO's can take several forms.[20] For most purposes of economic analysis, the difference is not important. Here, for analytical convenience, we will model all ROO's as taking the value-content form, which requires that the share of value produced in the member country be at least as high as a minimum stated share.

Under a free-trade agreement between the US and Mexico, then, if an ROO is imposed on an industry j, a Mexican good is not eligible for duty-free entry into the US unless at least θ_j of the costs of producing it are North-American in origin. This is a requirement that the firm's spending on labor and Mexican-made inputs for producing the export must be at least θ_j times the total costs incurred in producing the export. If the ROO is satisfied, the product can then be sold in the US without tariff, but the manufacturer also has the option of ignoring the ROO and paying the tariff instead. Accordingly, we will denote the former as ROO^S and the latter as ROO^{NS}, where the superscripts S and NS stand for 'satisfy' and 'not satisfy', respectively.

Three assumptions should be clarified here, which make the analysis much simpler than it would be in their absence. First, we assume that a firm can satisfy the ROO by ensuring a high domestic content share on its exports alone; production for the Mexican market need not enter into the calculation. Second, we assume that production for the US market under an ROO does not require setting up a separate plant and incurring the fixed production cost F again. These two assumptions together might be called a 'velvet rope' assumption: A firm can separate out, within one production facility, production for export from production for domestic sale so that it can document that the ROO is satisfied on the former without imposing it on the latter.

Third, we assume that an input produced by a Mexican firm with Mexican labor counts as Mexican cost for production of a good for sale in the US, even if that input itself does not satisfy the ROO. For example, Levent's Sunshine Toaster Company in Monterrey, Mexico, which wants to sell toasters in the US market, can satisfy its ROO partly by buying Mexican-produced heating coils, even if those heating coils themselves do not satisfy an ROO.

[20] See Krishna (2006) and Falvey and Reed (1998) for details.

3 The Case of Fast-Track Authority.

We first analyze equilibrium, taking policy as given, under the assumption that Congress has voted FT. What that implies is that the President is able to commit credibly to a trade policy in period 1, subject only to the constraint that it will be welfare-worsening for neither country. This means, in particular, that Mexican firms will observe the announced trade policy when they make their decisions as to whether to enter or not and also whether to invest in quality upgrading for the US market or not. This analysis will occupy this and the subsequent two sections; we will turn to the case without FT in Section 6.

3.1 The effect of an ROO.

If a Mexican firm is allowed to minimize costs taking prices as given without constraints, it will produce with a share of North American costs equal to $1-\beta(1-\eta)$, since $1-\beta$ is the share of Mexican labor in costs and $\beta\eta$ is the share of Mexican-produced inputs in costs.

Suppose that the firm's industry is faced with an ROO that requires firms to maintain a North American share of costs at least equal to θ in order to export to the US without paying a tariff. Then if $\theta \leq 1-\beta(1-\eta)$, the firm satisfies the ROO even with unconstrained cost minimization, and so if it chooses to export, it will export duty-free to the US, and the ROO will make no difference.

Now, suppose that $1-\beta(1-\eta) < \theta$. Now, the firm cannot satisfy the ROO without incurring some additional cost to raise the North American share of its costs. It will minimize costs subject to the ROO constraint. It is straightforward that its production costs per unit of export will be a strictly increasing function of θ (details are in the working paper). Consequently, if θ is high enough, the duty-free access will not be worth the cost increase, and all firms in the industry will ignore the ROO. To summarize:

Proposition 1 *There are values $\underline{\theta} = 1-\beta(1-\eta)$ and $\bar{\theta} > \underline{\theta}$ such that: (i) If $\theta_j \leq \underline{\theta}$, then all exporting firms in industry j will source inputs to minimize cost; the ROO will not bind; and they will export to the US without paying tariff. (ii) If $\underline{\theta} < \theta_j \leq \bar{\theta}$, then all exporting firms in industry j will source inputs to satisfy the ROO exactly for their export operation; the ROO binds; and they will export to the US without paying tariff. (iii) If $\theta_j > \bar{\theta}$, then all exporting firms in industry j will source inputs to minimize cost, ignoring the ROO; and* *they will export to the US and pay the MFN tariff.*

This summarizes the firm's decision on whether or not to comply with an ROO: It will ignore a very low or very high ROO, but comply with an intermediate ROO, raising its costs as it does so, but avoiding the tariff.[21]

3.2 National incomes as function of trade policy.

First, we analyze the equilibrium under a free trade agreement. Let R denote the number of industries hit with an ROO who choose not to comply with it. Each firm in each of these industries will choose to pay the tariff τ when exporting to the US. Let national income in the US, which in this model amounts to GDP plus any tariff revenue, be denoted by Y, and let national income in Mexico be denoted Y^*.

Of course, an industry not subject to an ROO or subject to an ROO and complying with it generates no tariff revenue. On the other hand, for an industry j facing an ROO but not complying, US consumer spending on the industry is $(1-\alpha)Y$, but only $\frac{(1-\alpha)Y}{1+\tau}$ of that spending reaches the Mexican producers. Consequently, the tariff revenue generated by each non-compliant ROO industry is equal to $\frac{\tau(1-\alpha)Y}{1+\tau}$ and so total tariff revenue is given by multiplying this value by R. Hence, national income can be written as

$$Y = L + R\frac{\tau(1-\alpha)Y}{1+\tau},$$

where L is US GDP (the wage, equal to unity, times the labor supply) plus tariff revenue. Simplifying, this yields

$$Y = \left(\frac{1+\tau}{1+(1-R(1-\alpha))\,\tau}\right)L. \tag{12}$$

Note that this is always greater than the GDP, L, unless the tariff is equal to zero or $R=0$, so that no Mexican industry pays the tariff. (The case in which where is no trade agreement in force can be represented conveniently by setting $R=1$, so that all Mexican imports to the US are subject to tariff.)

Mexican income can be derived in a similar way. First we note that

$$Y^* = w^*L^* + \Pi^* + TR^*,$$

[21] Some readers may wonder if non-compliance with ROO's is of more than theoretical interest, but in fact it is extremely common. For examples, see Kunimoto and Sawchuk (2005), Anson *et al.* (2005) and Hakobyan (2015).

where w^* is the Mexican wage, L^* is the supply of labor in Mexico, Π^* is aggregate profits in Mexico, and TR^* is tariff revenue in Mexico. In equilibrium, $\Pi^* = 0$, but to analyze the case without FT we will need to be able to compute income off of the equilibrium path, so that the trade policy expected by entrepreneurs is different from what is finally implemented, and in that case we can have non-zero profits. By an argument parallel to that used to derive (12), we can write

$$Y^* = \left(\frac{1 + d\tau^*}{1 + (1 - \alpha)d\tau^*} \right) (w^* L^* + \Pi^*) \,, \tag{13}$$

where τ^* is the Mexican tariff and d is a dummy variable for MFN tariff that takes a value of 1 if there is no free trade agreement in force, so that all US imports are subject to the tariff τ^*, and 0 if a free trade agreement is in force, so that US imports enter the country duty-free. Once again, note that because of tariff revenue, Mexican income strictly exceeds Mexican GDP, $w^* L^* + \Pi^*$, unless the Mexican tariff has a value of zero or there is a free trade agreement in force.

3.3 A key proposition on optimal ROO policy.

Some basic comparative statics regarding the effects of ROO's can now be derived.

Proposition 2 *Suppose that FT is in effect, so that both n and the number of Mexican firms that export will adjust to any announced choice of policy to make profits in Mexican manufacturing zero, i.e., $\Pi^* = 0$.*[22] *Suppose that the ROO's $\{\theta_j\}$ for $j \in [0, 1]$ have been set so that a fraction R of the industries have $\theta_j > \bar{\theta}$ (and thus ignore the ROO and pay the tariff); a fraction $(1-\gamma)(1-R)$ have $\theta_j \leq \underline{\theta}$ (and thus for them the ROO is not binding); and a fraction $\gamma(1 - R)$ have $\underline{\theta} < \theta_j \leq \bar{\theta}$ (and thus comply with the ROO). Denote the average value of θ_j for the complying industries by θ. Now consider changing the ROO schedule so that θ changes but not R or γ. Then*

$$\frac{\partial w^*}{\partial \theta} > 0, \frac{\partial n}{\partial \theta} > 0, \text{ and } \frac{\partial P_N X_N}{\partial \theta} < 0,$$

where X_N is the total imports of composite non-member inputs.

[22] When FT is not in effect, the number of exporters cannot adjust following an amendment by the US Congress. In that case, the number of firms in Mexico, n, will adjust to guarantee zero profit only for firms serving the domestic market, not for exporters. We will comment on this case without FT in Section 6.1.

The proof of this proposition, and of all subsequent propositions, is in our working paper Celik *et al.* (2018).

If complying firms are made to increase their purchases of Mexican inputs and labor, that increases the demand for Mexican labor, raising the Mexican wage; raises the demand for Mexican inputs, increasing the number of inputs produced; and lowers the import of non-member inputs. Now, note that the tightening of ROO's increases w^*, which tends to raise the marginal cost of Mexican manufacturers, while it also raises n, which, recalling (11), tends to have the opposite effect. The net effect on Mexican costs is ambiguous, and depends on the following condition.

Proposition 3 *Denoting by c the marginal cost of a Mexican firm for the domestic market (and thus the marginal cost for exports in the case of an exporting firm that is not constrained by an ROO),*

$$\frac{\partial c}{\partial \theta} > 0 \text{ iff}$$

$$\beta\eta < \frac{\rho(1-\beta)}{1-\rho}. \tag{14}$$

This condition is ensured by (9).

The stronger are backward and forward linkages, or in other words the bigger is $\beta\eta$, the more likely it is that the effect of the ROO on the number of Mexican firms dominates for marginal costs. It is immediate as well that if (14) holds, the number of varieties of each industry exported to the US is also decreasing in θ.[23] This all brings us to a very important conclusion on policy.

Proposition 4 *If (14) is satisfied, it is never optimal from the point of view of US welfare for a positive mass of industries to have ROO's with* $\underline{\theta} < \theta \leq \bar{\theta}$.

The point is that if condition (14) is satisfied, when θ is in the middle range, it raises the cost of producing Mexico's exports to the US, raising their prices to US consumers and lowering the variety of products available to US consumers, but does not generate any tariff

[23] Consider an industry i in which firms comply with the ROO. US spending on this industry is equal to $(1-\alpha)Y$, and variable profits will equal $(1-\rho)(1-\alpha)Y$. From (12), this is unchanged by a change in θ. For zero profits to hold, the aggregate sunk cost $\tilde{n}_i c^{ROO^S} S$ incurred in industry i, where $\tilde{n}_i$ is the number of firms in the industry that upgrade their quality for export, must be equal to total variable profit. Since an increase in θ raises c^{ROO^S}, it must lower $\tilde{n}_i$. The argument for other industries is parallel.

revenue. From here on, we will assume condition (14) holds unless otherwise stated, and therefore, without loss of generality, we can assume that for each j, θ_j is either above $\bar{\theta}$ (it makes no difference how far above) or below $\underline{\theta}$ (it makes no difference how far below). For brevity, henceforth we will call the former the case of an 'ROO,' and the latter the case of 'no ROO.'

In our model, the simple structure of optimal ROO's that emerges makes the potential use of ROO's as protectionist devices clear in a stark manner.[24] GATT Article XXIV is generally read to require that a free-trade agreement specify no tariffs at all on trade between members. In our model, however, ROO's effectively function as a way of selectively turning off tariff preferences for a subset of industries that is consistent with the letter if not the spirit of Article XXIV, and so our ROO's fit into the category termed 'hidden protection' in Krishna and Krueger (1995).

3.4 Equilibrium wage in Mexico.

We consider market-clearing conditions for the US numeraire good. Recall that under our assumptions this is produced only in the US, but it is consumed everywhere. Its supply is of course equal to the US labor supply, L, which, since it is the numeraire good, is both the quantity produced and the value sold. Domestic US consumer spending on the numeraire good is αY. Mexican consumer spending on the numeraire good is αY^*, of which $\frac{\alpha Y^*}{1+d\tau^*}$ is the value received by US producers (recall that d is the dummy for MFN tariff, as in Section 3.2).

To arrive at the demand from the non-member country we need a slightly roundabout argument. Suppose that in the aggregate, a quantity X_N of input is imported to Mexico from the non-member country at the constant world price of P_N. Then Mexico will have a trade deficit with the non-member country amounting to $P_N X_N$. Since each country's trade must be balanced overall in equilibrium, Mexico must run a trade surplus with the US exactly equal to this amount, and since US trade must also be balanced overall, the US runs an equal-sized trade surplus with the non-member country. Therefore, US sales of its numeraire good to the non-member country must be equal in equilibrium to $P_N X_N$.

[24] If the US economy also produced intermediate inputs that were used in Mexican manufacturing, there would likely be part of the parameter space where binding ROO's would be optimal. Other models in which binding ROO's could be optimal from the point of view of the US include Falvey and Reed (2002) and Duttagupta and Panagariya (2007).

As a result, market clearing for the numeraire good can be written as

$$L = \alpha Y + \frac{\alpha Y^*}{1 + d\tau^*} + P_N X_N. \tag{15}$$

Since cost minimization by Mexican firms implies that labor's share of total production costs is equal to $1-\beta$ and non-member inputs' share is equal to $\beta(1-\eta)$, and in the aggregate, labor's share of costs must be equal to w^*L^*, the condition can be rewritten as

$$L = \alpha Y + \frac{\alpha Y^*}{1 + d\tau^*} + \frac{\beta(1-\eta)}{1-\beta} w^* L^*.$$

Using (12) and (13), we obtain

$$w^* = \left[\frac{(1-\beta)(1-\alpha)(1+(1-\alpha)d\tau^*)}{\alpha(1-\beta) + \beta(1-\eta)(1+(1-\alpha)d\tau^*)} \right] Z(R) \frac{L}{L^*}, \tag{16}$$

where

$$Z(R) \equiv \frac{1 + (1-R)\tau}{1 + (1 - R(1-\alpha))\tau}. \tag{17}$$

Note that the Mexican wage w^* is decreasing in α and L^*/L, since these parameters respectively shift relative demand toward US-made goods, away from Mexican-produced goods, and increase the relative supply of Mexican labor. For our discussion, there are two relevant policy variables, R and d (since we are taking the existing tariff rates as given, but governments in the course of negotiation can choose the coverage of ROO's and whether or not to walk away from the free-trade agreement). Therefore, we can use (16) to define the equilibrium Mexican wage as a function of these two variables, $w^*(R, d)$. It is easy to verify that this function is decreasing in R and increasing in d. An increase in R causes a wider range of Mexican industries to be subject to US tariffs, which switches US consumer demand away from Mexican-produced goods. Switching d from 0 to 1 amounts to tearing up the free-trade agreement, which causes the Mexican tariff to be in force on all imports from the US. This pushes down the relative price of the numeraire good relative to Mexican products, raising the Mexican wage w^* relative to the US wage, and providing Mexico with a terms-of-trade benefit.

Proposition 5 *The Mexican wage in terms of the numeraire, w^*, is decreasing in the number R of industries hit by ROO's and is also decreased if Mexico eliminates its tariff (switching d from 1 to 0).*

3.5 Equilibrium number of firms.

Consider first the equilibrium number of domestic firms in Mexico. In order to find this, we need to add up the total domestic Mexican demand for a typical industry j. This consists of (a) Mexican final consumer demand; (b) demand by Mexican firms for inputs to produce output for export; and (c) inputs required for (a) and (b) plus inputs to produce inputs. Domestic consumer demand is equal to $(1-\alpha)Y^*$. Total revenues from exports, and therefore total costs for export production, amount to $(1-\alpha)Y$ for a no-ROO industry and $\frac{(1-\alpha)}{(1+\tau)}Y$ for an ROO industry. Given that there are $(1-R)$ of the former and R of the latter industries, export revenues are equal to $(1-\alpha)\left(\frac{1+(1-R)\tau}{1+\tau}\right)Y$, and a fraction $\beta\eta$ of that amount goes to domestically-produced inputs to produce those exports. We can therefore write parts (a) and (b) above as $Y^{a+b} \equiv (1-\alpha)\left(Y^* + \beta\eta\left(\frac{1+(1-R)\tau}{1+\tau}\right)Y\right)$. If we denote revenue from production of intermediates, part (c) above, by Y^c, then domestic revenue for all Mexican firms together is $Y^{a+b}+Y^c$, and since all Mexican firms produce with a cost share of domestic intermediates equal to $\beta\eta$, we have $Y^c = \beta\eta(Y^{a+b}+Y^c)$, so $Y^c = \left(\frac{\beta\eta}{1-\beta\eta}\right)Y^{a+b}$, and the domestic revenue of all Mexican firms is equal to $Y^{a+b}/(1-\beta\eta)$. Total revenues times $(1-\rho)$ yields variable profit (recall Section 2.5), so equating variable profit with fixed costs implies

$$n = \frac{(1-\alpha)(1-\rho)}{(1-\beta\eta)Fc(n,w^*)}\left[Y^*(w^*,d) + \left(\frac{1+(1-R)\tau}{1+\tau}\right)\beta\eta Y\right].$$

In other words, n is proportional to the domestic demand for Mexican products and inversely proportional to the fixed cost $Fc(n,w^*)$.[25] Using (12), (13), and (16), this can be rewritten as

$$n = \left[\frac{(1-\beta)(1-\alpha)(1+d\tau^*) + \beta\eta(1+(1-\alpha)d\tau^*)}{\alpha(1-\beta)+\beta(1-\eta)(1+(1-\alpha)d\tau^*)}\right]\frac{(1-\alpha)(1-\rho)}{Fc(n,w^*)}Z(R)L. \tag{18}$$

From (11), the right-hand side of (18) is increasing in n, taking a limit of 0 as $n \to 0$. Further, the elasticity of the right-hand side with respect to n is equal to

$$\left(\frac{1-\rho}{\rho}\right)\left(\frac{\beta\eta}{1-\beta\eta}\right).$$

[25] It is tempting to see the Mexican economy as a version of a Krugman (1980) economy, with one monopolistically-competitive sector that produces with labor as the only non-produced input, so that the constant markup implies a constant size for each firm, in turn implying a constant number of firms pinned down by the size of the Mexican labor force. This is not how the model works, for two reasons. First, some of the n Mexican firms choose to export, which requires additional labor, and the number of firms that do so is endogenous. Second, all of these firms use imported inputs, and a rise in w^* induces substitution away from Mexican labor toward imported inputs, reducing the labor required by each firm.

The value of this elasticity must be less than 1 for the stability of the equilibrium, which requires

$$\beta\eta < \rho. \tag{19}$$

Clearly, condition (9) guarantees this, so (19) will be redundant.

We can now identify the main comparative statics results with respect to a change in the ROO policy. It will be useful to focus on elasticities, and we denote by $\xi_{y,x}$ the elasticity of variable y with respect to the variable x. Nothing in the big square brackets of (18) depends on R either directly or indirectly, so in computing the elasticity $\xi_{n,R}$ of n with respect to R under FT, we need only to focus on the fraction at the end of the expression. Given (11), this amounts to

$$\xi_{n,R} = \xi_{Z,R} - \left(\frac{\rho - 1}{\rho}\right)\left(\frac{\beta\eta}{1 - \beta\eta}\right)\xi_{n,R} - \left(\frac{1 - \beta}{1 - \beta\eta}\right)\xi_{w^*,R}.$$

Using $\xi_{w^*,R} = \xi_{Z,R}$ (see equation (16)) and solving this, we have the elasticity of the number of firms in Mexico with respect to the extent of the ROO's

$$\xi_{n,R} = \frac{\beta\rho(1 - \eta)}{\rho - \beta\eta}\xi_{Z,R} < 0, \tag{20}$$

since (9) is assumed and using (17)

$$\xi_{Z,R} = -\frac{\alpha\tau(1 + \tau)R}{[1 + (1 - R(1 - \alpha))\tau][1 + (1 - R)\tau]} < 0. \tag{21}$$

Therefore, if R is increased, the number of firms in Mexico goes down. The exception is if $\beta = 0$ or $\eta = 1$, the two cases in which there are no imported inputs used. In both of these cases, units costs are proportional to w^* (see (11)), which is proportional to the demand shifter $Z(R)$ (see (16)), so when R is increased costs fall in proportion with demand, and the number of firms is unchanged.[26] Otherwise, the fall in n resulting from an increase in R will tend to raise marginal costs for Mexican firms (recall (11) again), while at the same time, from (16), the increase in R lowers the Mexican wage w^*, which tends to *lower* Mexican marginal costs. The net effect on marginal costs in Mexico is ambiguous, and given by

$$\xi_{c,R} = \left(\frac{\rho - 1}{\rho}\right)\left(\frac{\beta\eta}{1 - \beta\eta}\right)\xi_{n,R} + \left(\frac{1 - \beta}{1 - \beta\eta}\right)\xi_{w^*,R},$$

[26]The neutrality of n to R when $\beta = 0$ or $\eta = 1$ can also be seen from (18). When unit costs are proportional to w^*, the demand shifter $Z(R)$ cancels out and n does not depend on R anymore.

which, given (20) and $\xi_{w^*,R} = \xi_{Z,R}$, yields

$$\xi_{c,R} = \left(\frac{\rho(1-\beta(1-\eta)) - \beta\eta}{\rho - \beta\eta}\right)\xi_{Z,R}. \tag{22}$$

Given (19) and $\xi_{Z,R} < 0$ as shown in (21), this means that an increase in R lowers c, and therefore the price of each good produced in Mexico, as long as the numerator is positive. This will be true if η is small enough; specifically,

$$\xi_{c,R} < 0 \Leftrightarrow \eta < \left(\frac{\rho}{1-\rho}\right)\left(\frac{1-\beta}{\beta}\right). \tag{23}$$

Note that this is the same condition given in (14), and just as before it is guaranteed to hold by (9).

We turn now to the number of firms in each Mexican industry that choose to export to the US. For a given industry j, US consumer spending on the industry's products together is equal to $(1-\alpha)Y$. If industry j is not subject to an ROO (no-ROO industry), this is also the amount Mexican producers obtain whereas if it is subject to an ROO, only $\frac{(1-\alpha)Y}{1+\tau}$ of that spending reaches Mexican producers. Each firm produces $\frac{\rho}{1-\rho}S$ units of exported output. In order for the total industry export revenues to be equal to the value of consumer spending on the products received by Mexican producers, we must have

$$\begin{aligned}
\tilde{n}_j^{NR} p_j \left(\frac{\rho}{1-\rho}\right) S &= (1-\alpha)Y, \text{ if } j \text{ is a no-ROO industry} \\
\tilde{n}_j^{R} p_j \left(\frac{\rho}{1-\rho}\right) S &= \frac{(1-\alpha)Y}{1+\tau}, \text{ if } j \text{ is an ROO industry,}
\end{aligned}$$

where $\tilde{n}_j^{NR}$ and $\tilde{n}_j^{R}$ denote the number of j-industry firms that choose to export in a no-ROO and ROO industry, respectively. This yields the equilibrium number of exporters for a typical no-ROO industry

$$\tilde{n}^{NR} = (1-\alpha)(1-\rho)\frac{Y}{Sc}. \tag{24}$$

For an industry subject to an ROO, since they receive only $1/(1+\tau)$ of the consumer spending, their equilibrium number is reduced accordingly

$$\tilde{n}^{R} = \frac{\tilde{n}^{NR}}{1+\tau}. \tag{25}$$

The total number of exporters $\tilde{n}$ is defined as

$$\tilde{n} = R\tilde{n}^{R} + (1-R)\tilde{n}^{NR}. \tag{26}$$

It is straightforward to derive that if Mexican firms correctly anticipate the ROO policy that will be followed, then a more restrictive ROO policy will result in fewer exporters.

Proposition 6 *The total number of exporting firms in Mexico, $\tilde{n}$, is decreasing in R in equilibrium.*

4 Welfare.

Welfare in Mexico can be computed from the indirect utility function, derived from (1)

$$U^M = \frac{Y^*}{(1+d\tau^*)^\alpha \left(n^{\frac{\rho-1}{\rho}} p\right)^{1-\alpha}}. \tag{27}$$

Proposition 7 *Under condition (23), a fully anticipated increase in R will lower the Mexican wage, the number of varieties produced in each Mexican industry, and Mexican welfare.*

The corresponding expression for US welfare requires computation of the consumer price index in the US. Suppose that R industries expect an ROO. The price index for the composite good for each of those industries (see (7)) is $P_j = \left(\tilde{n}^R\right)^{\frac{\rho-1}{\rho}} (1+\tau)p$. The other $1-R$ industries are not subject to an ROO. The price index for each of those industries' composite goods in the US is $P_j = \left(\tilde{n}^{NR}\right)^{\frac{\rho-1}{\rho}} p$.

Consequently, the log of the price in the US of composite imported goods from Mexico is $\ln(P) = \int_0^1 \ln(P_j)dj = (1-R)\ln\left(\left(\tilde{n}^{NR}\right)^{\frac{\rho-1}{\rho}} p\right) + R\ln\left(\left(\tilde{n}^R\right)^{\frac{\rho-1}{\rho}} (1+\tau)p\right)$, so (recalling that $\tilde{n}^R = \tilde{n}^{NR}/(1+\tau)$),

$$P = (1+\tau)^{\frac{R}{\rho}} \left(\tilde{n}^{NR}\right)^{\frac{\rho-1}{\rho}} p. \tag{28}$$

Consequently, using (1) and (28), US welfare is given by

$$U^{US} = \frac{Y}{\left((1+\tau)^{\frac{R}{\rho}} \left(\tilde{n}^{NR}\right)^{\frac{\rho-1}{\rho}} p\right)^{1-\alpha}}. \tag{29}$$

Holding fixed the price of each Mexican good, US welfare is reduced by a rise in the tariff or by the number R of industries that pay the tariff (since this increases the consumption distortion), and increases with a rise in the number of varieties exported to the US (recalling that from (24), (25), and (26) the total number of exported varieties is proportional to $\tilde{n}^{NR}$).

We can now clarify the need for condition (9). In the case with no trade agreement at all (equivalent to the case of $R = 1$), a positive tariff τ is desirable for the US if and only if (9) holds:

Proposition 8 *With $R = 1$, the tariff τ that maximizes US welfare is positive if and only if $\beta < \rho$.*

Throughout our analysis, we assume that tariffs are positive, which would be difficult to justify if a unilateral tariff elimination would raise welfare. Proposition 8 shows that condition (9) eliminates this case. The underlying reason is as follows. Increasing the US tariff pushes down the US demand for Mexican products, which puts downward pressure both on the Mexican wage and on the number of Mexican firms. The former effect is desirable for the US, because it improves the US terms of trade, but the latter effect is undesirable because it raises costs for Mexican firms, increasing their prices and *worsening* the US terms of trade. The effect on the number of firms is larger the larger is β,[27] and the effect of reduced product variety on Mexican costs is larger, the smaller is ρ.[28] Condition (9) ensures that the effect on the Mexican wage is the dominant factor from the point of view of US welfare.

5 Equilibrium with Fast-Track Authority.

To compute US welfare under a given value of R under FT, combine (29) with (24) and the condition that $c = \rho p$ to obtain

$$U^{US} = \left[(1+\tau)^{\frac{R}{\rho}} \left(\frac{(1-\alpha)(1-\rho)}{S\rho} \right)^{\frac{\rho-1}{\rho}} \right]^{-(1-\alpha)} Y^{\frac{1-\alpha(1-\rho)}{\rho}} p^{-\frac{(1-\alpha)}{\rho}}. \tag{30}$$

US negotiators choose R to maximize US welfare, taking into account the effect of R on all endogenous variables (n, $\tilde{n}^R$, $\tilde{n}^{NR}$, w^*, and p), subject to the constraint that Mexican

[27] Recall from Section 3.5 that the number of Mexican firms is proportional to the demand for Mexican products and inversely proportional to the fixed cost Fc per firm. If $\beta = 0$, the cost is simply proportional to the wage w^*, but the wage is also proportional to the demand for Mexican products, so the net effect on n is zero. If $\beta > 0$, the cost is less sensitive to the wage, and this allows for the number of firms to respond to the tariff.

[28] If ρ is close to 1, products are almost perfect substitutes, and product variety does not much matter. Recall (11).

welfare with the agreement is not less than Mexican welfare without it. This amounts to

$$max_R \left\{U^{US}(R,0)\right\} \ni U^{MEX}(R,0) \geq U^{MEX}(1,1),$$

where $U^{US}(R,d)$ and $U^{MEX}(R,d)$ denote respectively US and Mexican utility, taking full account of the equilibrium effect of R and d on all endogenous variables. As before, d is a dummy variable that records a value of 1 if no free-trade agreement is in force, so that the tariffs apply to all trade between the US and Mexico; and d records a value of 0 if a free-trade agreement is in force, so that the tariff applies only to ROO sectors exporting to the US from Mexico. Of course, if there is no free-trade agreement in effect, all industries will pay the tariff, which is equivalent to setting $R = 1$, and so the welfare constraint is written as $U^{MEX}(1,1)$. There are two cases: the case in which the constraint on Mexican welfare does not bind, which we may call the 'interior solution,' and the case in which it does bind, which we may call the 'corner solution.'

5.1 Case I: The interior solution.

From (30), the elasticity of US welfare with respect to R under FT can be written as

$$\xi^{FT}_{U^{US},R} = -\frac{1-\alpha}{\rho} R\log(1+\tau) + \frac{1-\alpha(1-\rho)}{\rho}\xi_{Y,R} - \frac{1-\alpha}{\rho}\xi_{p,R}. \tag{31}$$

From (12), we have

$$\xi_{Y,R} = \frac{(1-\alpha)\tau R}{1+(1-R(1-\alpha))\tau}. \tag{32}$$

Furthermore, since markups are constant, we have $\xi_{p,R} = \xi_{c,R}$. Combining (31) with (22), (21), and (32), we obtain the following

$$\xi^{FT}_{U^{US},R} = \frac{(1-\alpha)R}{\rho}\left[\frac{\tau}{1+(1-R(1-\alpha))\tau}\left(1-\alpha\left(1-\rho\right)+\frac{\alpha(1+\tau)(\rho[1-\beta(1-\eta)]-\beta\eta)}{[1+(1-R)\tau][\rho-\beta\eta]}\right)-\log\left(1+\tau\right)\right]. \tag{33}$$

The expression in the square brackets is increasing in R. Therefore, if (33) is ever equal to zero, say for some value $R = \hat{R}$, then for all $R < \hat{R}$, it is negative, and for all $R > \hat{R}$, it is positive. Therefore, $\hat{R}$ is a minimum for US welfare rather than a maximum, and the only possible unconstrained optimal values for R are 0 or 1. In addition, if R is bounded above by an incentive constraint, so that it cannot take a value above, say, R^{max}, then the only possible optimal values are 0 and R^{max}. Therefore, we can disregard the interior solution and focus entirely on the corner solution.

5.2 Case II: The corner solution.

We can use (33) to clarify which corner solution will be preferred. The relationship between β and ρ is crucial, which makes sense because the higher is β, the more important are intermediate inputs in production, and the lower is ρ, the more important is the *variety* of intermediate inputs in production, so for high β and low ρ the reduction in n caused by expansion of ROO's discourages the US from using them aggressively. Precisely:

Proposition 9 *For sufficiently small $\tau > 0$, US welfare under FT is increasing in R if $\beta < \rho$ and decreasing in R if $\beta > \rho$.*

Therefore, at least in the small-τ case, if $\beta > \rho$, the optimum will be $R = 0$ and if $\beta < \rho$ – as we assume throughout – it will be the highest R that satisfies the Mexican participation constraint. In the latter case, the negotiations set the value of R so that the Mexican government will be indifferent between tearing up the agreement and ratifying it. In this case, the optimal value of R, say, R^*, will satisfy

$$U^M(R^*, d = 0) = U^M(R = 1, d = 1). \tag{34}$$

6 The Case without Fast-Track Authority.

All of the preceding analysis has been based on the assumption that FT is in force, so that the value of R proposed in the agreement in period 1 is the same as the value that prevails in period 2. Now, consider the case in which FT is not in effect, so it is possible for Congress to alter the agreement in period 2, just before ratification, after businesses have made their decisions in period 1. For our purposes, that means that in period 2, the value of $\tilde{n}_j$, the number of firms in industry j that have made the sunk investment in quality required to export to the US, is taken as given, and cannot respond to changes in R. Rather, $\tilde{n}_j$ responds to the trade policy that was *expected*, as of period 1, to prevail in period 2. The conditions (24), (25), and (26) will still apply, but, for example, $\tilde{n}^{NR}$ will be the number of firms that invest in an industry that was not *expected* to be hit with a protectionist ROO, and the values on the right-hand side are the *anticipated* US GDP and the *anticipated* value of marginal costs, c. We can consequently write all equilibrium variables as functions of realized trade policy and also of the $\tilde{n}$'s. Most variables of interest will need to be conditioned only on the aggregate, $\tilde{n}$, and not on $\tilde{n}^{NR}$ and $\tilde{n}^{R}$ separately.

Under these conditions, we can rewrite the definition of constrained-optimal R, as defined in (34) and denoted R^*, as

$$U^M(R^*, \tilde{n}(R^*), d = 0) = U^M(R = 1, \tilde{n}(R = 1), d = 1), \tag{35}$$

where $\tilde{n}(R)$ is the value of $\tilde{n}$ that results when as of period 1 it was expected that R industries would be hit with ROO's. By Proposition 6, $\tilde{n}(R^*) > \tilde{n}(1)$ as long as $R^* < 1$.

This optimal value of R will not be credible in the absence of an FT if

$$U^M(R^*, \tilde{n}(R^*), d = 0) > U^M(R = 1, \tilde{n}(R^*), d = 1). \tag{36}$$

The left-hand side of (36) is Mexican welfare if the US promises R^*; this promise is believed by all market participants; and the US actually implements R^*. (It is the same as the left-hand side of (34).) The right-hand side of (36) is Mexican welfare if the US promises R^*; this promise is believed by all market participants; and Mexico in the end walks away from the agreement, tearing it up so that both countries' trade policies return to the status-quo ante ($R = 1$ and $d = 1$); but Mexico's export sector is still locked into the investment level ($\tilde{n}(R^*)$) that results from an expectation of R^*. If (36) holds, then R^* is not credible *ex ante* because if it were believed *ex ante* then *ex post* Mexico would be strictly worse off tearing up the agreement rather than abiding by the agreement; therefore, Congress would have some leeway to adjust R *ex post* in a way that would be beneficial to the US and harmful to Mexico at the margin, and the Mexican government would still have an incentive to ratify. Since everyone would understand this, then (36) would imply that no-one would believe the US promise to implement R^*.

Since the left-hand sides of (35) and (36) are the same, for (36) to hold, it is sufficient that

$$U^M(R = 1, \tilde{n}(R = 1), d = 1) > U^M(R = 1, \tilde{n}(R^*), d = 1). \tag{37}$$

If that is true, and it is further true that the US can improve its welfare *ex post* by changing the value of R in a way that is injurious to Mexico, then (i) Mexico will do just as well under a free-trade agreement with FT as under no talks at all; (ii) Mexico will do strictly worse under a free-trade agreement without FT, because *ex post*, Congress can get Mexico to agree to the agreement with a higher value of R than it could with FT. Therefore, Mexico will never agree to negotiate without FT. We now investigate these conditions, which require us to learn about the comparative statics of period 2. To verify whether or not the US will want to adjust R in period 2, we need to study the comparative statics with respect to R, holding $\tilde{n}$ constant. To verify whether or not (37) holds, we need to study the comparative statics with respect to $\tilde{n}$, holding R constant. We turn to those inquiries now.

6.1 *Ex post* labor market clearing without FT.

Without FT, each business manager in Mexico will need to conjecture what amendments the US Congress might make to the agreement, and make investments accordingly. If firm i upgrades its product quality in order to be able to export to the US, then its management must start a process of transformation of the productive process in period 1 that will cost it S units of lost output in period 2 This decision is irreversible; if the firm's conjecture turns out in period 2 to be wrong, it will not be able to change it. In order to focus on the hold-up problem that results from this trade-specific sunk investment, we assume that firms can enter or exit Mexican manufacturing in period 2 (unless they have committed themselves to export), responding to new information about the actions of the US Congress.

Now on to the analysis of Period-2 equilibrium. In the working paper, we derive comparative statics for w^*, n, and c in period 2 with respect to $\tilde{n}$ and R. Essentially, one can derive a labor-market equilibrium condition for Mexico and a zero-profit condition for domestic Mexican firms and differentiate (see extended derivations in Section 6 and proofs in the Appendix). A difficulty with the analysis without FT is that although the zero-profit condition must be satisfied in equilibrium, it need not be satisfied off of the equilibrium path. Precisely, if Congress chooses a value of R in period 2 that is different from what was anticipated in period 1, the firms that invested in export capability will generally have non-zero profit. (Firms that do not export will still have zero profit, since we allow them to enter or exit in period 2, and so n is still endogenous.) This means that the logic used to derive (16), which repeatedly involves equating expenditure on an industry's products with that industry's cost, cannot be used, at least not off the equilibrium path. We omit the details here, and summarize the effects of a change in $\tilde{n}$ inherited from period 1 and a change in R on period-2 outcomes. The effects differ qualitatively for different parts of the parameter space, and it will be useful to contrast two cases: The case of 'weak linkages,' namely when η is small, so that the Mexican economy cannot improve its productivity much by producing a wide variety of inputs, and the economy acts like a neoclassical trade model; and the case of 'strong linkages,' in which η and β are both on the high end of their feasible range and the increasing-returns-to-scale nature of the Mexican manufacturing sector becomes more important.

First, the comparative statics for $\tilde{n}$:

Proposition 10 *In the case without FT, holding R constant, writing the elasticities of w^* and n with respect to $\tilde{n}$ as $\xi_{w^*,\tilde{n}}$ and $\xi_{n,\tilde{n}}$ respectively, we have:*

(i) In the 'weak linkages' limiting case with η close to 0:

$$\xi_{w^*,\tilde{n}} > 0,\ \xi_{n,\tilde{n}} < 0,\ \textit{and}\ \xi_{c,\tilde{n}} > 0.$$

(ii) In the 'strong linkages' limiting case with η close to 1 and β close to ρ but still less than ρ:

$$\xi_{w^*,\tilde{n}} = 0,\ \xi_{n,\tilde{n}} = 1,\ \textit{and}\ \xi_{c,\tilde{n}} = -1.$$

A rise in $\tilde{n}$ is similar to an exogenous increase in the demand for Mexican inputs to produce the required quality upgrades for export. In the weak-linkages case, this results in an increase in the price of Mexican inputs due to the increased wage: A greater demand for inputs increases the demand for labor, raising its price. In the process, the rise in costs squeezes out non-exporting firms, so n falls. Both the rise in w^* and the drop in n contribute to the rise in c (recall (11)). On the other hand, in the strong-linkages case, the economy is able to respond to this rise in the demand for inputs by generating a wider variety of inputs, which meets the extra demand with *lower* marginal costs. This reflects the strength of the increasing returns to scale in the manufacturing sector due to the backward and forward linkages. Recall the inefficiency in the equilibrium noted in the discussion of Proposition 3 when linkages are strong; given the external economies of scale, the economy can become much more productive if more firms than the equilibrium number enter. Note from (11) that in the limit with strong linkages c is proportional to $\frac{w^*}{n}$, so $\xi_{w^*,\tilde{n}} = 0$ and $\xi_{n,\tilde{n}} = 1$ together imply $\xi_{c,\tilde{n}} = -1$.

Next, we need the effects of a period-2 change in R:

Proposition 11 *In the case without FT, holding $\tilde{n}$ constant, consider two cases:*

(i) In the 'weak linkages' limiting case with η close to 0:

$$\xi_{w^*,R} < 0,\ \xi_{n,R} < 0,\ \text{and}\ \xi_{c,R} < 0.$$

(ii) In the 'strong linkages' limiting case with η close to 1 and β close to ρ but still less than ρ:

$$\xi_{w^*,R} = \xi_{Z,R} < 0,\ \xi_{n,R} = 0,\ \text{and}\ \xi_{c,R} < 0.$$

A rise in R diverts some portion of US consumer demand away from Mexican products, indirectly lowering the demand for Mexican labor. This pushes down the Mexican wage. The effect on the number of Mexican firms is more subtle. Other things equal, a drop in the demand for Mexican products will reduce the number of Mexican firms. At the same time, other things equal, a drop in marginal costs (due to lower Mexican wage) will *increase* the number of Mexican firms. So we have two opposing forces on the number of firms. Recalling (11), the effect of w^* on c is much larger with strong backward and forward linkages than it is with weak linkages. As η approaches 1, the elasticity of c with respect to w^* approaches unity. What Proposition 11 shows is that when the linkages are weak, the demand effect dominates, and n falls when R rises; with strong linkages the cost effect counteracts it, so that in the limit the effect of R on n vanishes.

7 A Punchline.

We can now assemble all of these pieces into a conclusion about the desirability of FT for cases in which η is not too large. (We will discuss the strong-linkages case in the next section.) Recall that FT is needed in order to coax Mexico to the table *ex ante* if and only if (37) holds. For this, we need to check whether Mexican welfare is higher or lower due to the higher value of $\tilde{n}$ if Mexico walks away from the agreement *ex post* (recalling that by Proposition 6, $\tilde{n}(R^*) > \tilde{n}(1)$ as long as $R^* < 1$). Indeed, in the small-η case, a higher $\tilde{n}$ implies a lower value of n and a higher value of c, so a lower variety of goods to consume and a higher price for each variety. Further, since $c\tilde{n}$ is higher, Mexican income is lower.[29] Putting all of these effects together, Mexicans have lower income, higher consumer prices,

[29] It is easy to show that Mexican income is decreasing in the pre-committed sunk cost for exporting, $\tilde{n}cS$.

and less product variety due to the productive resources consumed by the higher value of $\tilde{n}$, implying lower welfare, and so (37) is satisfied. *Ex post*, the Mexican threat point is worsened by the *ex ante* expectation of an agreement, so that the US Congress may be able to extract some additional rents from the Mexicans in period 2 without triggering refusal of the agreement.

At the same time, we can use (29) with the elasticities in Proposition 11 to verify that the US will want to increase R *ex post* if it can.[30] Indeed, by increasing R, Congress will increase Y (through increased tariff revenue) and reduce the price of each imported good (through reduction of c), without sacrificing product variety available to Americans (since $\tilde{n}$ is fixed). By the same token, the increase in R will lower Mexican welfare.

Proposition 12 *If $\beta < \rho$ (as in (9)) and τ is not too large, then for small values of η the optimal R, R^*, for the US is strictly positive, and gives Mexico the same welfare as it would have obtained with no agreement. But this value of R cannot be realized in equilibrium without FT, because if $R = R^*$ was expected, ex post the US would wish to increase R beyond that level, and the Mexican government would agree to remain in the agreement. The equilibrium value of R without FT will be strictly greater than R^*, and Mexican utility will be strictly less than with no agreement and no expectation of an agreement.*

This is the hold-up problem at work. Under these conditions, Mexico would never agree to negotiations in the absence of FT.

8 The Case With Strong Backward and Forward Linkages.

Now, we can address how the model works in the strong linkages case. The behavior of the model is qualitatively different when linkages are strong, in ways that may help understand trade policy in practice.

[30] We should underline the different roles of the two propositions. Proposition 11 shows how things change when the US Congress changes R ex post, with $\tilde{n}$ unchanged; this is used to check whether or not the Congress would wish to change R if it is not constrained by FT. Proposition 10 shows how things change with a higher value of $\tilde{n}$, due to the *anticipation* of a lower value of R, holding the actual value of R constant; this is used to check whether or not the Mexican utility constraint will be slack, per (37), so that the US Congress would be *able* to increase R *ex post*.

Proposition 13 *If $\beta < \rho$ (as in (9)) and τ is not too large, then if η is close to 1 and β is close to ρ, the optimal R, R^*, for the US is strictly positive, and gives Mexico the same welfare as it would have obtained with no agreement. But this value of R cannot be realized in equilibrium without FT, because if $R = R^*$ was expected, ex post the Mexican government would be willing to walk away from the agreement unless R was lowered below R^*.*

This can be seen very simply from the results in Proposition 10. In the strong-linkages case, the increased $\tilde{n}$ that results from Mexican businesses anticipating the agreement has no effect on Mexican incomes. Since in the limit the elasticity of c with respect to $\tilde{n}$ approaches -1, the $\tilde{n}c$ is unchanged, and so Mexican income is unchanged (recall footnote 29). However, the variety of manufactured products n goes up and the price of each one of them goes down (since c falls), so, by (27), Mexican welfare rises with an increase in $\tilde{n}$ for any given trade policy. Consequently, Mexican threat-point welfare goes up, and Mexico will no longer be willing to accept $R = R^*$ in period 2 if it is possible to change it.

The implication of Proposition 13 for FT is that if an agreement is anticipated between the US and Mexico in the presence of strong linkages, the resulting increase in $\tilde{n}$ will *strengthen* Mexico's bargaining power. Therefore, Congress will want FT, but it will not be because of a hold-up problem suffered by Mexico: It will be to avoid being held up by Mexico. Mexico would have no need to insist on FT as a precondition for negotiations.

9 Conclusion.

The mechanism studied here can be summarized as follows, for cases when η is not too large, so that backward and forward linkages are weak.

(i) Under full commitment (which here means under FT), the optimal policy for the US in designing a free-trade agreement with Mexico is to set maximal ROO's on a subset R of industries, to claw back the tariff preference *de facto* that the free trade agreement creates, while setting minimal ROO's on the remaining industries. It is not optimal to distort any industry's actual input use with an ROO.

(ii) There is an optimal level of R from the point of view of US welfare, which is either $R = 0$ or $R = 1$. In the empirically more interesting case where $R = 1$ is preferred, Mexico's participation constraint will be binding, so the optimal choice of R becomes the value, $R^* < 1$, under which Mexico's welfare from the agreement is equal to its status-quo welfare.

(iii) However, it cannot achieve this optimal policy in the absence of commitment (in other words, without FT). The reason is that if Mexican businesses anticipate $R = R^*$, more of them will invest in quality upgrades for the US market than would have done so under the status quo, and so their government's *ex post* bargaining power will be worse. As a result, at the last minute Congress will be able to raise R above R^* somewhat and the Mexican government will still accept the amended agreement.

(iv) Anticipating this, Mexico will refuse to enter negotiations unless FT is in place first.

On the other hand, when backward and forward linkages are large, the hold-up problem is flipped on its head: Mexico's bargaining position is improved *ex post* by the additional industrial development that comes from an anticipated trade agreement, and it is in a position to demand more from the US than it could have demanded *ex ante*. As a result, in this case the US will be the one to insist on FT.

This contrast between the workings of the cases with strong and weak linkages may help explain the anomalous cases of the Canada-US Auto Pact and the TPP, as mentioned in footnote 2 in the Introduction. If weak linkages lead to FT because the US can hold up its trade partner, and strong linkages lead to FT because the trade partner can hold up the US, it is conceivable that there is an intermediate level of linkages where there is no hold-up problem in either direction and the optimal agreement is time-consistent (to a close approximation). Recalling (from Section 2.6) that the strength of linkages tends to be highly correlated with a country's level of development, this could explain how these two agreements, both primarily with countries at a similar level of development, could have been negotiated without FT. Conceivably both Canada and Japan (the key negotiating partner in the TPP) are at such an intermediate level of linkages where the hold-up problem cancels out, while Mexico and less developed economies have weaker linkages that create the regular hold-up problem; and perhaps no country has such strong linkages that the reverse hold-up problem arises.[31] (The case of Jordan would need a separate explanation.)

[31] Alternatively, it is possible that there are countries with strong linkages to that extreme degree but that the US does not wish to sign trade agreements with them. It can be shown in our model that if β is close enough to ρ and η is close enough to 1, then reductions in τ^* will paradoxically lower US utility. This is because lowering Mexico's tariff will lower Mexican income, thereby lowering n and raising Mexican marginal costs, which increases the price charged to US consumers. As a result, in this case of extremely

References

[1] Amador, Manuel and Kyle Bagwell, 2018. Delegation theory and the delegation of trade-policy authority. Working Paper, Stanford University.

[2] Anson, José, Olivier Cadot, Antoni Estevadeordal, Jaime de Melo, Akiko Suwa-Eisenmann and Bolormaa Tumurchudur, 2005. Rules of origin in North-South preferential trading arrangements with an application to NAFTA. *Review of International Economics* 13(3), pp. 501-517.

[3] Bagwell, Kyle, 1997. The Case for Fast Track. *HERMES (Columbia Business School)*, Fall, pp.21-1.

[4] Bartelme, Dominick and Yuriy Gorodnichenko, 2015. Linkages and economic development. NBER Working Paper No. 21251 (June).

[5] Bertrab, Hermann von, 1997. *Negotiating NAFTA: A Mexican Envoy's Account.* Westport, Connecticut: Praeger.

[6] Bowles, Erskine B., 1997. The Case for Fast Track. *HERMES (Columbia Business School)*, Fall, pp.21-1.

[7] Bown, Chad, 2018. Sweating the Auto Details of Trump's Trade Deal with Mexico. Peterson Institute for International Economics Trade and Investment Policy Watch (August 29).

[8] Committee on Finance, United States Senate, 2007. *Trade Promotion Authority Annotated Including Procedural Provisions From the Trade Act of 1974 and the Trade Act of 2002 As Amended.* Washington, D.C.: US Government Printing Office (February).

[9] Celik, Levent, Bilgehan Karabay and John McLaren, 2013. Trade policy making in a model of legislative bargaining. *Journal of International Economics* 91(2), pp. 179-190.

strong linkages, the US would not want a trade agreement with Mexico. This is another special feature of the model that would likely change if we introduced a sector in the US that produces inputs for Mexican manufactures.

[10] Celik, Levent, Bilgehan Karabay and John McLaren, 2015. When is it optimal to delegate? The theory of fast-track authority. *American Economic Journal: Microeconomics* 7(3), pp. 347-389.

[11] Celik, Levent, Bilgehan Karabay and John McLaren, 2018. Fast-Track Authority: A hold-up interpretation. NBER Working Paper No. 24427 (March; revised 2020).

[12] Chisik, Richard, 2003. Gradualism in free trade agreements: a theoretical justification. *Journal of International Economics* 59(2), pp. 367-397.

[13] Chisik, Richard, 2012. Trade disputes, quality choice, and economic integration. *Journal of International Economics* 88(1), pp. 47-61.

[14] Conconi, Paola, Giovanni Facchini and Maurizio Zanardi, 2012. Fast-track authority and international trade negotiations. *American Economic Journal: Economic Policy* 4(3), pp. 146-189.

[15] Conconi, Paola, Laura Puccio, Manuel Garcia-Santana and Roberto Venturini, 2018. From final goods to inputs: the protectionist effect of rules of origin. *American Economic Review* 108(8), pp. 2335-2365..

[16] Costinot, Arnold, Dave Donaldson, Jonathan Vogel and Iván Werning, 2015. Comparative advantage and optimal trade policy. *Quarterly Journal of Economics* 130(2), pp. 659-702.

[17] Duttagupta, Rupa and Arvind Panagariya, 2007. Free Trade Areas and rules of origin: economics and politics. *Economics & Politics* 19(2), pp. 169-190.

[18] Eaton, Jonathan and Samuel Kortum, 2002. Technology, geography, and trade. *Econometrica* 70(5), pp. 1741-1779.

[19] Falvey, Rod and Geoff Reed, 2002. Rules of origin as commercial policy instruments. *International Economic Review* 43(2), pp. 393-407.

[20] Falvey, Rod and Geoff Reed, 1998. Economic effects of rules of origin. *Weltwirtschaftliches Archiv* 134(2), pp. 209-229.

[21] Fergusson, Ian F., 2015. Trade promotion authority (TPA) and the role of Congress in trade policy. Congressional Research Service 7-5700 (June 15).

[22] Freund, Caroline and John McLaren, 1999. On the dynamics of trade diversion: evidence from four trade blocs. Board of Governors of the Federal Reserve System International Finance Discussion Papers No. 637 (June).

[23] Fujita, Masahisa, Paul R. Krugman, and Anthony Venables, 1999. *The Spatial Economy: Cities, Regions, and International Trade.* Cambridge, MA: MIT Press.

[24] Grossman, Gene, 1981. The theory of domestic content protection and content preference. *Quarterly Journal of Economics* 96(4), pp. 583-603.

[25] Guebert, Alan, 2014. Farm and Food: Not So Fast-track on Trade Deals. Journal-Star.com (January 18).

[26] Hallak, Juan Carlos and Jagadeesh Sivadasan, 2013. Product and process productivity: implications for quality choice and conditional exporter premia. *Journal of International Economics* 91(1), pp. 53-67.

[27] Handley, Kyle, 2012. Exporting under trade policy uncertainty: theory and evidence. *Journal of International Economics* 94(1), pp. 50-66.

[28] Handley, Kyle and Nuno Limão, 2015. Trade and investment under policy uncertainty: theory and firm evidence. *American Economic Journal: Economic Policy* 7(4), pp. 189-222.

[29] Hakobyan, Shushanik, 2015. Accounting for underutilization of trade preference programs: the US generalized system of preferences. *Canadian Journal of Economics* 48(2), pp. 408-436.

[30] Iacovone, Leonardo and Beata Javorcik, 2012. Getting ready: preparation for exporting. CEPR Discussion Paper No. 8926 (February).

[31] Ju, Jiandong and Kala Krishna, 2005. Firm behaviour and market access in a free trade area with rules of origin. *Canadian Journal of Economics* 38(1), pp. 290-308.

[32] Koh, Harold H., 1992. The fast track and United States trade policy. *Brooklyn Journal of International Law* 18(1), pp. 143-180.

[33] Krishna, Kala, 2006. Understanding rules of origin. In Olivier Cadot, Antoni Estevadeordal, Akiko Suwa-Eisenmann and Thierry Verdier (eds.), *The Origin of Goods: Rules of Origin in Regional Trade Agreements*, Oxford: Oxford University Press, pp. 19-34.

[34] Krishna, Kala and Anne Krueger, 1995. Implementing free trade areas: rules of origin and hidden protection. In Alan Deardorff, James Levinsohn and Robert Stern (eds.), *New Directions in Trade Theory*. Ann Arbor: University of Michigan Press, pp. 149-198.

[35] Krugman, Paul R., 1980. Scale economies, product differentiation, and the pattern of trade. *American Economic Review* 70(5), pp. 950-959.

[36] Krugman, Paul R. and Anthony J. Venables, 1995. Globalization and the inequality of nations. *Quarterly Journal of Economics* 110(4), pp. 857-880.

[37] Kunimoto, Robert and Gary Sawchuk, 2005. NAFTA Rules of Origin. Ottawa: Ontario, Government of Canada Policy Research Initiative Discussion Paper (June).

[38] Lohmann, Susanne and Sharyn O'Halloran, 1994. Divided government and U.S. trade policy: theory and evidence. *International Organization* 48(4), pp. 595-632.

[39] Maggi, Giovanni and Andrés Rodríguez-Clare, 2007. A political-economy theory of trade agreements. *American Economic Review* 97(4), pp. 1374-1406.

[40] McLaren, John, 1997. Size, sunk costs, and Judge Bowker's objection to free trade. *American Economic Review* 87(3), pp. 400-420.

[41] McLaren, John, 2002. A theory of insidious regionalism. *Quarterly Journal Economics* 117(2), pp. 571-608.

[42] McLaren, John, 2016. Chapter 2: The political economy of commercial policy. In Kyle Bagwell and Robert Staiger (eds.), *Handbook of Commercial Policy, Volume 1A*, Elsevier, pp. 109-159.

[43] Okun-Kozlowicki, Jeff and Gabe Horwitz, 2013. Trade promotion authority: myths & facts. Washington, DC: Third Way (September).

[44] Ornelas, Emanuel and John L. Turner, 2008. Trade liberalization, outsourcing, and the hold-up problem. *Journal of International Economics* 74(1), pp. 225-241.

[45] Ornelas, Emanuel and John L. Turner, 2011. Protection and international sourcing. *Economic Journal* 122 (March), pp. 26-63.

[46] Smith, Carolyn C., 2006. Trade promotion authority and fast-track negotiating authority for trade agreements: Major votes. CRS Report RS21004, Congressional Research Service (October 18).

[47] Staiger, Robert W. and Guido Tabellini, 1989. Rules and discretion in trade policy. *European Economic Review* 33(6), pp. 1265-1277.

[48] Stevens, Guy, 1998. U.S. direct investment to Mexico: politics, economics, and NAFTA. *Contemporary Economic Policy* 16(2), pp. 197-210.

[49] Tucker, Todd and Lori Wallach, 2008. *The Rise and Fall of Fast Track Trade Authority.* Washington, DC: Public Citizen.

[50] Verhoogen, Eric, 2008. Trade, quality upgrading, and wage inequality in the Mexican manufacturing sector. *Quarterly Journal of Economics* 123(2), pp. 489-530.