How Important can the Non-Violation Clause be for the GATT/WTO?*

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Abstract

The "non-violation" clause was a major focus of the drafters of GATT in 1947, and its relevance was revisited and reaffirmed with the creation of the WTO in 1995. And according to the terms-of-trade theory of trade agreements, it has an important role to play in facilitating the success of the "shallow integration" approach that the GATT/WTO has adopted. Yet despite the prominence given to the non-violation clause by its legal drafters and suggested by economic theory, in GATT/WTO practice the observed performance of the non-violation complaint has been weak. Can a model account for the observed features of the usage and outcomes of non-violation claims? And if so, what is implied by these weak performance measures about the (on- and off-) equilibrium impacts of the non-violation clause on the joint welfare of the GATT/WTO member governments? We develop a model of non-violation claims in trade agreements, demonstrate that it can account for the observed features of the usage and outcomes of non-violation claims, and show that the weak performance measures of observed non-violation claims are not inconsistent with a valuable role for the non-violation clause in the GATT/WTO.

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1. Introduction

If international trade agreements are thought to be incomplete contracts, then the "non-violation" clause of the General Agreement on Tariffs and Trade (GATT) is Exhibit A. This clause, which is also included in GATT's successor, the World Trade Organization (WTO), allows one GATT/WTO member government to seek compensation from another for adverse trade effects of the other's policies, even though those policies do not violate any GATT/WTO obligations. The concept of a non-violation complaint represents an explicit acknowledgment that the GATT/WTO contract is incomplete in its coverage of the potential policy measures with trade effects that governments might conceivably employ.

The non-violation clause was a major focus of the drafters of GATT in 1947 (see for example Hudec, 1990), and its relevance was revisited and reaffirmed with the creation of the WTO in 1995 (see Petersmann, 1997). And according to the terms-of-trade theory of trade agreements, the non-violation clause has an important role to play in facilitating the success of the "shallow integration" approach that the GATT/WTO has adopted (see for example Bagwell and Staiger, 2001, 2002, 2006, 2010 and Staiger and Sykes, 2011).

Yet despite the prominence given to the non-violation clause by its legal drafters and legal scholars and suggested by economic theory, in GATT/WTO practice the observed performance of the non-violation complaint has been weak. In particular, relative to GATT/WTO disputes that feature more traditional "violation" complaints, GATT/WTO rulings on non-violation complaints have been both rare and mostly unsuccessful.

In this paper we document these and other stylized features of the use of the non-violation complaint in GATT/WTO disputes, and we ask: Can a model account for these observed features of the usage and outcomes of violation and non-violation claims?; And if so, what is implied from the weak performance measures of observed non-violation claims about the (on- and off-) equilibrium impacts of the non-violation clause on the joint welfare of the GATT/WTO member governments?

To speak to these questions, a model must predict that disputes are actually observed in equilibrium. But in the models of non-violation claims referenced above, all disputes are essentially off equilibrium (see, for example, Bagwell and Staiger, 2006, note 6), so those models are generally silent on these questions.[1] A model of trade agreements that does predict equilib-

[1] A partial exception is Bagwell and Staiger (2010), where conditions are provided under which the impact on non-violation claims is off equilibrium but where under other conditions the use of non-violation claims will be

rium disputes is developed by Maggi and Staiger (2011), but that model does not consider the possibility of non-violation claims. We adopt and extend the model of Maggi and Staiger to incorporate the possibility of non-violation claims, and then use the extended model to consider the nature and potential importance of the role of the non-violation clause in the GATT/WTO.

As in Maggi and Staiger (2011), when a dispute arises in our model it is because one of the parties is acting opportunistically to exploit the absence of a complete contract and the inaccuracy of the court rulings: either the complainant country is attempting to force liberalization with an incorrect court ruling when the defendant country's intervention is in fact globally efficient, or the defendant country is attempting to "get away with" intervention with an incorrect court ruling when laissez faire is in fact the efficient policy. From this perspective, we show that the relative infrequency of non-violation rulings in GATT/WTO disputes can be understood according to our model as primarily attributable to two underlying forces, one that reflects features of the GATT/WTO institutional environment and keeps in check the incentive to use the non-violation claim against policies that are globally efficient, and the other that reflects features of the policy environment and keeps in check the incentive to use domestic tax and regulatory policies for terms-of-trade manipulation. And we show that the relatively low success rate of non-violation claims as compared to violation claims in GATT/WTO disputes can be understood as a reflection of dispute selection effects that work to raise the success rate of violation claims but that are rendered inoperative when it comes to non-violation claims as long as the court is highly accurate.

Our model also indicates that, despite the paucity of GATT/WTO rulings on non-violation claims and their low rate of success, these observed features of disputes are not inconsistent with a valuable role for the non-violation clause in the GATT/WTO. We establish this by re-solving the model in the absence of the non-violation clause but under the restricted set of model parameters implied by the observed dispute features. And we find that according to our model, the weak performance measures of observed non-violation claims are consistent with a world in which governments make market access commitments with contracts over border measures while preserving policy autonomy over domestic taxes and regulations, and the non-violation clause functions mostly off-equilibrium to reroute policy interventions into forms that are explicitly addressed by the GATT/WTO contract and thereby prevent the circumvention

observed on the equilibrium path (see in particular the discussion after their Proposition 4). However Bagwell and Staiger do not consider the frequency of observed non-violation claims that might be implied by their model.

of these market access commitments, a function that is broadly in line with the role emphasized by economists and legal scholars and envisioned by the drafters of GATT.

The rest of the paper proceeds as follows. The next section provides some institutional background and describes some stylized features of non-violation claims in GATT/WTO disputes. Section 3 then presents the model setup, while section 4 derives the equilibrium outcomes. Section 5 explores the ability of a restricted set of model parameters to capture the stylized features of the role that non-violation claims have played in GATT/WTO disputes. Section 6 then considers the potential impacts of the non-violation clause, and asks whether the non-violation clause could add significant value for the GATT/WTO members under the restricted set of parameters identified in section 5. Finally, section 7 concludes.

2. The Non-Violation Clause

We begin with a brief institutional overview of the non-violation clause and a description of several stylized features concerning the role that non-violation claims have played in GATT/WTO disputes. This overview and description will guide the analysis in the following sections. In Staiger and Sykes (2013) we provide a more detailed legal and institutional discussion of these issues (see also Petersmann, 1997, and Hudec, 1990 and 1993).

To understand the origins of the non-violation clause in GATT, it is helpful to recall that the central purpose of the GATT/WTO is to facilitate market access integration between and among its member governments. To achieve this, the GATT and (albeit to a lesser extent) the WTO have taken a "shallow" approach to integration, focusing primarily on the reduction of tariffs, with a set of attendant rules (e.g., the non-discrimination rules embodied in the national treatment and most-favored-nation obligations) that create an agreed code of conduct on non-tariff measures. But even with these rules, it was well-understood by GATT drafters (see Hudec, 1990) that the market access implications of tariff cuts could be nullified by behind-the-border policies that would not and could not be subjected to negotiations. It is for this reason that the non-violation clause was included in the original 1947 GATT dispute settlement articles and incorporated as well into the articles of the WTO.

The non-violation clause is contained in GATT's Article XXIII:1 on "Nullification or Impairment," which states:

> If any contracting party should consider that any benefit accruing to it directly or

> indirectly under this Agreement is being nullified or impaired or that the attainment of any objective of the Agreement is being impeded as the result of
>
> (a) the failure of another contracting party to carry out its obligations under this Agreement, or
>
> (b) the application by another contracting party of any measure, whether or not it conflicts with the provisions of this Agreement, or
>
> (c) the existence of any other situation,
>
> the contracting party may [have recourse to the dispute resolution process]...

In principle, Article XXIII provides for a total of six possible "causes of action:" three for "nullification or impairment" of benefits, either for reasons of (a) "the failure... to carry out... obligations," or (b) "the application by another... of any measure, whether or not it conflicts" with GATT, or (c) "the existence of any other situation;" and three where the "attainment of any objective... is being impeded" (as a result of any of the same three reasons).

The GATT negotiators were aware that this language is exceedingly vague and open-ended in terms of the circumstances that might trigger a right to dispute resolution. But as Hudec (1990, chapter 4) explains, they nevertheless chose to retain the "any measure" and "other situation" provisions, with the hope that the GATT membership would interpret these provisions sensibly over time. In practice, only two of the six actions provided in Article XXIII have proven significant in the context of GATT/WTO disputes, and they each focus on "nullification or impairment." The so-called "violation" claims invoke Article XXIII:1(a), while "non-violation" claims proceed with respect to Article XXIII:1(b). All claims are made to a "panel" of judges drawn from the GATT/WTO membership, and the panel issues a ruling (which under WTO procedures can be appealed to a higher level of judges). Henceforth we will refer to the relevant collection of judges in a GATT/WTO dispute as the "DSB" (dispute settlement body).

As the name suggests, violation claims are conceptually straightforward, and simply involve a claim by some government that another government is violating its obligations under the agreement (with a presumption that such violations then nullify the complaining government's benefits under the agreement). Non-violation claims, on the other hand, are less familiar, as they involve no claim that a government is actually violating any of its agreed obligations. Rather, non-violation claims target policies that have "frustrated the legitimate market access expectations" of the claimant under the agreement even if these policies have not violated any obligations under the agreement.

Violation claims can therefore only be leveled at policies that have been contracted over (or that display features, e.g., discrimination, that have been contracted over). Non-violation claims, by contrast, can be made against any policies, whether or not those policies have been contracted over (or display features that have been contracted over). And if it is contracted over, a single policy can be the subject of both a violation claim and a non-violation claim. In such a case, there is a specific hierarchy of claims: the DSB rules first on the violation claim, and only moves on to rule on the non-violation claim if it has ruled against the claimant on the violation claim. Hence, a non-violation claim can be aimed at policies that would otherwise be beyond the reach of the GATT/WTO contract; or it can be used as a "backup claim" to a violation claim concerning a contracted (or contracted feature of a) policy.[2]

Finally, under a successful violation claim there is typically a legal presumption that the defendant will bring its policy into compliance with the agreement.[3] But under a successful non-violation claim there is no such presumption. A successful non-violation claim only creates a legal right for the claimant to receive compensation from the defendant, which the defendant can either pay, or can avoid paying by removing the policy in question (or making other policy adjustments) so as to eliminate the nullification of benefits for the claimant.

With this institutional background in place, we next record three stylized features about the role that non-violation claims have played in GATT/WTO disputes.[4] In later sections we will return to these stylized features and ask whether our model can capture them.

A first feature is the paucity of GATT/WTO disputes in which the DSB has ruled on a non-violation claim. This is arguably true in absolute terms – over the more than 60 years that the GATT/WTO has been in operation, there have been only 19 disputes that involved

[2] An example of a non-violation claim aimed at a policy that would otherwise be beyond the reach of the GATT/WTO contract can be found in the 1984 GATT dispute *Australia v. European Community: Operation of Beef and Veal Regime*, where Australia invoked Article XXIII:1(b) to claim that the EC CAP regime subsidies on beef and veal were distorting world prices and eroding Australia's ability to export to third markets (see Hudec, 1993, p. 521). An example of a non-violation claim used as a "backup claim" to a violation claim concerning a contracted (or contracted feature of a) policy can be found in the 1949 GATT dispute *Chile v. Australia: Subsidy on Ammonium Sulfate*, where Chile claimed that a domestic consumption subsidy granted to purchasers of ammonium sulfate fertilizer but not to purchasers of sodium nitrate fertilizer violated the most-favored-nation obligation (GATT Article I:1), and as a backup claim argued that the recent discontinuance of only the sodium nitrate subsidy program constituted Article XXIII:1(b) non-violation nullification and impairment of Australia's recent tariff concessions (see Hudec, 1993, pp. 421-422).

[3] We discuss this further at later points in the paper (see especially note 13)

[4] The data behind the calculations we present below come from Hudec (1993) for the GATT-era disputes and from the World Bank's WTO Dispute Settlement Database (see Horn, Johannesson and Mavroidis, 2011 for a description) and the WTO web site for the WTO-era disputes.

a ruling on a non-violation claim – but the feature of the data that we emphasize here is the paucity of rulings on non-violation claims relative to the total number of disputes: of the 232 GATT/WTO disputes initiated through the end of 2009 for which a ruling on any kind of claim occurred, the 19 disputes that involved a ruling on a non-violation claim represent a mere 8%, a number that would shrink further if it were limited to panel rulings on non-violation claims that were "adopted" as official by the wider GATT/WTO membership.[5]

A second feature is that the filing of non-violation claims – as distinct from DSB rulings on those claims – is *not* particularly uncommon: 20% (47 disputes) of the 232 GATT/WTO disputes initiated through the end of 2009 for which a ruling on any kind of claim occurred included a non-violation claim. In light of the first feature emphasized above, this implies a relatively low probability that non-violation claims are actually ruled upon. Indeed, if a non-violation claim is made in a GATT/WTO dispute that results in a ruling on any kind of claim, the non-violation claim is less than half as likely to be ruled upon by the DSB as compared to the DSB's likelihood of ruling on a violation claim. Hence, of those GATT/WTO disputes that resulted in a DSB ruling on any kind of claim, the fraction that involved a ruling on a non-violation claim is quite small, while the fraction that included a non-violation claim, whether or not that claim was ruled upon, is not particularly small.

And a third feature is that, conditional on getting a DSB ruling, the success rate of violation claims is fairly high, while the success rate of non-violation claims is quite low. In particular, in GATT/WTO disputes initiated through the end of 2009 for which a DSB ruling on a violation claim occurred, the DSB ruled in favor of the claimant on (at least some portion of) the violation claim approximately 73% of the time.[6] By contrast, in GATT/WTO disputes initiated through the end of 2009 for which a DSB ruling on a non-violation claim occurred, the DSB ruled in favor of the claimant on the non-violation claim approximately 37% of the time.

We summarize these observed features as follows: relative to the number of GATT/WTO

[5]Panel rulings that were not adopted by the GATT membership in the GATT era or that were overturned on appeal in the WTO era do not have official status in GATT/WTO law, and so it may be appropriate to exclude such rulings from calculations like those we present here. Doing so would only provide further support for the features we emphasize. Also, as we discuss later (see in particular notes 7 and 27), many GATT/WTO disputes settle before a ruling occurs, and so we focus here on the number of disputes for which a ruling on a non-violation claim occurred relative to the total number of disputes for which a ruling on a claim of any kind occurred.

[6]These calculations again include all DSB rulings, whether or not they were adopted by the GATT/WTO membership (see also note 5). The WTO reports related success rates that are somewhat higher (see WTO, 2007, p. 273) under a different criterion for the inclusion of rulings. The WTO report does not break out separate success rates for violation claims and non-violation claims as we do here.

disputes in which a ruling on any kind of claim occurred, (i) the number of these disputes in which a ruling on the non-violation claim occurred is small, and (ii) the number of these disputes in which a non-violation claim was made is not small; and (iii) the success rate of violation claims in GATT/WTO disputes is fairly high, while the success rate of non-violation claims is very low.

Can a model account for these observed features of the usage and outcomes of violation and non-violation claims? And if so, what is implied from the weak performance measures of observed non-violation claims about the (on- and off-) equilibrium impacts of the non-violation clause on the joint welfare of the GATT/WTO member governments? To speak to these questions, a model must predict that disputes are actually observed in equilibrium, and as noted in the Introduction the models highlighting the role of the non-violation clause are generally silent on this issue. One model that does predict equilibrium disputes is developed by Maggi and Staiger (2011), but that model does not consider the possibility of non-violation claims. In the next section we adopt and extend the model of Maggi and Staiger to incorporate the possibility of non-violation claims, and then use the extended model to consider the nature and potential importance of the role of the non-violation clause in the GATT/WTO.

3. A Model of Violation and Non-Violation Claims

Maggi and Staiger (2011) develop a two-country partial equilibrium model of dispute settlement in international trade agreements in which an importing government has a binary trade policy choice. Ex ante, before uncertainty over the value of trade policy commitments is resolved, the governments of the importing and exporting country can write an incomplete contract and can also set up a dispute settlement body (DSB) and define its mandate. Then ex post, once uncertainty is resolved, the importing government makes its trade policy choice and the exporting government decides whether to initiate a dispute, which if initiated is resolved by the DSB according to its given mandate.

We build from the model of Maggi and Staiger (2011), extending it in two ways. First, in addition to its trade policy choice, we allow the importing government to make a domestic regulatory choice. And second, in addition to the (violation) claim considered in Maggi-Staiger, we introduce the possibility of bringing a non-violation claim.

Our setup is partial-equilibrium, and it focuses on a single industry in which the Home (importing) government chooses a binary import policy $\tau \in \{FT, P\}$ (Free Trade or Protection) and also makes a binary choice over a domestic regulation $r \in \{FT, R\}$ (Free Trade or Regulation). The payoff of the Home government is $\omega(\tau, r; s)$, where $s \equiv (s_1, s_2, ..., s_N)$ is a vector of state variables. Each state variable s_i represents a binary event (such as "there is/is not an import surge" or "the product does/does not contain asbestos"), with $p(s)$ the probability that state s occurs and Σ the set of possible states. The Foreign (exporting) government has no export policy in this industry, and its payoff is given by $\omega^*(\tau, r; s)$. We assume for simplicity that it is never internationally efficient or unilaterally optimal for Home to set both $\tau = P$ and $r = R$ at the same time. Hence there are three relevant policy settings to consider: $\mathcal{FT} \equiv \{\tau = FT, r = FT\}$, $\mathcal{P} \equiv \{\tau = P, r = FT\}$, and $\mathcal{R} \equiv \{\tau = FT, r = R\}$.

We denote the impact of trade protection on Home payoffs by $\gamma^{\mathcal{P}}(s) \equiv \omega(\mathcal{P}; s) - \omega(\mathcal{FT}; s) > 0$, and the impact of domestic regulation on Home payoffs by $\gamma^{\mathcal{R}}(s) \equiv \omega(\mathcal{R}; s) - \omega(\mathcal{FT}; s) > 0$. These impacts may be thought of as arising from a combination of terms-of-trade and purely domestic considerations. We assume that Foreign loses from Home policy intervention in all states s; and for simplicity we fix the impact of Home intervention on Foreign payoffs in a given state to be the same across both policies, and we denote this impact (defined positively) by $\gamma^*(s) \equiv \omega^*(\mathcal{FT}; s) - \omega^*(\mathcal{P}; s) = \omega^*(\mathcal{FT}; s) - \omega^*(\mathcal{R}; s) > 0$: in effect, we are assuming that the impact of Home policies on Foreign payoffs is transmitted through the trade effects of the Home policy choice, and that in a given state s the trade effects of $\mathcal{P}$ and $\mathcal{R}$ are the same. Finally, we rule out negotiations between governments at the ex-post stage (after the state s is realized).[7]

Defining the "first-best" policy for a given state s as the policy that maximizes the governments' joint payoff $\Omega(\tau, r; s) \equiv \omega(\tau, r; s) + \omega^*(\tau, r; s)$, we may now partition the states of the world into three sets: those where the first-best involves no policy intervention, those where the first-best involves import protection and those where the first-best involves domestic regulation. Formally, we let $\Gamma^{\mathcal{P}}(s) \equiv \gamma^{\mathcal{P}}(s) - \gamma^*(s) = \Omega(\mathcal{P}; s) - \Omega(\mathcal{FT}; s)$ denote the joint (positive

[7] Maggi and Staiger (2011) also abstract from ex-post negotiations, with an assumption that effective ex-post transfers are not available to governments (see Maggi and Staiger on a justification for this assumption within the context of GATT/WTO disputes). As will become clear below, we can appeal to a similar assumption here, provided that the ex-post transfers that are available to governments in our model are sufficiently inefficient. Alternatively, sufficiently high ex-post bargaining frictions of any form would be sufficient for our purposes. In reality, many GATT/WTO disputes are in fact settled through ex-post negotiations, and Maggi and Staiger (2012) consider the intermediate case in which ex-post transfers are inefficient but not so inefficient as to preclude ex-post negotiation and settlement of disputes (although they do not focus on non-violation complaints as we do here). We leave the extension to that case as an important direction for future work on non-violation complaints (see also note 27).

or negative) gain from protection relative to free trade for the two governments; and we let $\Gamma^{\mathcal{R}}(s) \equiv \gamma^{\mathcal{R}}(s) - \gamma^{*}(s) = \Omega(\mathcal{R}; s) - \Omega(\mathcal{FT}; s)$ denote the joint (positive or negative) gain from domestic regulation relative to free trade for the two governments. We may then use $\sigma^{\mathcal{FT}}$, $\sigma^{\mathcal{P}}$ and $\sigma^{\mathcal{R}}$ to denote the sets of states for which the first-best policy is respectively $\mathcal{FT}$, $\mathcal{P}$ and $\mathcal{R}$:

$$\begin{aligned}
\sigma^{\mathcal{FT}} &\equiv \{s \text{ such that } \max[\Gamma^{\mathcal{P}}(s), \Gamma^{\mathcal{R}}(s)] \leq 0\}, \\
\sigma^{\mathcal{P}} &\equiv \{s \text{ such that } \Gamma^{\mathcal{P}}(s) > \max[0, \Gamma^{\mathcal{R}}(s)]\}, \quad \text{and} \\
\sigma^{\mathcal{R}} &\equiv \{s \text{ such that } \Gamma^{\mathcal{R}}(s) > \max[0, \Gamma^{\mathcal{P}}(s)]\}.
\end{aligned}$$

We assume that the realized state s is observed by the governments and by the DSB, while $\Gamma^{\mathcal{P}}$ and $\Gamma^{\mathcal{R}}$ are observed by the governments but not by the DSB (so that payoff levels are not verifiable and hence non-contractible).

In $\sigma^{\mathcal{P}}$ where the first-best involves import protection, we do not take a stand on whether the alternative of domestic regulation is better or worse than free trade, i.e., we allow $\Gamma^{\mathcal{R}}(s) \gtreqless 0$. Similarly, in $\sigma^{\mathcal{R}}$ where the first-best involves domestic regulation, the alternative of import protection may be better or worse than free trade, i.e., we allow $\Gamma^{\mathcal{P}}(s) \gtreqless 0$. But in $\sigma^{\mathcal{FT}}$ where the first-best is free trade, it is natural that Home would prefer import protection to domestic regulation – that is, $\gamma^{\mathcal{P}}(s) > \gamma^{\mathcal{R}}(s)$ – which, as both $\mathcal{P}$ and $\mathcal{R}$ are associated with the same level of $\gamma^{*}(s)$, then implies $\Gamma^{\mathcal{P}}(s) > \Gamma^{\mathcal{R}}(s)$: the reason is that, in a wide set of environments, the benefits to Home of intervening in $\sigma^{\mathcal{FT}}$ where intervention is jointly inefficient are associated with terms-of-trade manipulation (see Bagwell and Staiger, 1999, 2001), and import protection (a tariff) is the first-best policy instrument for this purpose.[8] To capture this feature we introduce a parameter $\theta \in (0, 1)$ to reflect the degree to which the policy $\mathcal{R}$ is a good substitute for $\mathcal{P}$ for the purpose of terms-of-trade manipulation, and we impose

$$\gamma^{\mathcal{R}}(s) = \theta \cdot \gamma^{\mathcal{P}}(s) \text{ for } s \in \sigma^{\mathcal{FT}}. \qquad \text{(Assumption 1)}$$

The policy substitution parameter θ will play a key role in our analysis.

[8] More specifically, a state in $\sigma^{\mathcal{P}}$ could correspond to a situation in which significant distributional concerns arise for Home, with the implicit policy ranking that import protection dominates domestic regulation on global efficiency grounds as the preferred policy response in such situations, but where domestic regulation might still be preferred on efficiency grounds relative to free trade as a second-best form of redistribution. Similarly, a state in $\sigma^{\mathcal{R}}$ might correspond to a situation in which significant safety concerns associated with the imported product arise for Home, where domestic regulation now dominates import protection as the preferred policy response but where import protection might still be preferred relative to free trade as a second-best policy response. Finally, states in $\sigma^{\mathcal{FT}}$ would correspond to situations where there is no legitimate grounds for deviation from free trade from the perspective of global efficiency, and where Home's incentive to deviate from free trade then arises from beggar-thy-neighbor terms-of-trade considerations that are most effectively pursued with import protection.

We next discuss the contracting possibilities. Following Maggi and Staiger (2011), we assume that it is costless to describe the trade policy τ in a contract but prohibitively costly to describe precisely all the relevant state variables $(s_1, s_2, ..., s_N)$ that would be necessary to write a complete contingent contract covering τ, and we focus instead on what Maggi and Staiger term a "vague contract" that takes the form "$\tau = P$ allowed if and only if ν," where ν is a vague sentence such as "there is serious injury to the domestic industry due to increased imports." Vague contracts use "off the shelf" language and are costless to write, but their meaning is ambiguous in some states of the world; and following Maggi and Staiger, in those states of the world where their meaning is *un*ambiguous we assume that vague contracts are written so that they specify the first-best policy choice. By contrast, we assume that writing r in an ex-ante contract would itself be prohibitively expensive, reflecting the notion that r could encompass any of a myriad of domestic regulations that might be implemented ex post. Hence, the vague contract cannot be written to cover r, nor for the same reason can any other ex-ante contract cover r. In short, due to prohibitively high writing costs, r is left out of the ex-ante contract altogether. Or, using Maggi and Staiger's terminology and as we discuss further below, r is covered by the "empty contract."[9]

In addition to writing the ex-ante contract covering τ, governments can introduce a court – the DSB – and can give the DSB a mandate to follow if it is invoked to settle a dispute ex post. Recall that the DSB is assumed to observe the realized state s but not the values of $\Gamma^{\mathcal{P}}$ and $\Gamma^{\mathcal{R}}$; thus, the DSB does not know what the "best" (joint-payoff-maximizing) policy is for the realized state s. What role can the DSB play? Here we identify two possible roles: the DSB can address a *violation complaint*, and/or the DSB can address a *non-violation complaint*.

[9] Of course, it might be possible to describe r in vague terms in an ex-ante contract, much like the use of vague language to describe state contingencies. But there is an important difference between contingencies and policies where the use of vague language is concerned: states of the world can reasonably be viewed as exogenous, but the same cannot be said for the design of policies. As a consequence, while a well-crafted vague sentence describing certain contingencies might have unambiguous meaning in an important set of states of the world, policies can often be designed *around* the unambiguous proscriptions of a vague sentence meant to describe them. This difference makes inclusion of a vague sentence describing domestic policies in an ex-ante contract especially problematic, as the breadth required to encompass all of the available policy options (e.g., "domestic taxes and regulations") would limit the possibility of desirable ex-ante constraints (to, e.g., broad proscriptions against discrimination, such as national treatment). On the other hand, a more narrow class of policies (e.g., "subsidies") might be usefully described with a vague sentence and more tightly constrained once such policies were found to be especially relevant in practice, and in the Conclusion we discuss further the possibility that classes of domestic policies which turn out to be relatively frequent targets of successful non-violation complaints might be later carved out and added to the ex-ante contract with vague language, a possibility which can itself contribute to an explanation of the relative paucity and low success rate of non-violation rulings.

A violation complaint occurs when Home selects $\tau = P$ in state s and Foreign invokes the DSB, and claims that the contract specifies $\tau = FT$ in state s and hence that the contract has been violated by Home's policy choice. If the trade policy obligation specified in the contract ($\tau = FT$ or $\tau = P$) is unambiguous for state s, then the DSB simply enforces the contract, and we ignore such disputes in what follows.[10] We focus instead on states s where the obligation specified in the contract is ambiguous; and we assume that, if invoked in such a state, the DSB observes an unbiased but noisy signal of $\Gamma^{\mathcal{P}}$, which can be thought of as the outcome of an independent investigation in which the DSB "interprets" the contract. The DSB then issues a *ruling* – that is a policy determination τ^{DSB}, which we assume in the case of a violation complaint is automatically enforced – with the objective of maximizing the expected joint payoff of the governments given the signal. In particular, the DSB issues the ruling $\tau^{DSB} = FT$ if its signal indicates $\Gamma^{\mathcal{P}} \leq 0$, and it issues the ruling $\tau^{DSB} = P$ if its signal indicates $\Gamma^{\mathcal{P}} > 0$.

Notice that when ruling on a violation claim against $\tau = P$ the DSB does not consider the Home policy option $r = R$. Implicitly we are assuming that when Home selects $\tau = P$ in state s, it is not possible for Home to switch to $r = R$ within the time frame of dispute resolution. And so the issue that has arisen for the DSB to resolve is simply whether or not to allow import protection in state s. Our modeling of DSB behavior therefore broadly echoes Posner's (2005, p. 8) description of the interpretive role of courts: "Gap filling and disambiguating are both 'interpretive' in the sense that they are efforts to determine how the parties would have resolved the issue that has arisen had they foreseen it when they negotiated their contract."

Hence, in our model the approach to contracting over the import policy τ is analogous to the combination of a vague contract and an interpretive DSB mandate as introduced in Maggi and Staiger (2011). Maggi and Staiger also consider other forms for the ex-ante contract and DSB mandate, optimize among the possible contract/DSB mandate pairings, and show that the vague contract and interpretive DSB mandate can be optimal provided that the noise in the DSB signal is relatively small. Rather than optimizing the contract/DSB mandate pair across a variety of options, in what follows we simplify and focus exclusively on the vague contract and interpretive DSB mandate for the import policy τ in order to emphasize different themes: nevertheless, as we describe further below, we will concentrate our attention on the relatively-small-DSB-noise environment where this contract/DSB mandate is likely to be optimal.[11]

[10] Indeed, as we introduce just below a cost of disputes borne by each party, our model implies that no such disputes would ever arise in equilibrium.

[11] More specifically, as Maggi and Staiger (2011) demonstrate, when the noise in the DSB signal is in a small-

In contrast to a violation complaint, a non-violation complaint does not involve a claim that a contractual obligation has been violated, and hence we assume (in line with GATT/WTO practice) that a non-violation claim can be brought either against τ (when Home sets $\tau = P$), which is covered by the ex-ante contract, or against r (when Home selects $r = R$), which is not covered by any ex-ante contract. If the DSB is asked to rule on a non-violation complaint involving τ (r), we again assume that the DSB observes an unbiased but noisy signal of $\Gamma^{\mathcal{P}}$ ($\Gamma^{\mathcal{R}}$) and issues a ruling/policy determination τ^{DSB} (r^{DSB}), again with the objective of maximizing the expected joint payoff of the governments given the signal. Therefore, when Home sets $\tau = P$, the DSB ruling is $\tau^{DSB} = FT$ if its signal indicates $\Gamma^{\mathcal{P}} \leq 0$ and $\tau^{DSB} = P$ if the signal indicates $\Gamma^{\mathcal{P}} > 0$; and when Home selects $r = R$, the DSB ruling is $r^{DSB} = FT$ if its signal indicates $\Gamma^{\mathcal{R}} \leq 0$ and $r^{DSB} = R$ if the signal indicates $\Gamma^{\mathcal{R}} > 0$.[12] However, and unlike in a violation complaint, in the case of a non-violation ruling that goes against the Home government ($\tau^{DSB} = FT$ or $r^{DSB} = FT$), we assume (again in line with GATT/WTO practice) that Home is under no obligation to implement FT. Instead the non-violation complaint operates as a *liability rule*, in that Home has the *option* of either implementing the DSB policy determination or paying *damages* $b(s)$ to Foreign.[13]

What level of damages must the Home government pay if it wishes to keep its intervention in place when a non-violation ruling goes against it? We assume that the DSB sets damages at $b(s) = \gamma^*(s)$, the level of harm done to the Foreign country; and hence we assume that $\gamma^*(s)$ is

to-intermediate range the vague contract and interpretive DSB mandate will be optimal, but if the noise in the DSB signal is sufficiently small the vague contract and interpretive DSB mandate can become dominated by other contract/DSB mandate pairings. However, this possibility is most likely to arise when there would be no observed disputes under the vague contract and interpretive DSB mandate, and so our focus below on parameter ranges which in combination with relatively small DSB noise yield observed disputes makes this possibility unlikely to arise in our environment.

[12] Our discussion above concerning the interpretation of the DSB ruling applies without modification to non-violation claims brought against τ, and it applies as well with appropriate modification to the case of non-violation claims brought against r. That is, for this latter case we are implicitly assuming that when Home selects $r = R$ in state s, it is not possible for Home to switch to $\tau = P$ within the time frame of dispute resolution. And so the issue that has arisen for the DSB to resolve is simply whether or not to allow domestic regulation in state s.

[13] In this regard, there is an important question as to the practical distinction between violation and non-violation complaints in the GATT/WTO, in light of the fact that the same reciprocity-of-trade-effects rule generally guides the permissible retaliation for continued application of the intervention at issue in either case. This has fueled a debate among legal scholars about whether the typical violation complaint in a GATT/WTO dispute might be better interpreted as a liability rule, rather than as a "property rule" implying automatic enforcement as we have interpreted it above (see Jackson, 1997, and Schwartz and Sykes, 2002). And even setting aside this issue, there are some rule violations (e.g., the WTO rules on "actionable" subsidies) that operate as liability rather than property rules. We return to this issue in the Conclusion, and discuss there the case where both violation and non-violation claims are treated as liability rules.

observable to the DSB (but that $\gamma^{\mathcal{P}}(s)$ and $\gamma^{\mathcal{R}}(s)$ and therefore $\Gamma^{\mathcal{P}}$ and $\Gamma^{\mathcal{R}}$ are not). Below we will discuss the desirability/feasibility of setting damages in this way. We record this in

$$b(s) = \gamma^*(s) \text{ for } s \in \Sigma. \qquad \text{(Assumption 2)}$$

Finally, we denote by $b^*(s)$ the damages actually received by Foreign when Home pays $b(s)$, and we assume that Foreign receives less than Home pays, reflecting the dead-weight loss associated with reciprocal tariff retaliation, the typical form of "self-help" compensation authorized in GATT/WTO disputes.[14] To capture this feature we introduce a parameter $\delta \in (0,1)$ to reflect (inversely) the extent of the inefficiency in government-to-government transfers in the context of GATT/WTO disputes, and we impose:

$$b^*(s) \equiv \delta \cdot b(s) \text{ for } s \in \Sigma. \qquad \text{(Assumption 3)}$$

The transfer cost parameter δ will play a key role in our analysis.

Notice that if Home sets $\tau = P$, then Foreign may bring a violation complaint, a non-violation complaint, or bring both, or do nothing. We assume that if both a violation and non-violation claim are brought against Home's selection of $\tau = P$, the DSB first rules on the violation claim, and it moves on to rule on the non-violation claim only if it has ruled for the Home country (i.e., determines $\tau^{DSB} = P$) in the violation claim. This is the sequencing followed in GATT/WTO practice, and it can be rationalized on grounds of "judicial economy."[15]

On the other hand, if Home sets $r = R$, the possible responses of Foreign are to file a non-violation claim or do nothing, as r is not covered in an ex-ante contract and so a violation claim cannot be brought. Hence, our model captures the idea that non-violation claims can serve as an alternative to violation claims for disciplining policies that would be too costly to describe in a contract, an idea that we touched on in section 2 and that is well-reflected in the following quote from Hudec (1990) on the origins of the non-violation clause in GATT:

> "The dominant purpose of a trade agreement was the exchange of tariff reductions. The concept of a balanced exchange [reciprocity] was central...Concern for

[14] See Maggi and Staiger (2012) for a discussion of methods of compensation in GATT/WTO disputes and the deadweight loss typically associated with these methods.

[15] In particular, with the property rule/liability rule distinction across violation and non-violation claims, the sequencing of rulings described in the text is in line with the principle of judicial economy, because a ruling against the Home government on the violation claim would render meaningless to the Foreign government a subsequent ruling on the non-violation claim.

reciprocity stimulated the general code of trade policy rules that traditionally went along with the exchange of tariff reductions. Tariffs were only one instrument of trade policy, and unless other trade policy measures were held in check, the commercial opportunity of a tariff reduction could easily be nullified by some other collateral measure. To maintain reciprocity, therefore, prohibitions against quantitative restrictions, discrimination, and the like were essential. Even so, it was impossible fully to guarantee reciprocity by means of legal commitments. The standard trade policy rules could deal with the common types of trade policy measure governments usually employ to control trade. But trade can also be affected by other "domestic" measures, such as product safety standards, that have nothing directly to do with trade policy. It would have been next to impossible to catalogue all such possibilities in advance. Moreover, governments would never have agreed to circumscribe their freedom in all these other areas for the sake of a mere tariff agreement. The shortcomings of the standard legal commitments were recognized in a report by a group of trade experts at the London Monetary and Economic Conference of 1933. The group concluded that trade agreements should have another more general provision which would address itself to any other government action that produced an adverse effect on the balance of commercial opportunity." (pp. 19-20).[16]

Notice also that with damages in a successful non-violation complaint against Home set at $b(s) = \gamma^*(s)$ by Assumption 2, it follows that when Home faces a successful non-violation complaint (concerning either τ or r) for $s \in \sigma^{\mathcal{FT}}$, Home will comply with the policy determination (FT) rather than choose to maintain its policy and pay damages $b(s)$. But when Home faces a successful non-violation complaint over τ for $s \in \sigma^{\mathcal{P}}$ it will choose to maintain $\tau = P$ and pay the damages $b(s)$; and similarly, when Home faces a successful non-violation complaint over r for $s \in \sigma^{\mathcal{R}}$ it will choose to maintain $r = R$ and pay the damages $b(s)$. In other words, as modeled, Home's policy choices under the non-violation complaint have the flavor of those induced by an "efficient breach" rule.[17]

[16] The idea that non-violation claims can serve as an alternative to violation claims for disciplining policies that would be too costly to describe in a contract is also highlighted by Sykes (2005) in the context of disciplines on domestic subsidies: "A nice feature of the nonviolation doctrine is the fact that it does not require subsidies to be carefully defined or measured. A complaining member need simply demonstrate that an unanticipated government program has improved the competitive position of domestic firms at the expense of their foreign competition."

[17] See Schwartz and Sykes (2002) on an efficient-breach interpretation of GATT rules more generally, and see

At this point in may be useful to summarize how our approach to modeling the non-violation claim relates formally to Maggi and Staiger (2011) and Bagwell and Staiger (2001). Relative to Maggi and Staiger, our modeling of the non-violation claim in the context of the domestic regulatory policy is analogous to an empty contract (over r) paired with a mandate of the DSB to fill gaps, except that in the setting of Maggi and Staiger the DSB announces a policy which would be automatically enforced (a property rule), whereas we model the non-violation claim as a liability rule, with the DSB announcing damages that must be paid by Home if it wishes to keep its policy choice. The liability rule, in turn, plays the role of the market access preservation rule which Bagwell and Staiger use to formalize the "reciprocity-preserving" feature of the non-violation complaint described by Hudec (1990) in the passage quoted above, in terms of the ability of this rule to induce efficient policy choices by the Home country without the need to contract directly over domestic regulatory policies. Relative to Maggi and Staiger, we also allow the non-violation complaint to be brought against the policy covered by the vague contract (the import policy τ), and when it is brought in combination with a violation complaint the non-violation compliant serves here as a "back-up" complaint should the DSB fail to rule in favor of the Foreign exporter's violation claim.

Finally, we denote the probability that the DSB issues the "wrong"ruling by $q \in (0, 1/2)$, a parameter that applies to both violation and non-violation claims and captures (inversely) the overall quality of the DSB information.[18] Implicit in this formulation is that the DSB investigation is better than a coin flip, and that the DSB is not an active player in the game between the Home and Foreign governments.[19] If the DSB rules on both a violation and a non-violation claim in the same dispute, we assume that the error rate q applies to each ruling independently.[20] And importantly, we assume that disputes are costly: if the exporter

Grossman and Sykes (2010) for a discussion of some of the practical limitations associated with this interpretation. We say "the flavor of" efficient breach because by Assumption 3 the damage payment $b(s)$ made by Home carries with it a dead-weight loss so that Foreign receives $b^*(s) < b(s)$; and hence, while the policy choice mimics that of an efficient breach rule in the presence of lump-sum/efficient transfers, there are nonetheless inefficiencies associated with the transfer payments.

[18] A natural extension would be to allow one DSB error rate for violation claims and another for non-violation claims and consider the possibility that the former is smaller than the latter. We discuss this extension briefly in the Conclusion.

[19] For example, we are ruling out the possibility that the DSB might attempt to draw inferences about the appropriate ruling from the observed filing behavior induced by the actions of the two governments. Maggi and Staiger (2011) make an analogous assumption. Modeling the DSB as an active player would be an interesting extension, though if governments could commit the DSB not to be an active player it would be optimal for them to do so (for a related discussion, see also Maggi and Staiger, 2012).

[20] With our reduced form modeling of DSB errors we are glossing over some underlying differences between

(complainant) invokes the DSB, then for each complaint that the exporter brings the exporter incurs cost c^* and the importer (defendant) incurs cost c.

Formally, we consider the following timing:

Stage 0. The state s is realized;

Stage 1. Home chooses $\tau \in \{FT, P\}$ and $r \in \{FT, R\}$;

Stage 2. Foreign decides whether to file a violation and/or non-violation complaint with the DSB;

Stage 3. If invoked for a violation complaint, the DSB issues a ruling $\tau^{DSB} \in \{FT, P\}$; if invoked for a non-violation complaint, the DSB issues a ruling $\tau^{DSB} \in \{FT, P\}$ or $r^{DSB} \in \{FT, R\}$; if invoked for both a violation and a non-violation complaint, the DSB issues a first (violation) ruling $\tau^{DSB} \in \{FT, P\}$, and issues a second (non-violation) ruling $\tau^{DSB} \in \{FT, P\}$ if and only if its first ruling is $\tau^{DSB} = P$;

Stage 4. If the DSB is invoked and issues a non-violation ruling that goes against Home, then Home chooses whether to revert to FT or maintain its policy and pay damages $b(s)$; DSB violation rulings against Home are automatically enforced;

Stage 5. Payoffs are realized.

In what follows, we characterize the subgame perfect equilibrium of this game.

4. Analysis

We now derive the equilibrium policy choices and filing behavior. Earlier we partitioned the states of the world Σ into three sets: $\sigma^{\mathcal{R}}$, those states for which the first-best policy is $\mathcal{R} \equiv \{\tau = FT, r = R\}$; $\sigma^{\mathcal{P}}$, those states for which the first-best policy is $\mathcal{P} \equiv \{\tau = P, r = FT\}$; and $\sigma^{\mathcal{FT}}$, those states for which the first-best policy is $\mathcal{FT} \equiv \{\tau = FT, r = FT\}$. It is helpful to proceed first with states in $\sigma^{\mathcal{R}}$, and then follow with states in $\sigma^{\mathcal{FT}}$ and finally $\sigma^{\mathcal{P}}$.

violation and non-violation claims to preserve tractability. In a richer model, one could imagine a contract covering import protection that both featured vague phrases and contained gaps, and under such a contract violation claims would amount to asking the DSB to interpret vague phrases of the contract while non-violation claims would take aim at the contract gaps. Our simple parameterization of the DSB accuracy rate $(1 - q)$ can be thought of as a reduced form way of capturing the probability that the DSB rules for the right policy – whether for the right reason (e.g., finds a violation when in fact there was a violation of an appropriately interpreted vague phrase of the contract) or the wrong reason (e.g., finds a violation when in fact there was no violation but there was a non-violation) – when asked to evaluate a violation or a non-violation claim.

4.1. When the first-best policy is $\mathcal{R}$

Consider a state $s \in \sigma^{\mathcal{R}}$. We begin by deriving the Stage-2 filing behavior of Foreign conditional on a Home policy choice, and then derive the Stage-1 Home policy choice. We will establish below that in $\sigma^{\mathcal{R}}$ the relevant policy choice for Home is either $\mathcal{R}$ or $\mathcal{FT}$. Given this, the relevant filing decision for Foreign is, if Home chooses $\mathcal{R}$, whether or not to file a non-violation claim with the DSB. In particular, Foreign files a non-violation complaint against $\mathcal{R}$ if and only if the expected benefit to Foreign of filing exceeds its cost of filing, that is

$$\Pr(\text{DSB NV ruling is } r = FT \mid \sigma^{\mathcal{R}}) \cdot b^*(s) > c^*, \tag{4.1}$$

where here and throughout we let $\Pr(\cdot|\sigma^i)$ for $i \in \{\mathcal{R}, \mathcal{P}, \mathcal{FT}\}$ denote the probability of an outcome conditional on $s \in \sigma^i$. Condition (4.1) is the"filing"condition for Foreign to invoke the DSB in $\sigma^{\mathcal{R}}$ with a non-violation claim in response to a policy choice by Home of $\mathcal{R}$. Notice that (4.1) reflects the fact that, under Assumption 2, for states in $\sigma^{\mathcal{R}}$ Home will not alter its policy choice of $\mathcal{R}$ in response to a successful non-violation complaint against it by Foreign, but will instead pay damages $b(s)$ resulting in a payment $b^*(s)$ to Foreign. Note also that for states in $\sigma^{\mathcal{R}}$ we have $\Pr(\text{DSB NV ruling is } r = FT \mid s) = q$, and so using Assumptions 2 and 3 we may rewrite (4.1) as

$$\gamma^*(s) > \frac{c^*}{\delta q} \text{ for } s \in \sigma^{\mathcal{R}}. \tag{4.2}$$

Hence, Foreign files a non-violation claim against $\mathcal{R}$ for $s \in \sigma^{\mathcal{R}}$ if and only if the harm from $\mathcal{R}$ suffered by Foreign exceeds the threshold described in (4.2).

Next consider the Home government's Stage-1 policy choice for $s \in \sigma^{\mathcal{R}}$. It is easy to see that Home will never choose $\mathcal{P}$ for $s \in \sigma^{\mathcal{R}}$. This is because by definition we have $\gamma^{\mathcal{R}}(s) > \gamma^{\mathcal{P}}(s)$ in $\sigma^{\mathcal{R}}$, so the only reason that Home might wish to choose $\mathcal{P}$ rather than $\mathcal{R}$ would be to induce a more favorable expected dispute outcome. When (4.2) fails, this is clearly not possible, as the selection of $\mathcal{R}$ does not result in a dispute. And conditional on a dispute over $\mathcal{P}$ occurring, the best that Home could hope for is to face a non-violation claim, and under such a claim Home's expected payoff is higher under $\mathcal{R}$ than under $\mathcal{P}$.[21] Hence, when (4.2) holds and Foreign would

[21] To see this, observe first that facing both a violation and a non-violation claim over $\mathcal{P}$ is clearly worse for Home than facing one claim or the other; and between a non-violation claim and a violation claim, Home can expect to do (weakly) better under the non-violation claim because that claim operates as a liability rule. Finally, it is straightforward to check that in $\sigma^{\mathcal{R}}$ Home's expected payoff when it selects $\mathcal{R}$ and faces a non-violation claim (which we present in the text just below) is higher than its expected payoff from selecting $\mathcal{P}$ and facing a non-violation claim.

file a non-violation claim against $\mathcal{R}$, Home could only do better by selecting $\mathcal{P}$ if by doing so it could avoid a dispute altogether. But when (4.2) holds, Foreign is guaranteed to benefit from launching a dispute over $\mathcal{P}$ as well, and so Home cannot avoid a dispute with this policy selection.[22] We may conclude that Home will never choose $\mathcal{P}$ for $s \in \sigma^{\mathcal{R}}$.

This leaves two relevant Home policy options for $s \in \sigma^{\mathcal{R}}$: either $\mathcal{R}$ or $\mathcal{FT}$. And Home chooses $\mathcal{R}$ if either (4.2) fails – because then Home can choose $\mathcal{R}$ without triggering a dispute – or if (4.2) holds and the expected benefit to Home from choosing to implement domestic regulation exceeds the cost to Home of a DSB dispute:

$$\Pr(\text{DSB NV ruling is } R \mid \sigma^{\mathcal{R}}) \cdot \gamma^{\mathcal{R}}(s) + \Pr(\text{DSB NV ruling is } FT \mid \sigma^{\mathcal{R}}) \cdot [\gamma^{\mathcal{R}}(s) - b(s)] > c.$$

To reduce the number of cases and focus on the more interesting ones, we will follow Maggi and Staiger (2011) and assume that for each disputant the cost of a dispute is relatively small. In particular, here we assume that even in the case of maximal DSB noise, i.e., $q \to 1/2$, the condition above is satisfied for s in $\sigma^{\mathcal{R}}$:

$$\gamma^{\mathcal{R}}(s) > 2c \text{ for } s \in \sigma^{\mathcal{R}}. \qquad \text{(Assumption 4)}$$

Assumption 4 ensures that Home always chooses $\mathcal{R}$ for $s \in \sigma^{\mathcal{R}}$ (i.e., when $\mathcal{R}$ is the first-best policy) whether or not this triggers a non-violation complaint by Foreign.

4.2. When the first-best policy is $\mathcal{FT}$

Next we turn to states in $\sigma^{\mathcal{FT}}$. Again we begin by deriving the Stage-2 filing behavior of Foreign conditional on a Home policy choice, and then derive the Stage-1 Home policy choice.[23]

If Home chooses $\mathcal{R}$, the relevant filing decision for Foreign is whether or not to file a non-violation claim with the DSB. In particular, if Home chooses $\mathcal{R}$, Foreign files a non-violation complaint if and only if the expected benefit to Foreign of filing exceeds its cost of filing, that is

$$\Pr(\text{DSB NV ruling is } r = FT \mid \sigma^{\mathcal{FT}}) \cdot \gamma^{*}(s) > c^{*}. \qquad (4.3)$$

[22] For example, Foreign's expected payoff from filing a violation claim against $\mathcal{P}$ in $\sigma^{\mathcal{R}}$ would be $q\gamma^{*}(s) - c^{*}$ if $\Gamma^{\mathcal{P}}(s) > 0$ and $(1-q)\gamma^{*}(s) - c^{*}$ if $\Gamma^{\mathcal{P}}(s) \leq 0$, both of which are guaranteed to be positive under (4.2).

[23] As discussed earlier, the vague contract that covers τ will unambiguously obligate Home to $\tau = FT$ in a subset of states in $\sigma^{\mathcal{FT}}$. For this subset of states, Home selects $\tau = FT$ and there will be no equilibrium filing of either violation or non-violation claims by Foreign. For simplicity of exposition we ignore these states here, by in effect assuming that they constitute an insignificant number of states.

Condition (4.3) is the "filing" condition for Foreign to invoke the DSB with a non-violation claim in response to a policy choice by the Home government of $\mathcal{R}$ for states in $\sigma^{\mathcal{FT}}$. Notice that, contrary to (4.1) which applies for states in $\sigma^{\mathcal{R}}$, (4.3) reflects the fact that, under Assumption 2, for states in $\sigma^{\mathcal{FT}}$ Home *will* alter its policy choice of $\mathcal{R}$ in response to a successful non-violation complaint against it by Foreign (rather than maintaining its policy and paying the required damages $b(s)$). Observing that for states in $\sigma^{\mathcal{FT}}$ we have $\Pr(\text{DSB NV ruling is } r = FT \mid s) = (1-q)$, we may rewrite (4.3) as $(1-q)\gamma^*(s) > c^*$. Again to reduce the number of cases and focus on the more interesting ones, we assume that filing costs for Foreign are sufficiently small so that it always files against $\mathcal{R}$ for states in $\sigma^{\mathcal{FT}}$ (i.e., when $\mathcal{FT}$ is the first-best policy), regardless of the noise in the DSB signal, or:

$$\gamma^*(s) > 2c^* \text{ for } s \in \sigma^{\mathcal{FT}}. \qquad \text{(Assumption 5)}$$

On the other hand, if Home chooses $\mathcal{P}$ for states in $\sigma^{\mathcal{FT}}$, then Foreign has more filing choices. But it is immediate that Foreign would never (strictly) prefer to file a non-violation claim against $\tau = FT$ for states in $\sigma^{\mathcal{FT}}$ over a violation claim.[24] Moreover, the payoff to Foreign from filing a violation complaint will be positive provided that $\gamma^*(s) > \frac{c^*}{(1-q)}$, which is guaranteed by Assumption 5. Hence, the relevant choice for Foreign when Home selects $\mathcal{P}$ in $\sigma^{\mathcal{FT}}$ is whether to add a non-violation complaint to its violation complaint, which it will do if and only if

$$\gamma^*(s) \geq \frac{c^*}{(1-q)q} \text{ for } s \in \sigma^{\mathcal{FT}}. \qquad (4.4)$$

Therefore, Foreign always files a violation claim against $\mathcal{P}$ for states in $\sigma^{\mathcal{FT}}$, and files a non-violation claim as well if the harm to Foreign from $\mathcal{P}$ exceeds the threshold described in (4.4).

Consider next the Home government's Stage-1 policy choice for states in $\sigma^{\mathcal{FT}}$. Here, if Home chooses $\mathcal{R}$, it will face a non-violation complaint from Foreign and can expect the payoff

$$\Pr(\text{DSB NV ruling is } r = R \mid \sigma^{\mathcal{FT}}) \cdot \gamma^{\mathcal{R}}(s) - c.$$

[24] In fact, Foreign is indifferent between a violation and a non-violation claim against $\mathcal{P}$ in $\sigma^{\mathcal{FT}}$, and we break this indifference in favor of a violation claim. But Foreign's preference for the violation claim in these states would be strict if it were assumed that the DSB had even slightly higher accuracy in evaluating violation claims than in evaluating non-violation claims (due perhaps to the extra guidance offered by the contract in the case of violation complaints). We choose to conserve on notation with the assumption that DSB accuracy is the same across violation and non-violation claims, and we then break the resulting Foreign indifference that arises for this case in favor of the violation claim.

On the other hand, if Home chooses $\mathcal{P}$, then it will face a violation complaint from Foreign if (4.4) fails and can expect the payoff

$$\Pr(\text{DSB V ruling is } \tau = P \mid \sigma^{\mathcal{FT}}) \cdot \gamma^{\mathcal{P}}(s) - c,$$

while if (4.4) holds then Home will face both a violation and non-violation complaint from Foreign and can expect the payoff

$$\Pr(\text{DSB V ruling is } \tau = P \mid \sigma^{\mathcal{FT}}) \cdot \Pr(\text{DSB NV ruling is } \tau = P \mid \sigma^{\mathcal{FT}}) \cdot \gamma^{\mathcal{P}}(s) - 2c.$$

The above payoffs can be used to characterize the Home policy choice for states in $\sigma^{\mathcal{FT}}$. When (4.4) fails this characterization is particularly simple, because Home then faces the same consequences whether it chooses $\mathcal{P}$ or $\mathcal{R}$ (namely, the filing of a single complaint by Foreign which, if successful, will result in $\mathcal{FT}$), and with Assumption 1 it then follows that Home chooses $\mathcal{P}$ and Foreign files a violation complaint if

$$\gamma^{\mathcal{P}}(s) > \frac{c}{q} \tag{4.5}$$

and Home chooses $\mathcal{FT}$ otherwise.

When (4.4) holds, Home's policy choice is more involved, and hinges on the magnitude of θ, the parameter governing the attractiveness to Home of $\mathcal{R}$ relative to $\mathcal{P}$ in $\sigma^{\mathcal{FT}}$ in accordance with Assumption 1. When θ is low, and specifically for $\theta \in (0, \frac{q}{2}]$, Home will never choose $\mathcal{R}$ over $\mathcal{P}$ as a means of policy intervention in $\sigma^{\mathcal{FT}}$, even though Home's choice of $\mathcal{P}$ will now trigger the filing of an additional (violation) claim by Foreign. Rather, in this case Home chooses $\mathcal{P}$ and Foreign files both a violation and a non-violation complaint if

$$\gamma^{\mathcal{P}}(s) > \frac{2c}{qq} \tag{4.6}$$

and Home chooses $\mathcal{FT}$ otherwise. At the other extreme, when θ is high, and specifically for $\theta \in [q, 1)$, Home will always prefer $\mathcal{R}$ to $\mathcal{P}$ because it is a means of policy intervention in $\sigma^{\mathcal{FT}}$ which can avoid the additional (violation) claim by Foreign. In this case Home chooses $\mathcal{R}$ and Foreign files a non-violation complaint if

$$\gamma^{\mathcal{P}}(s) > \frac{c}{q\theta} \tag{4.7}$$

and Home chooses $\mathcal{FT}$ otherwise. Finally, for θ in the intermediate range of $\theta \in (\frac{q}{2}, q)$, Home's preferred instrument of intervention in $\sigma^{\mathcal{FT}}$ varies with $\gamma^{\mathcal{P}}(s)$. For this case Home chooses $\mathcal{P}$

and Foreign files both a violation and a non-violation complaint if

$$\gamma^{\mathcal{P}}(s) > \frac{c}{q(q-\theta)}, \tag{4.8}$$

Home chooses $\mathcal{R}$ and Foreign files a non-violation complaint if

$$\gamma^{\mathcal{P}}(s) \in (\frac{c}{q\theta}, \frac{c}{q(q-\theta)}), \tag{4.9}$$

and Home chooses $\mathcal{FT}$ otherwise.

4.3. When the first-best policy is $\mathcal{P}$

Finally we turn to states in $\sigma^{\mathcal{P}}$. Once again we first derive the Stage-2 filing behavior of Foreign conditional on a Home policy choice, and then derive the Stage-1 Home policy choice.[25]

If Home selects $\mathcal{P}$, Foreign must choose whether to file with the DSB a violation claim, a non-violation claim, both or neither. If Foreign files a violation complaint alone it can expect the benefit

$$\Pr(\text{DSB V ruling is } \tau = FT \mid \sigma^{\mathcal{P}}) \cdot \gamma^*(s) - c^*;$$

if Foreign files a non-violation complaint alone, it can expect the benefit

$$\Pr(\text{DSB NV ruling is } \tau = FT \mid \sigma^{\mathcal{P}}) \cdot b^*(s) - c^*,$$

where notice that reflected in the above expression is the fact that under Assumption 2 Home will choose to maintain $\mathcal{P}$ and pay damages under a successful non-violation complaint in $\sigma^{\mathcal{P}}$; and if Foreign files both a violation and a non-violation complaint against Home's choice of $\mathcal{P}$ it can expect the benefit

$$\begin{aligned}&\Pr(\text{DSB V ruling is } \tau = FT \mid \sigma^{\mathcal{P}}) \cdot \gamma^*(s) \;\; + \\ &\qquad \Pr(\text{DSB V ruling is } \tau = P \mid \sigma^{\mathcal{P}}) \cdot \Pr(\text{DSB NV ruling is } \tau = FT \mid \sigma^{\mathcal{P}}) \cdot b^*(s) - 2c^*.\end{aligned}$$

These payoffs can be used to characterize the Foreign filing behavior if Home selects $\mathcal{P}$. Using Assumption 3, it is direct to confirm that for states in $\sigma^{\mathcal{P}}$, if Home selects $\mathcal{P}$ then Foreign does not file a complaint if

$$\gamma^*(s) \leq \frac{c^*}{q} \text{ for } s \in \sigma^{\mathcal{P}}, \tag{4.10}$$

[25] As we describe earlier, the vague contract that covers τ will unambiguously allow $\tau = P$ in a subset of states in $\sigma^{\mathcal{P}}$. For this subset of states, Home selects $\tau = P$ and there will be no equilibrium filing of either violation or non-violation claims by Foreign. As before (see note 23), for simplicity of exposition we ignore these states here, by in effect assuming that they constitute an insignificant number of states.

Foreign files a violation complaint alone if

$$\gamma^*(s) \in \left(\frac{c^*}{q}, \frac{c^*}{\delta(1-q)q}\right) \text{ for } s \in \sigma^{\mathcal{P}}, \tag{4.11}$$

and Foreign files both a violation and non-violation complaint if

$$\gamma^*(s) \geq \frac{c^*}{\delta(1-q)q} \text{ for } s \in \sigma^{\mathcal{P}}. \tag{4.12}$$

Hence, Foreign does not file a complaint against $\mathcal{P}$ for $s \in \sigma^{\mathcal{P}}$ if the harm to Foreign from $\mathcal{P}$ is below the threshold described in (4.10), files a violation claim alone if the harm is in an intermediate range described in (4.11), and files both a violation and a non-violation claim if the harm exceeds the threshold described in (4.12).

Alternatively, if Home selects $\mathcal{R}$, Foreign must choose whether to file a non-violation complaint or do nothing. If $\Gamma^{\mathcal{R}}(s) > 0$ so that Home's benefit from selecting $\mathcal{R}$ relative to $\mathcal{FT}$ is larger than the harm caused to Foreign by this policy selection, then Foreign can expect the benefit

$$\Pr(\text{DSB NV ruling is } r = FT \mid \sigma^{\mathcal{P}}) \cdot b^*(s) - c^*$$

if it files a non-violation complaint, reflecting the fact that under Assumption 2 and with $\Gamma^{\mathcal{R}}(s) > 0$ Home will choose to maintain $\mathcal{R}$ and pay damages under a successful non-violation complaint. And if $\Gamma^{\mathcal{R}}(s) \leq 0$ so that Home's benefit from selecting $\mathcal{R}$ relative to $\mathcal{FT}$ is smaller than the harm caused to Foreign by this policy selection, then Foreign can expect the benefit

$$\Pr(\text{DSB NV ruling is } r = FT \mid \sigma^{\mathcal{P}}) \cdot \gamma^*(s) - c^*$$

if it files a non-violation complaint; reflected here is the fact that under Assumption 2 and with $\Gamma^{\mathcal{R}}(s) \leq 0$ Home will choose to remove $\mathcal{R}$ under a successful non-violation complaint.

These payoffs can be used to characterize the Foreign filing behavior if Home selects $\mathcal{R}$. Proceeding as before, we have that for states in $\sigma^{\mathcal{P}}$, if $\Gamma^{\mathcal{R}}(s) > 0$ then Foreign files a non-violation complaint against $\mathcal{R}$ if and only if

$$\gamma^*(s) > \frac{c^*}{\delta q} \text{ for } s \in \sigma^{\mathcal{P}}, \tag{4.13}$$

while if $\Gamma^{\mathcal{R}}(s) \leq 0$ then Foreign files a non-violation complaint against $\mathcal{R}$ if and only if

$$\gamma^*(s) > \frac{c^*}{(1-q)} \text{ for } s \in \sigma^{\mathcal{P}}. \tag{4.14}$$

We may now summarize the Foreign government's Stage-2 filing behavior for $s \in \sigma^{\mathcal{P}}$. In effect, as $\gamma^*(s)$ rises, Foreign's filing behavior becomes increasingly aggressive: Foreign does not file against $\mathcal{P}$ or $\mathcal{R}$ for $\gamma^*(s) \leq \frac{c^*}{(1-q)}$; for $\gamma^*(s) \in \left(\frac{c^*}{(1-q)}, \frac{c^*}{q}\right)$ Foreign does not file against $\mathcal{P}$, but files a non-violation claim against $\mathcal{R}$ if and only if $\Gamma^{\mathcal{R}}(s) \leq 0$; for $\gamma^*(s) \in \left(\frac{c^*}{q}, \frac{c^*}{\delta q}\right)$ Foreign files a violation claim against $\mathcal{P}$, and files a non-violation claim against $\mathcal{R}$ if and only if $\Gamma^{\mathcal{R}}(s) \leq 0$; for $\gamma^*(s) \in \left(\frac{c^*}{\delta q}, \frac{c^*}{\delta(1-q)q}\right)$ Foreign files a violation claim against $\mathcal{P}$ and files a non-violation claim against $\mathcal{R}$; and for $\gamma^*(s) \geq \frac{c^*}{\delta(1-q)q}$, Foreign files both a violation and a non-violation claim against $\mathcal{P}$ and files a non-violation claim against $\mathcal{R}$.

Consider next the Home government's Stage-1 policy choice for states in $\sigma^{\mathcal{P}}$. As above to reduce the number of cases and focus on the more interesting ones, we assume that c is sufficiently small so that, even in the case of maximal DSB noise, i.e. if the DSB flips a coin, Home would prefer $\mathcal{P}$ to $\mathcal{FT}$ for $s \in \sigma^{\mathcal{P}}$ (i.e., when $\mathcal{P}$ is the first-best policy) whether or not this triggers a (violation or violation-plus-non-violation) complaint. It is straightforward to check that this is guaranteed by:

$$\gamma^{\mathcal{P}}(s) > 8c \text{ for } s \in \sigma^{\mathcal{P}}. \qquad \text{(Assumption 6)}$$

With Assumption 6, the remaining question is then whether Home chooses $\mathcal{P}$ or rather $\mathcal{R}$ for states in $\sigma^{\mathcal{P}}$. Certainly Home chooses $\mathcal{P}$ if $\gamma^*(s) \leq \frac{c^*}{q}$, because then Home can choose $\mathcal{P}$ without triggering a dispute. The more difficult question is determining when Home would choose $\mathcal{R}$ to avoid a dispute over $\mathcal{P}$. This possibility can only arise if $\gamma^*(s) > \frac{c^*}{q}$, and to proceed it is useful to describe separately the case where $\Gamma^{\mathcal{R}}(s) > 0$ and then the case where $\Gamma^{\mathcal{R}}(s) \leq 0$. In each case, the incentive for Home to choose $\mathcal{R}$ to avoid a dispute over $\mathcal{P}$ varies with the aggressiveness of Foreign's filing behavior.

If $\Gamma^{\mathcal{R}}(s) > 0$, Home's benefit from selecting $\mathcal{R}$ relative to $\mathcal{FT}$ is larger than the harm caused to Foreign by this policy selection. For $\gamma^*(s) \in \left(\frac{c^*}{q}, \frac{c^*}{\delta q}\right)$ we know that Home's choice of $\mathcal{P}$ would be met by a violation claim and hence yield the Home expected payoff

$$\Pr(\text{DSB V ruling is } \tau = P \mid \sigma^{\mathcal{P}}) \cdot \gamma^{\mathcal{P}}(s) - c,$$

while a choice of $\mathcal{R}$ would not trigger a dispute and therefore yield $\gamma^{\mathcal{R}}(s)$. This implies that in this case Home chooses $\mathcal{P}$ if

$$\gamma^{\mathcal{R}}(s) < (1-q)\gamma^{\mathcal{P}}(s) - c \qquad (4.15)$$

and chooses $\mathcal{R}$ otherwise. For $\gamma^*(s) \in \left(\frac{c^*}{\delta q}, \frac{c^*}{\delta(1-q)q}\right)$, Home's choice of $\mathcal{P}$ would again be met by a violation claim but a choice of $\mathcal{R}$ would now trigger a non-violation claim and hence (using $\Gamma^{\mathcal{R}}(s) > 0$) yield the Home expected payoff

$$\Pr(\text{DSB NV ruling is } r = R \mid s) \cdot \gamma^{\mathcal{R}}(s \in \sigma^{\mathcal{P}}) + \Pr(\text{DSB NV ruling is } r = FT \mid \sigma^{\mathcal{P}}) \cdot [\gamma^{\mathcal{R}}(s) - b(s)] - c,$$

implying that in this case Home chooses $\mathcal{P}$ if

$$\gamma^{\mathcal{R}}(s) < (1-q)\gamma^{\mathcal{P}}(s) + q\gamma^*(s) \tag{4.16}$$

and chooses $\mathcal{R}$ otherwise. And finally, for $\gamma^*(s) \geq \frac{c^*}{\delta(1-q)q}$ Home's choice of $\mathcal{R}$ would continue to be met by a non-violation claim, but now a choice of $\mathcal{P}$ would trigger both a violation and a non-violation claim yielding (again using $\Gamma^{\mathcal{R}}(s) > 0$)

$$\begin{aligned}&\Pr(\text{DSB V ruling is } \tau = P \mid \sigma^{\mathcal{P}}) \cdot \Pr(\text{DSB NV ruling is } \tau = P \mid \sigma^{\mathcal{P}}) \cdot \gamma^{\mathcal{P}}(s) \;\; + \\ &\Pr(\text{DSB V ruling is } \tau = P \mid \sigma^{\mathcal{P}}) \cdot \Pr(\text{DSB NV ruling is } \tau = FT \mid \sigma^{\mathcal{P}}) \cdot [\gamma^{\mathcal{P}}(s) - b(s)] - 2c,\end{aligned}$$

and implying that in this case Home chooses $\mathcal{P}$ if

$$\gamma^{\mathcal{R}}(s) < (1-q)\gamma^{\mathcal{P}}(s) - c + qq\gamma^*(s) \tag{4.17}$$

and Home chooses $\mathcal{R}$ otherwise.

Alternatively, if $\Gamma^{\mathcal{R}}(s) \leq 0$, Home's benefit from selecting $\mathcal{R}$ relative to $\mathcal{FT}$ is smaller than the harm caused to Foreign by this policy selection. For $\gamma^*(s) \in \left(\frac{c^*}{q}, \frac{c^*}{\delta(1-q)q}\right)$ Home's choice of $\mathcal{P}$ would be met by a violation claim while a choice of $\mathcal{R}$ would be met by a non-violation claim, but in this case (using $\Gamma^{\mathcal{R}}(s) \leq 0$, which implies that Home would now remove $\mathcal{R}$ under a successful non-violation complaint) Home always chooses $\mathcal{P}$. And finally, for $\gamma^*(s) \geq \frac{c^*}{\delta(1-q)q}$ Home's choice of $\mathcal{R}$ would be met by a non-violation claim and a choice of $\mathcal{P}$ would trigger both a violation and a non-violation claim, implying that in this case (and using $\Gamma^{\mathcal{R}}(s) \leq 0$) Home chooses $\mathcal{P}$ if

$$\gamma^{\mathcal{R}}(s) < \frac{(1-q)\gamma^{\mathcal{P}}(s) - c - (1-q)q\gamma^*(s)}{q} \tag{4.18}$$

and Home chooses $\mathcal{R}$ otherwise.

4.4. Equilibrium Policy Choices and Filing Behavior

Collecting these conditions and simplifying, we now summarize the equilibrium policy choices and filing behavior with:

Proposition 1. *Under Assumption 1-Assumption 6, the equilibrium policy choices and filing behavior are as follows:*

(i) *For $s \in \sigma^{\mathcal{R}}$ Home always chooses $\mathcal{R}$: Foreign files a non-violation complaint when $\gamma^*(s) > \frac{c^*}{\delta q}$; otherwise Foreign does not file a complaint.*

(ii) *For $s \in \sigma^{\mathcal{P}}$ and $\Gamma^{\mathcal{R}}(s) > 0$, Home always chooses either $\mathcal{P}$ or $\mathcal{R}$: if $\gamma^*(s) \leq \frac{c^*}{q}$ Home chooses $\mathcal{P}$ and Foreign does not file a complaint; if $\gamma^*(s) \in \left(\frac{c^*}{q}, \frac{c^*}{\delta q}\right)$ Home chooses $\mathcal{P}$ and Foreign files a violation complaint when $\gamma^{\mathcal{R}}(s) < (1-q)\gamma^{\mathcal{P}}(s) - c$, otherwise Home chooses $\mathcal{R}$ and Foreign does not file a complaint; if $\gamma^*(s) \in \left(\frac{c^*}{\delta q}, \frac{c^*}{\delta(1-q)q}\right)$ Home chooses $\mathcal{P}$ and Foreign files a violation complaint when $\gamma^{\mathcal{R}}(s) < (1-q)\gamma^{\mathcal{P}}(s) + q\gamma^*(s)$, otherwise Home chooses $\mathcal{R}$ and Foreign files a non-violation complaint; and if $\gamma^*(s) \geq \frac{c^*}{\delta(1-q)q}$ Home chooses $\mathcal{P}$ and Foreign files both a violation and a non-violation complaint when $\gamma^{\mathcal{R}}(s) < (1-q)\gamma^{\mathcal{P}}(s) - c + qq\gamma^*(s)$, otherwise Home chooses $\mathcal{R}$ and Foreign files a non-violation complaint.*

(iii) *For $s \in \sigma^{\mathcal{P}}$ and $\Gamma^{\mathcal{R}}(s) \leq 0$, Home always chooses either $\mathcal{P}$ or $\mathcal{R}$: if $\gamma^*(s) \leq \frac{c^*}{q}$ Home chooses $\mathcal{P}$ and Foreign does not file a complaint; if $\gamma^*(s) \in \left(\frac{c^*}{q}, \frac{c^*}{\delta(1-q)q}\right)$ Home chooses $\mathcal{P}$ and Foreign files a violation complaint; and if $\gamma^*(s) \geq \frac{c^*}{\delta(1-q)q}$ Home chooses $\mathcal{P}$ and Foreign files both a violation and a non-violation complaint when $\gamma^{\mathcal{R}}(s) < \frac{(1-q)\gamma^{\mathcal{P}}(s) - c - (1-q)q\gamma^*(s)}{q}$, otherwise Home chooses $\mathcal{R}$ and Foreign files a non-violation complaint.*

(iv) *For $s \in \sigma^{\mathcal{FT}}$ and $\gamma^*(s) < \frac{c^*}{(1-q)q}$ Home always chooses either $\mathcal{P}$ or $\mathcal{FT}$: Home chooses $\mathcal{P}$ and Foreign files a violation complaint when $\gamma^{\mathcal{P}}(s) > \frac{c}{q}$; otherwise Home chooses $\mathcal{FT}$.*

(v) *For $s \in \sigma^{\mathcal{FT}}$ and $\gamma^*(s) \geq \frac{c^*}{(1-q)q}$: if $\theta \in (0, \frac{q}{2}]$ Home chooses $\mathcal{P}$ and Foreign files both a violation and a non-violation complaint when $\gamma^{\mathcal{P}}(s) > \frac{2c}{qq}$ and Home chooses $\mathcal{FT}$ otherwise; if $\theta \in (\frac{q}{2}, q)$ Home chooses $\mathcal{P}$ and Foreign files both a violation and a non-violation complaint when $\gamma^{\mathcal{P}}(s) > \frac{c}{q(q-\theta)}$, Home chooses $\mathcal{R}$ and Foreign files a non-violation complaint when $\gamma^{\mathcal{P}}(s) \in (\frac{c}{q\theta}, \frac{c}{q(q-\theta)})$, and Home chooses $\mathcal{FT}$ otherwise; and if $\theta \in [q, 1)$ Home chooses $\mathcal{R}$ and Foreign files a non-violation complaint when $\gamma^{\mathcal{P}}(s) > \frac{c}{q\theta}$ and Home chooses $\mathcal{FT}$ otherwise.*

Observe that, according to Proposition 1, the outcome for a given state s is the first-best/efficient outcome if and only if there is no dispute in state s, and there will be no dispute in state s if and only if the DSB is sufficiently accurate (low q).[26] That is, as Proposition 1 confirms,

[26] We note as well that this property is shared by Maggi and Staiger (2011), conditional on the vague contract and interpretive DSB mandate, but Maggi and Staiger also emphasize that it need not hold globally once the choice of contract and DSB mandate is optimized with respect to q.

when a dispute arises in this model, it is because one of the parties is acting opportunistically to exploit the absence of a complete contract and the inaccuracy of the DSB rulings: either the Foreign country is attempting to force free trade (or the payment of compensation) with an incorrect DSB ruling when the Home-country intervention is in fact efficient (for s in $\sigma^{\mathcal{R}}$ or $\sigma^{\mathcal{P}}$), or the Home country is attempting to "get away with" intervention with an incorrect DSB ruling when free trade is in fact the efficient policy (for s in $\sigma^{\mathcal{FT}}$). An implication of this observation is that the clearest efficiency-enhancing role of the DSB occurs off-equilibrium.

In addition to the DSB error rate q, note also that the dispute costs c and c^*, the transfer cost parameter δ and the policy substitution parameter θ all help to determine our model's predictions about the frequency of disputes and the kinds of claims filed. In the next section we seek to characterize ranges for these parameters that would yield model predictions consistent with the stylized features of violation and non-violation claims in GATT/WTO disputes as described in section 2, and thereby use our model to offer an explanation for these features.

5. What Explains the Features of Violation and Non-Violation Claims in the GATT/WTO?

Armed with the characterization of equilibrium policy choices and filing behavior contained in Proposition 1, we are ready to consider the model's predictions about the frequency of violation and non-violation claims and rulings and their rates of success. We first define the relevant probability measures according to our model.

We begin with the probability of observing non-violation claims and rulings. Letting $m^{\mathcal{R}} \equiv \sum_{s \in \sigma^{\mathcal{R}}} p(s)$, $m^{\mathcal{P}} \equiv \sum_{s \in \sigma^{\mathcal{P}}} p(s)$ and $m^{\mathcal{FT}} \equiv \sum_{s \in \sigma^{\mathcal{FT}}} p(s)$ denote respectively the probability of states in $\sigma^{\mathcal{R}}$, $\sigma^{\mathcal{P}}$ and $\sigma^{\mathcal{FT}}$, Proposition 1 implies that the probability of observing a non-violation claim – either alone or in combination with a violation claim – can be written as

$$m^{NVclaim} = m^{\mathcal{R}} \cdot \Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{R}}) + m^{\mathcal{P}} \cdot [\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{P}}) + \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{P}})] + m^{\mathcal{FT}} \cdot [\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{FT}}) + \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{FT}})],$$

where $\{\mathcal{R} : NV\}$ denotes the outcome in which Home chooses $\mathcal{R}$ and Foreign files a non-violation complaint and $\{\mathcal{P} : V\&NV\}$ denotes the outcome in which Home chooses $\mathcal{P}$ and Foreign files both a violation and a non-violation complaint. Recalling that, in disputes where both a violation and a non-violation claim are filed, a ruling on the non-violation claim occurs if and only if the ruling on the violation claim goes against the Foreign (claimant) government, we may write the probability of observing a non-violation ruling as

$$m^{NVrule} = m^{\mathcal{R}} \cdot \Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{R}}) + m^{\mathcal{P}} \cdot [\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{P}}) + (1-q) \cdot \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{P}})] \\ + m^{\mathcal{FT}} \cdot [\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{FT}}) + q \cdot \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{FT}})].$$

Turning to the probability of observing violation claims and rulings, notice that as our model abstracts from settlement, every violation claim will be ruled upon by the DSB, regardless of whether it is filed alone or in combination with a non-violation claim.[27] Hence the probabilities of observing violation claims and rulings are one and the same, and according to Proposition 1, this probability can be written as

$$m^{Vclaim} = m^{Vrule} = m^{\mathcal{P}} \cdot [\Pr(\{\mathcal{P} : V\}|\sigma^{\mathcal{P}}) + \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{P}})] \\ + m^{\mathcal{FT}} \cdot [\Pr(\{\mathcal{P} : V\}|\sigma^{\mathcal{FT}}) + \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{FT}})].$$

Finally, we define the probability of a dispute (with a claim of any kind):

$$Dispute = m^{\mathcal{R}} \cdot \Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{R}}) + m^{\mathcal{P}} \cdot [\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{P}}) + \Pr(\{\mathcal{P} : V\}|\sigma^{\mathcal{P}}) + \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{P}})] \\ + m^{\mathcal{FT}} \cdot [\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{FT}}) + \Pr(\{\mathcal{P} : V\}|\sigma^{\mathcal{FT}}) + \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{FT}})].$$

Throughout we restrict our attention to parameter ranges under which $Dispute > 0$. With this we may then define the share of disputes that include a non-violation claim by $s^{NVclaim} = \frac{m^{NVclaim}}{Dispute}$, and the share of disputes that result in a non-violation ruling by $s^{NVrule} = \frac{m^{NVrule}}{Dispute}$.

With the relevant probability measures defined, we now turn to a consideration of model parameters under which the model predictions would be consistent with the stylized features of GATT/WTO disputes described in section 2. We begin with the relative frequency of non-violation claims and rulings. As summarized in section 2, in this regard two features stand

[27] As we have already observed (see note 7) and as Busch and Reinhardt (2000) emphasize, settlement is an important phenomenon in GATT/WTO disputes. It is therefore possible that the paucity of non-violation rulings as described in section 2 could be accounted for by higher settlement rates in disputes involving non-violation claims. In this regard, Maggi and Staiger (2012) provide evidence that, over the WTO-era, settlement rates have indeed been higher in disputes involving non-violation claims than for the typical violation claim; but they also provide evidence that during the GATT era, the reverse is true, with lower settlement rates in disputes involving non-violation claims than for the typical violation claim. Hence, the settlement margin cannot account for the paucity of non-violation rulings over the full GATT/WTO period. We therefore feel justified abstracting from settlement here in order to focus on other distinctive features of the comparison between violation and non-violation claims, though a more complete account would of course incorporate both of these distinctions.

out: relative to the number of GATT/WTO disputes in which a ruling on any kind of claim occurred, (i) the number of these disputes in which a ruling on the non-violation claim occurred is small, and (ii) the number of these disputes in which a non-violation claim was made is not small. As observed above, in our model a dispute always results in a ruling of some kind; and so the first feature translates into the model prediction that s^{NVrule} is small, while the second feature translates into the model prediction that $s^{NVclaim}$ is not small. Or equivalently, these two features can be stated as the model prediction that s^{NVrule} is small while $[s^{NVclaim} - s^{NVrule}]$ is not small. We therefore look for parameter ranges that can deliver these model predictions. We assume that $m^{\mathcal{R}} >> 0$, $m^{\mathcal{P}} >> 0$ and $m^{\mathcal{FT}} >> 0$, but beyond this we place no restrictions on the relative probabilities of states where the various intervention possibilities are first best.

To see what is required for our model to deliver $[s^{NVclaim} - s^{NVrule}]$ not small, we express $[s^{NVclaim} - s^{NVrule}]$ as

$$[s^{NVclaim} - s^{NVrule}] = \frac{(1-q) \cdot m^{\mathcal{FT}} \cdot \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{FT}})}{Dispute} + \frac{q \cdot m^{\mathcal{P}} \cdot \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{P}})}{Dispute}.$$

As this expression makes clear, the possibility that a non-violation claim will not be ruled upon arises in the model only for disputes where both violation and non-violation claims are filed. The first term on the right-hand side reflects the share of disputes for which the non-violation claim is not ruled upon because the DSB correctly ruled on the violation claim against the Home government's choice of $\mathcal{P}$ in $\sigma^{\mathcal{FT}}$, while the second term reflects the share of disputes for which the non-violation claim is not ruled upon because the DSB incorrectly ruled on the violation claim against the Home government's choice of $\mathcal{P}$ in $\sigma^{\mathcal{P}}$.

Evidently, to generate $[s^{NVclaim} - s^{NVrule}]$ not small and recalling that $q \in (0, 1/2)$, we must have $\frac{\Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{FT}})}{Dispute}$ not small and/or $\frac{q \cdot \Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{P}})}{Dispute}$ not small. On the other hand, for s^{NVrule} small, we must have $\frac{\Pr(\{\mathcal{R}:NV\}|\sigma^{\mathcal{R}})}{Dispute}$, $\frac{\Pr(\{\mathcal{R}:NV\}|\sigma^{\mathcal{P}})}{Dispute}$, $\frac{\Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{P}})}{Dispute}$, $\frac{\Pr(\{\mathcal{R}:NV\}|\sigma^{\mathcal{FT}})}{Dispute}$ and $\frac{q \cdot \Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{FT}})}{Dispute}$ each small. With these observations, a corollary to Proposition 1 follows:

Corollary. *As implied by* **Proposition 1**, s^{NVrule} *is small and* $[s^{NVclaim} - s^{NVrule}]$ *is not small if and only if the following conditions hold:* $\frac{\Pr(\{\mathcal{R}:NV\}|\sigma^{\mathcal{R}})}{Dispute}$, $\frac{\Pr(\{\mathcal{R}:NV\}|\sigma^{\mathcal{P}})}{Dispute}$, $\frac{\Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{P}})}{Dispute}$ *and* $\frac{\Pr(\{\mathcal{R}:NV\}|\sigma^{\mathcal{FT}})}{Dispute}$ *are each small;* $\frac{\Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{FT}})}{Dispute}$ *is not small; and* q *is small.*

Notice that the conditions for small s^{NVrule} imply that it must be $\frac{\Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{FT}})}{Dispute}$ not small that accounts for $[s^{NVclaim} - s^{NVrule}]$ not small, and with $\frac{\Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{FT}})}{Dispute}$ not small it then follows that we must have q small to ensure that $\frac{q \cdot \Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{FT}})}{Dispute}$ and hence s^{NVrule} is small.

Intuitively, with $\frac{\Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{FT}})}{Dispute}$ not small and q small, we would then observe significant numbers of disputes with both violation and non-violation claims filed, but only on rare occasions will the DSB rule against the Foreign (claimant) government on the violation complaint in these disputes and move on to a ruling on the non-violation complaint.

We next consider the parameter ranges that can deliver the conditions on outcomes identified in the Corollary to Proposition 1. Consider first the requirement that $\frac{\Pr(\{\mathcal{R}:NV\}|\sigma^{\mathcal{R}})}{Dispute}$ is small. To formalize this requirement, we define $\tilde{\gamma}^*_{\mathcal{R}}(L)$ according to the condition $\Pr(\gamma^*(s) > \tilde{\gamma}^*|\sigma^{\mathcal{R}}) = L$ for arbitrary $L \in (0,1)$. Using Proposition 1(i), it then follows that $\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{R}}) \leq L$ provided $\delta \leq \frac{c^*}{q\cdot\tilde{\gamma}^*_{\mathcal{R}}(L)}$. Similarly, if we define $\tilde{\gamma}^*_{\mathcal{P}}(L)$ according to the condition $\Pr(\gamma^*(s) > \tilde{\gamma}^*|\sigma^{\mathcal{P}}) = L$, then using Proposition 1(ii) and (iii) it follows that $\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{P}}) \leq L$ and $\Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{P}}) \leq L$ provided $\delta \leq \frac{c^*}{q\cdot\tilde{\gamma}^*_{\mathcal{P}}(L)}$. Hence, defining $\tilde{\delta}(\frac{c^*}{q}; L) \equiv \min[1, \min[\frac{c^*}{q\cdot\tilde{\gamma}^*_{\mathcal{R}}(L)}, \frac{c^*}{q\cdot\tilde{\gamma}^*_{\mathcal{P}}(L)}]]$, we have that $\frac{\Pr(\{\mathcal{R}:NV\}|\sigma^{\mathcal{R}})}{Dispute} \leq \frac{L}{Dispute}$, $\frac{\Pr(\{\mathcal{R}:NV\}|\sigma^{\mathcal{P}})}{Dispute} \leq \frac{L}{Dispute}$ and $\frac{\Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{P}})}{Dispute} \leq \frac{L}{Dispute}$ are assured for arbitrarily small $L > 0$ provided that $\delta \leq \tilde{\delta}(\frac{c^*}{q}; L)$. Notice that $\tilde{\delta}(\frac{c^*}{q}; L)$ is weakly increasing in L and strictly positive for $L \in (0,1)$.

We also need to ensure that $\frac{\Pr(\{\mathcal{R}:NV\}|\sigma^{\mathcal{FT}})}{Dispute}$ is small and $\frac{\Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{FT}})}{Dispute}$ is not small. To this end, we define $\tilde{\gamma}^*_{\mathcal{FT}}(H)$ according to the condition $\Pr(\gamma^*(s) > \tilde{\gamma}^*|\sigma^{\mathcal{FT}}) = H$ for an arbitrary $H \in (0,1)$. According to Proposition 1(iv) and (v), for $\frac{\Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{FT}})}{Dispute}$ not small we must have $\frac{\Pr(\gamma^*(s)\geq\frac{c^*}{(1-q)q}|\sigma^{\mathcal{FT}})}{Dispute}$ not small, and we are assured that $\frac{\Pr(\gamma^*(s)\geq\frac{c^*}{(1-q)q}|\sigma^{\mathcal{FT}})}{Dispute} \geq \frac{H}{Dispute}$ provided that $c^* \leq (1-q)q \cdot \tilde{\gamma}^*_{\mathcal{FT}}(H) \equiv \tilde{c}^*(q; H)$. Note that $\tilde{c}^*(q; H)$ is weakly decreasing in H and strictly positive for $H \in (0,1)$. Next we denote by $\tilde{\sigma}^{\mathcal{FT}}$ the set of $s \in \sigma^{\mathcal{FT}}$ for which $\gamma^*(s) \geq \frac{c^*}{(1-q)q}$, and with this define $\tilde{\theta}(c, q; L)$ according to the condition $\frac{\Pr(\frac{c}{q\theta}<\gamma^{\mathcal{P}}(s)<\frac{c}{q(q-\theta)}|\tilde{\sigma}^{\mathcal{FT}})}{\Pr(\gamma^{\mathcal{P}}(s)>\frac{c}{q}|\tilde{\sigma}^{\mathcal{FT}})} = L$, where $\frac{c}{q(q-\theta)} = \infty$ for $\theta \geq q$ is understood. Note that $\frac{\Pr(\frac{c}{q\theta}<\gamma^{\mathcal{P}}(s)<\frac{c}{q(q-\theta)}|\tilde{\sigma}^{\mathcal{FT}})}{\Pr(\gamma^{\mathcal{P}}(s)>\frac{c}{q}|\tilde{\sigma}^{\mathcal{FT}})}$ equals 0 for $\theta \leq \frac{q}{2}$ and equals 1 for $\theta = 1$, so $\tilde{\theta}(c, q; L)$ drops to $\frac{q}{2}$ as L drops to 0. Observing from Proposition 1(iv) and (v) that $\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{FT}}) \leq \Pr(\{\mathcal{R} : NV\}|\tilde{\sigma}^{\mathcal{FT}})$, it now follows that $\frac{\Pr(\{\mathcal{R}:NV\}|\sigma^{\mathcal{FT}})}{Dispute} \leq \frac{L}{Dispute}$ is assured by $\theta \leq \tilde{\theta}(c, q; L)$. Finally, for $\frac{\Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{FT}})}{Dispute}$ not small we have already noted that we must have $\frac{\Pr(\gamma^*(s)\geq\frac{c^*}{(1-q)q}|\sigma^{\mathcal{FT}})}{Dispute} \geq H$, which is assured by $c^* \leq \tilde{c}^*(q; H)$; but we must also have $\frac{\Pr(\gamma^{\mathcal{P}}(s)\geq\frac{2c}{qq}|\tilde{\sigma}^{\mathcal{FT}})}{Dispute}$ not small, and defining $\tilde{\gamma}^{\mathcal{P}}_{\mathcal{FT}}(H)$ according to the condition $\frac{\Pr(\gamma^{\mathcal{P}}(s)>\tilde{\gamma}|\tilde{\sigma}^{\mathcal{FT}})}{Dispute} = H$ we are assured that $\frac{\Pr(\gamma^{\mathcal{P}}(s)\geq\frac{2c}{qq}|\tilde{\sigma}^{\mathcal{FT}})}{Dispute} \geq \frac{H}{Dispute}$ provided that $c \leq \frac{qq\cdot\tilde{\gamma}^{\mathcal{P}}_{\mathcal{FT}}(H)}{2} \equiv \tilde{c}(q; H)$, with $\tilde{c}(q; H)$ decreasing in H and strictly positive for $H \in (0,1)$. Hence, $c^* \leq \tilde{c}^*(q; H)$ and $c \leq \tilde{c}(q; H)$ then ensure that $\frac{\Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{FT}})}{Dispute} \geq \frac{H^2}{Dispute}$ when $\theta \leq \tilde{\theta}(c, q; L)$ for L sufficiently close to 0, and for H sufficiently close to 1 and L sufficiently close to 0 we then have $m^{NV claim} \geq m^{\mathcal{FT}}$.

We may now state:

Proposition 2. *For any* $\overline{s^{NVrule}} > 0$ *and* $\overline{[s^{NVclaim} - s^{NVrule}]} \in (0, \frac{m^{\mathcal{FT}}}{Dispute})$*, there exists a* $\tilde{q} > 0$ *and an* $L \in (0,1)$ *and* $H \in (0,1)$ *such that*

(i) $s^{NVrule} \leq \overline{s^{NVrule}}$ *and*

(ii) $[s^{NVclaim} - s^{NVrule}] \geq \overline{[s^{NVclaim} - s^{NVrule}]}$

whenever $q \in (0, \tilde{q})$*,* $c^* \in (0, \tilde{c}^*(q; H))$*,* $c \in (0, \tilde{c}(q; H))$*,* $\delta \in (0, \tilde{\delta}(\frac{c^*}{q}; L))$ *and* $\theta \in (0, \tilde{\theta}(c, q; L))$*.*

According to Proposition 2, the relative infrequency of non-violation rulings in GATT/WTO disputes is primarily a reflection of two underlying forces. The first reflects features of the GATT/WTO institutional environment: due to the levels of compensation specified under GATT/WTO rules (self-help reciprocity) and the inefficiency of GATT/WTO compensation mechanisms (low δ), the payoff for a government to bring a non-violation complaint against another's policy that it knows is efficient from a global perspective (in $\sigma^{\mathcal{R}}$ and $\sigma^{\mathcal{P}}$) – and hence understands will not result in the removal of the policy but at best only lead to compensation through authorized retaliation – is low. The second reflects features of the policy environment: due to the poor substitute that domestic regulation provides relative to border measures as a means of terms-of-trade manipulation (low θ), the payoff for a government to utilize domestic regulation rather than border measures when laissez faire would be globally efficient (in $\sigma^{\mathcal{FT}}$) is low. Together these features help to keep the frequency of non-violation rulings low. And given these features, the relatively common occurrence of non-violation claims *filed* as opposed to ruled upon then reflects the relatively low dispute costs (low c and low c^*) and relatively high DSB accuracy (low q), which together ensure that there are substantial numbers of GATT/WTO disputes that involve opportunistic policy intervention (the use of $\mathcal{P}$, in $\sigma^{\mathcal{FT}}$) and elicit the filing of both violation and non-violation claims which usually end in a (correct) DSB ruling on the violation claim against the policy intervention.

Finally, of particular relevance in light of the relative paucity of observed rulings on non-violation claims in GATT/WTO disputes is the case described by Proposition 2 as L approaches 0. Under mild regularity conditions on the distribution of $\gamma^*(s)$ we can ensure that $\lim_{L\to 0} \tilde{\gamma}^*_{\mathcal{R}}(L)$ and $\lim_{L\to 0} \tilde{\gamma}^*_{\mathcal{P}}(L)$ are finite, and we may then define $\tilde{\delta}_0(\frac{c^*}{q}) \equiv \lim_{L\to 0} \tilde{\delta}(\frac{c^*}{q}; L)$ with $\tilde{\delta}_0(\frac{c^*}{q}) > 0$. With this and recalling that $\tilde{\theta}(c, q; L)$ drops to $\frac{q}{2}$ as L drops to 0, we may state the following:

Corollary. *For any* $\overline{[s^{NVclaim} - s^{NVrule}]} \in (0, \frac{m^{\mathcal{FT}}}{Dispute})$, *there exists a* $\check{q} > 0$ *and an* $H \in (0,1)$ *such that*

(i) s^{NVrule} *is arbitrarily close to* 0 *and*

(ii) $[s^{NVclaim} - s^{NVrule}] \geq \overline{[s^{NVclaim} - s^{NVrule}]}$

whenever $q \in (0, \check{q})$, $c^* \in (0, \check{c}^*(q; H))$, $c \in (0, \check{c}(q; H))$, $\delta \in (0, \tilde{\delta}_0(\frac{c^*}{q}))$ *and* $\theta \in (0, \frac{q}{2})$.

We turn next to the success rates of violation and non-violation claims. According to Proposition 1, the probability of a successful violation claim conditional on a DSB ruling on the violation claim is given by

$$V^{success} = \frac{m^{\mathcal{P}} \cdot [\Pr(\{\mathcal{P} : V\}|\sigma^{\mathcal{P}}) + \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{P}})]}{m^{Vrule}} \cdot q + \frac{m^{\mathcal{FT}} \cdot [\Pr(\{\mathcal{P} : V\}|\sigma^{\mathcal{FT}}) + \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{FT}})]}{m^{Vrule}} \cdot (1 - q).$$

The probability of a successful violation claim is a weighted average of q – the probability that the DSB "gets it wrong" – and $(1 - q)$ – the probability that the DSB "gets it right" – with weights that reflect the relative frequency of disputes that arise in $\sigma^{\mathcal{P}}$ and $\sigma^{\mathcal{FT}}$ respectively and include a violation claim (because a violation claim is always ruled upon by the DSB).

To express the probability of a successful non-violation claim conditional on a DSB ruling on the non-violation claim, we first denote by $\tilde{\sigma}_1^{\mathcal{P}}$ the set of $s \in \sigma^{\mathcal{P}}$ for which $\Gamma^{\mathcal{R}}(s) > 0$ and by $\tilde{\sigma}_2^{\mathcal{P}}$ the set of $s \in \sigma^{\mathcal{P}}$ for which $\Gamma^{\mathcal{R}}(s) \leq 0$, corresponding to the sets of states associated with Proposition 1(ii) and (iii) respectively. And we let $\tilde{m}_1^{\mathcal{P}}$ and $\tilde{m}_2^{\mathcal{P}}$ denote the probability of states in $\tilde{\sigma}_1^{\mathcal{P}}$ and $\tilde{\sigma}_2^{\mathcal{P}}$ respectively. With this, the probability of a successful non-violation claim conditional on a DSB ruling on the non-violation claim is given by

$$NV^{success} = \frac{m^{\mathcal{R}} \cdot \Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{R}}) + m^{\mathcal{P}} \cdot (1 - q) \cdot \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{P}})] + \tilde{m}_1^{\mathcal{P}} \cdot [\Pr(\{\mathcal{R} : NV\}|\tilde{\sigma}_1^{\mathcal{P}})]}{m^{NVrule}} \cdot q$$
$$+ \frac{\tilde{m}_2^{\mathcal{P}} \cdot [\Pr(\{\mathcal{R} : NV\}|\tilde{\sigma}_2^{\mathcal{P}})] + m^{\mathcal{FT}} \cdot [\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{FT}}) + q \cdot \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{FT}})]}{m^{NVrule}} \cdot (1 - q).$$

The probability of a successful non-violation claim is also a weighted average of q and $(1 - q)$, but notice that here the weights reflect the frequency of *rulings* on the non-violation claim – as distinct from the frequency of disputes that include a non-violation claim – that occur in, respectively, $\sigma^{\mathcal{R}}$ or $\sigma^{\mathcal{P}}$ for $\{\mathcal{P} : V\&NV\}$ or $\tilde{\sigma}_1^{\mathcal{P}}$ for $\{\mathcal{R} : NV\}$, and $\tilde{\sigma}_2^{\mathcal{P}}$ for $\{\mathcal{R} : NV\}$ or $\sigma^{\mathcal{FT}}$.

As described in section 2, the success rate of violation claims in GATT/WTO disputes is fairly high while that of non-violation claims is very low. Hence, we look for model parameter ranges within those described in Proposition 2 that deliver $V^{success}$ high and $NV^{success}$ low.

To this end, consider the subset of parameters described by Proposition 2 for which $\frac{c^*}{q} < \max[\tilde{\gamma}^*_{\mathcal{R}}(L), \tilde{\gamma}^*_{\mathcal{P}}(L)]$, implying $\tilde{\delta}(\frac{c^*}{q}; L) < 1$. For this subset of parameters, by Proposition 1(ii) and (iii) there exists $\tilde{L} > 0$ such that when $\delta < \tilde{\delta}(\frac{c^*}{q}; \tilde{L})$ we must have $\Pr(\{\mathcal{R} : NV\}|\tilde{\sigma}^{\mathcal{P}}_2) = 0$. And for δ close to its upper limit $\tilde{\delta}(\frac{c^*}{q}; \tilde{L})$ we must also have $\max[\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{R}}), \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{P}}), \Pr(\{\mathcal{R} : NV\}|\tilde{\sigma}^{\mathcal{P}}_1)] > 0$. And the minimum value for $\tilde{\theta}(c, q; L)$ is $\frac{q}{2}$, and so $\theta < \frac{q}{2}$ is always within the parameter ranges described in Proposition 2. But when $\theta < \frac{q}{2}$, we have from Proposition 1(v) that $\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{FT}}) = 0$.

Hence, for $\theta < \frac{q}{2}$ and q sufficiently small, within this subset of parameters it must be that $\frac{\tilde{m}^{\mathcal{P}}_2 \cdot [\Pr(\{\mathcal{R}:NV\}|\tilde{\sigma}^{\mathcal{P}}_2)]}{m^{NVrule}} = 0$ and $\frac{m^{\mathcal{FT}} \cdot [\Pr(\{\mathcal{R}:NV\}|\sigma^{\mathcal{FT}}) + q \cdot \Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{FT}})]}{m^{NVrule}}$ approaches 0 so that the probability weight on $(1-q)$ in the expression for $NV^{success}$ goes to 0, while the probability weight on q in the expression for $NV^{success}$, $\frac{m^{\mathcal{R}} \cdot \Pr(\{\mathcal{R}:NV\}|\sigma^{\mathcal{R}}) + m^{\mathcal{P}} \cdot (1-q) \cdot \Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{P}})] + \tilde{m}^{\mathcal{P}}_1 \cdot [\Pr(\{\mathcal{R}:NV\}|\tilde{\sigma}^{\mathcal{P}}_1)]}{m^{NVrule}}$, remains strictly positive; and therefore $NV^{success}$ must approach q. What does this parameter range imply for $V^{success}$? That will depend on the magnitude of $\Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{FT}})$. This probability will approach 1 for parameters described by Proposition 2 that are associated with $\overline{[s^{NVclaim} - s^{NVrule}]}$ approaching $\frac{m^{\mathcal{FT}}}{Dispute}$, and for that case $\frac{m^{\mathcal{FT}} \cdot [\Pr(\{\mathcal{P}:V\}|\sigma^{\mathcal{FT}}) + \Pr(\{\mathcal{P}:V\&NV\}|\sigma^{\mathcal{FT}})]}{m^{Vrule}}$ approaches $\frac{m^{\mathcal{FT}}}{m^{Vrule}}$, implying in turn that $V^{success}$ must then be larger than $\frac{m^{\mathcal{P}}}{m^{\mathcal{P}} + m^{\mathcal{FT}}} \cdot q + \frac{m^{\mathcal{FT}}}{m^{\mathcal{P}} + m^{\mathcal{FT}}} \cdot (1-q)$, which will itself approach $(1-q)$ if $m^{\mathcal{FT}} >> m^{\mathcal{P}}$.

We summarize with:

Proposition 3. *For any $\overline{s^{NVrule}} > 0$ and $\overline{[s^{NVclaim} - s^{NVrule}]} \in (0, \frac{m^{\mathcal{FT}}}{Dispute})$, and for $\theta \in (0, \frac{q}{2})$ and $q > 0$ but sufficiently small, there exists a $\hat{\delta} \in (0, \tilde{\delta}(\frac{c^*}{q}; L))$ and an $\tilde{L} > 0$ with $L \in (0, \tilde{L})$ and $H \in (0, 1)$ such that*

(i) $s^{NVrule} \le \overline{s^{NVrule}}$,

(ii) $[s^{NVclaim} - s^{NVrule}] \ge \overline{[s^{NVclaim} - s^{NVrule}]}$,

(iii) *$NV^{success}$ is arbitrarily close to q, and*

(iv) *for $\overline{[s^{NVclaim} - s^{NVrule}]} \to \frac{m^{\mathcal{FT}}}{Dispute}$, $V^{success} \to \overline{V^{success}} > \left[\frac{m^{\mathcal{FT}}}{m^{\mathcal{P}} + m^{\mathcal{FT}}}\right] \cdot (1-q) + \left[\frac{m^{\mathcal{P}}}{m^{\mathcal{P}} + m^{\mathcal{FT}}}\right] \cdot q$*

whenever $c^* \in (0, \tilde{c}^*(q; H))$, $c \in (0, \tilde{c}(q; H))$, $\frac{c^*}{q} < \max[\tilde{\gamma}^*_{\mathcal{R}}(\tilde{L}), \tilde{\gamma}^*_{\mathcal{P}}(\tilde{L})]$ and $\delta \in (\hat{\delta}, \tilde{\delta}(\frac{c^*}{q}; \tilde{L}))$.

As Proposition 3 indicates, the substantive additional parameter restrictions under which our model predicts $V^{success}$ high and $NV^{success}$ low are that θ and q are sufficiently small within the ranges described by Proposition 2. The low θ is needed to ensure that the probability $\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{FT}})$ is sufficiently small *relative* to at least one of the probabilities $\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{R}})$, $\Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{P}})$, and $\Pr(\{\mathcal{R} : NV\}|\tilde{\sigma}_1^{\mathcal{P}})$, and the low q is needed to ensure that the probability $q \cdot \Pr(\{\mathcal{P} : V\&NV\}|\sigma^{\mathcal{FT}})$ is also sufficiently low (with the low L ensuring that $\Pr(\{\mathcal{R} : NV\}|\tilde{\sigma}_2^{\mathcal{P}}) = 0$).

In effect, under these conditions many/most disputes occur in $\sigma^{\mathcal{FT}}$ where the Home country is attempting to "get away with" violating the contract rather than in $\sigma^{\mathcal{R}}$ or $\sigma^{\mathcal{P}}$ where the Foreign country is attempting to force free trade (or the payment of compensation); and as a result of this selection of disputes, when an accurate DSB rules on a violation claim it will mostly rule in favor of the Foreign government (claimant), making $V^{success}$ high. But this selection effect loses its force with respect to rulings on non-violation claims, because the non-violation claim will only be ruled upon in these disputes in the rare instance when the violation claim is not successful, and so non-violation claims will rarely be ruled upon precisely when they too would have the highest chance of winning. This "censoring" keeps $NV^{success}$ low.

Finally, as with Proposition 2, we may also state the following Corollary to Proposition 3:

Corollary. *For any* $\overline{[s^{NVclaim} - s^{NVrule}]} \in (0, \frac{m^{\mathcal{FT}}}{Dispute})$, *and for* $\theta \in (0, \frac{q}{2})$ *and* $q > 0$ *but sufficiently small, there exists an* $H \in (0,1)$ *such that as* $\delta \to \tilde{\delta}_0(\frac{c^*}{q})$ *from above,*

(i) $s^{NVrule} \to 0$,

(ii) $[s^{NVclaim} - s^{NVrule}] \geq \overline{[s^{NVclaim} - s^{NVrule}]}$,

(iii) $NV^{success}$ *is arbitrarily close to* q, *and*

(iv) *for* $\overline{[s^{NVclaim} - s^{NVrule}]} \to \frac{m^{\mathcal{FT}}}{Dispute}$, $V^{success} \to \overline{V^{success}} > \left[\frac{m^{\mathcal{FT}}}{m^{\mathcal{P}}+m^{\mathcal{FT}}}\right] \cdot (1-q) + \left[\frac{m^{\mathcal{P}}}{m^{\mathcal{P}}+m^{\mathcal{FT}}}\right] \cdot q$ *whenever* $c^* \in (0, \breve{c}^*(q;H))$, $c \in (0, \breve{c}(q;H))$ *and* $\frac{c^*}{q} < \max[\lim_{L\to 0} \tilde{\gamma}^*_{\mathcal{R}}(L), \lim_{L\to 0} \tilde{\gamma}^*_{\mathcal{P}}(L)]$.

The Corollary to Proposition 3 describes a set of model parameters that will provide a useful benchmark in the next section when we assess the value of the non-violation clause.

6. Assessing the Value of the Non-Violation Clause

We next turn to the task of assessing the value of the non-violation clause. To this end, we consider an alternative environment, identical to that considered in the previous sections but with the ability to bring non-violation claims removed.

Formally, we now consider the following timing for the model absent the non-violation clause:

Stage 0. The state s is realized.

Stage 1. Home chooses $\tau \in \{FT, P\}$ and $r \in \{FT, R\}$.

Stage 2. Foreign decides whether to file a violation complaint with the DSB.

Stage 3. If invoked, the DSB issues a ruling $\tau^{DSB} \in \{FT, P\}$.

Stage 4. Payoffs are realized.

As before, we characterize the subgame perfect equilibrium of this game.

Following analogous steps to those described in the previous section, it is direct to establish:

Proposition 4. *Absent the non-violation clause, under Assumption 1-Assumption 6 the equilibrium policy choices and filing behavior are as follows:*

(i) *For $s \in \sigma^{\mathcal{R}}$ Home always chooses $\mathcal{R}$, and Foreign does not file a complaint.*

(ii) *For $s \in \sigma^{\mathcal{P}}$ Home always chooses either $\mathcal{P}$ or $\mathcal{R}$, and* **(a)** *if $\gamma^*(s) \leq \frac{c^*}{q}$ Home chooses $\mathcal{P}$ and Foreign does not file a complaint, and* **(b)** *if $\gamma^*(s) > \frac{c^*}{q}$ Home chooses $\mathcal{P}$ and Foreign files a violation complaint when $\gamma^{\mathcal{R}}(s) < (1-q)\gamma^{\mathcal{P}}(s) - c$, otherwise Home chooses $\mathcal{R}$ and Foreign does not file a complaint.*

(iii) *For $s \in \sigma^{\mathcal{FT}}$ Home always chooses either $\mathcal{P}$ or $\mathcal{R}$. If $\gamma^{\mathcal{P}}(s) > \frac{c}{(q-\theta)}$ Home chooses $\mathcal{P}$ and Foreign files a violation complaint; otherwise, Home chooses $\mathcal{R}$ and Foreign does not file a complaint.*

These outcomes are intuitive. In $\sigma^{\mathcal{R}}$ Home always chooses $\mathcal{R}$ and Foreign has no basis to file a complaint. In $\sigma^{\mathcal{P}}$ Home chooses $\mathcal{P}$ when the harm to Foreign is insufficient to generate a dispute, but when a dispute over $\mathcal{P}$ would arise Home switches to a choice of $\mathcal{R}$ to avoid the dispute as long as Home's payoff from $\mathcal{R}$ is above a threshold level. And in $\sigma^{\mathcal{FT}}$ Home chooses $\mathcal{P}$ and triggers a dispute as long as Home's payoff from $\mathcal{P}$ is above a threshold level, while below this level Home chooses $\mathcal{R}$ to avoid the dispute.

Notice that, in contrast to our results in Proposition 1 where the non-violation claim is available, Proposition 4 implies that the absence of a dispute in a state is no longer sufficient to indicate that the first best outcome has been achieved for that state. In particular, when the non-violation claim is unavailable, the absence of a dispute in $\sigma^{\mathcal{P}}$ or $\sigma^{\mathcal{FT}}$ is simply an indication that Home has chosen to avoid a dispute with the selection of $\mathcal{R}$ which, without the possibility that Foreign could bring a non-violation claim, Home can do with impunity.

A comparison of Propositions 1 and 4 reveals a rich set of potential on- and off-equilibrium impacts that the ability to bring non-violation claims can have according to our model. We first catalog and interpret these impacts.

We begin with states in $\sigma^{\mathcal{R}}$. As Propositions 1(i) and 4(i) confirm, for these states the impact of the non-violation clause is only present when a non-violation claim is actually filed (i.e., the impact is only on-equilibrium), which occurs whenever $\gamma^*(s) > \frac{c^*}{\delta q}$. In such states, Foreign will file a non-violation complaint against Home's choice of $\mathcal{R}$ when it has the ability to do so (i.e., in the presence of the non-violation clause), at a cost to joint surplus of $[q(1-\delta)\gamma^*(s) + (c + c^*)] > 0$, reflecting the possibility that the DSB will rule in error and compensation will be paid $(q(1-\delta)\gamma^*(s))$ as well as the direct costs of the dispute $(c + c^*)$. Figure 1a depicts, for a given $\gamma^{\mathcal{P}}(s)$, the outcomes described by Propositions 1(i) and 4(i) for the relevant range of $\gamma^{\mathcal{R}}(s)$ (on the vertical axis) and $\gamma^*(s)$ (on the horizontal axis). For comparison, outcomes in the presence of the non-violation clause (Proposition 1(i) outcomes) are displayed inside curly brackets, while outcomes in the absence of the non-violation clause (Proposition 4(i) outcomes) are displayed in square brackets. As depicted, for the relevant range of $\gamma^{\mathcal{R}}(s)$ and when $\gamma^*(s) \leq \frac{c^*}{\delta q}$ the first best is achieved in $\sigma^{\mathcal{R}}$ whether or not the non-violation clause is present, but when $\gamma^*(s) > \frac{c^*}{\delta q}$ the introduction of the non-violation clause leads to the filing of non-violation complaints against $\mathcal{R}$ and an associated loss in joint surplus.

Consider next states in $\sigma^{\mathcal{P}}$. Here a comparison of Proposition 1(ii) and (iii) with Proposition 4 (ii) indicates the subtle array of both on- and off- equilibrium impacts of the non-violation clause that are possible in $\sigma^{\mathcal{P}}$ depending on parameters. With $\gamma^{\mathcal{R}}(s)$ on the vertical axis and $\gamma^*(s)$ on the horizontal axis, Figure 1b depicts these possibilities for a given $\gamma^{\mathcal{P}}(s)$, again using the convention that outcomes in the presence of the non-violation clause (Proposition 1(ii) and (iii) outcomes) are displayed inside curly brackets, while outcomes in the absence of the non-violation clause (Proposition 4(ii) outcomes) are displayed in square brackets.

As Figure 1b depicts, for $\gamma^*(s) \leq \frac{c^*}{q}$, the first best is achieved in $\sigma^{\mathcal{P}}$ whether or not the non-violation clause is available. For $\gamma^*(s) \in (\frac{c^*}{q}, \frac{c^*}{\delta q})$, the first best is not achieved but the outcome is again the same whether or not the non-violation clause is available, with the exception of states that also satisfy $\gamma^{\mathcal{R}}(s) \in ((1-q)\gamma^{\mathcal{P}}(s) - c, \gamma^*(s))$. Notice that for these states, the introduction of the non-violation clause has a surprising off-equilibrium impact: it converts what would have been an undisputed choice of $\mathcal{R}$ into a choice of $\mathcal{P}$ that results in a violation complaint. In this way the non-violation clause can serve a *complementary* role to violation claims (i.e., there are states of the world in which violation claims are made which would not have been made in the absence of the non-violation clause), for the simple reason that the presence of the non-violation clause can cause the Home government to *substitute* into choices over contracted policies which are themselves susceptible to violation complaints. The associated impact on joint surplus of this off-equilibrium effect is given by $[(1-q)\Gamma^{\mathcal{P}}(s) - \Gamma^{\mathcal{R}}(s) - (c + c^*)]$, which can be positive or negative in $\sigma^{\mathcal{P}}$ but is guaranteed to be positive when q, c and c^* are each sufficiently small.

Figure 1b also depicts the various off- and on-equilibrium impacts of the non-violation clause that arise in $\sigma^{\mathcal{P}}$ when $\gamma^*(s) \geq \frac{c^*}{\delta q}$. The only possible off-equilibrium impact over this parameter range is the same as the one described just above, in which the presence of the non-violation clause converts what would have been an undisputed choice of $\mathcal{R}$ into a choice of $\mathcal{P}$ that results in a violation complaint. The new possibilities over this parameter range all involve on-equilibrium impacts of the non-violation clause in which, when it is available, the non-violation complaint is used. Figure 1b catalogs four distinct on-equilibrium impacts, of which two have a negative impact on joint surplus (the two for which Home would choose $\mathcal{P}$ in the absence of the non-violation clause) and two can have either a positive or negative impact on joint surplus depending on parameters (the two for which Home would choose $\mathcal{R}$ in the absence of the non-violation clause). Intuitively, in $\sigma^{\mathcal{P}}$ the on-equilibrium impact of the non-violation clause must reduce joint surplus if Home would have chosen $\mathcal{P}$ in the absence of the non-violation clause, because the non-violation clause in this case can only work against the chance that the first-best policy will be implemented; and the on-equilibrium impact of the non-violation clause can increase joint surplus if Home would have chosen $\mathcal{R}$ in the absence of the non-violation clause, because then the non-violation clause can be used to help secure a policy which may be more efficient ($\mathcal{FT}$).

Consider now states in $\sigma^{\mathcal{FT}}$. Here the relevant comparison is between Proposition 1(iv) and (v) – the outcomes in $\sigma^{\mathcal{FT}}$ with the non-violation clause – and Proposition 4(iii) – the outcomes in $\sigma^{\mathcal{FT}}$ without the non-violation clause.

It is useful to begin by comparing Proposition 1(iv), where $\gamma^*(s) < \frac{c^*}{(1-q)q}$, with Proposition 4(iii). For this range of parameters the only differences in outcomes when the non-violation claim is introduced occur when it is also the case that $\gamma^{\mathcal{P}}(s) \leq \frac{c}{(q-\theta)}$ and by Proposition 4(iii) Home would choose $\mathcal{R}$ in the absence of the non-violation clause. For this parameter range only off-equilibrium impacts of the non-violation clause can arise, and there are two possibilities depending on whether $\gamma^{\mathcal{P}}(s) \leq \frac{c}{q}$ or $\gamma^{\mathcal{P}}(s) > \frac{c}{q}$. In the former case, the introduction of the non-violation clause converts an undisputed choice of $\mathcal{R}$ into a first-best choice of $\mathcal{FT}$ with associated gain in joint surplus equal to $-\Gamma^{\mathcal{R}}(s)$ which is strictly positive in $\sigma^{\mathcal{FT}}$; and in the latter case the introduction of the non-violation clause converts an undisputed choice of $\mathcal{R}$ into a choice of $\mathcal{P}$ that results in a violation complaint, with associated impact on joint surplus given by $[q\Gamma^{\mathcal{P}}(s) - \Gamma^{\mathcal{R}}(s) - (c + c^*)]$ which can be positive or negative but is guaranteed to be positive when q, c and c^* are each sufficiently small. Notice that in this latter case, as in $\sigma^{\mathcal{P}}$, the non-violation clause plays a complementary role to violation claims, in the sense that there are states of the world in which violation claims are made which would not have been made in the absence of the non-violation clause.

When $\gamma^*(s) \geq \frac{c^*}{(1-q)q}$ it is a comparison of Proposition 1(v) with Proposition 4(iii) that reveals the impacts of the non-violation clause in $\sigma^{\mathcal{FT}}$. Here the impact hinges on the value of the parameter θ in addition to the level of $\gamma^{\mathcal{P}}(s)$. With $\gamma^{\mathcal{P}}(s)$ on the vertical axis and θ on the horizontal axis, Figure 1c illustrates how the impacts of the non-violation clause vary with $\gamma^{\mathcal{P}}(s)$ and θ in $\sigma^{\mathcal{FT}}$. As before, outcomes in the presence of the non-violation clause (Proposition 1(iv) and (v) outcomes) are displayed inside curly brackets, while outcomes in the absence of the non-violation clause (Proposition 4(iii) outcomes) are displayed in square brackets; and for each case, the first entry displays the outcome when $\gamma^*(s) < \frac{c^*}{(1-q)q}$, which we have described just above, and the second entry displays the outcome when $\gamma^*(s) \geq \frac{c^*}{(1-q)q}$. As the second entries reveal, when $\gamma^*(s) \geq \frac{c^*}{(1-q)q}$ both on-equilibrium and off-equilibrium impacts of the non-violation clause are possible in $\sigma^{\mathcal{FT}}$, depending on the values of $\gamma^{\mathcal{P}}(s)$ and θ.

Specifically, when $\gamma^*(s) \geq \frac{c^*}{(1-q)q}$ there are now two possible off-equilibrium impacts in $\sigma^{\mathcal{FT}}$. One is the same as the first off-equilibrium impact described just above: as Figure 1c depicts, for $\gamma^{\mathcal{P}}(s) \leq \min[\frac{c}{(q-\theta)}, \frac{c}{q\theta}]$, the introduction of the non-violation clause converts an undisputed choice of $\mathcal{R}$ into a first-best choice of $\mathcal{FT}$ with associated gain in joint surplus equal to $-\Gamma^{\mathcal{R}}(s)$ which is strictly positive in $\sigma^{\mathcal{FT}}$. The second possible off-equilibrium impact occurs when $\gamma^{\mathcal{P}}(s) \in (\frac{c}{(q-\theta)}, \min[\frac{2c}{qq}, \frac{c}{q\theta}))$. For this parameter range, the introduction of the non-violation clause converts a choice of $\mathcal{P}$ that results in a violation complaint into a first-best choice of $\mathcal{FT}$ with associated gain in joint surplus equal to $[-q\Gamma^{\mathcal{P}}(s) + (c + c^{*})]$ which is strictly positive in $\sigma^{\mathcal{FT}}$. Notice that here the non-violation clause now acts as a *substitute* for violation claims, in the sense that there are states of the world in which violation claims would have been made in the absence of the non-violation clause but are not made in its presence.

And finally, there are three possible on-equilibrium impacts of the non-violation clause when $\gamma^{*}(s) \geq \frac{c^{*}}{(1-q)q}$ in $\sigma^{\mathcal{FT}}$. A first converts a choice of $\mathcal{P}$ that results in a violation complaint into a choice of $\mathcal{P}$ that results in both a violation and non-violation complaint. As Figure 1c depicts, this possibility occurs for $\theta < q$ when $\gamma^{\mathcal{P}}(s) \geq \max[\frac{2c}{qq}, \frac{c}{q(q-\theta)}]$, resulting in an impact on joint surplus given by $[-(1-q)q\Gamma^{\mathcal{P}}(s) - (c + c^{*})]$ which can be positive or negative, but which approaches 0 when q, c and c^{*} are each sufficiently small. A second possibility converts a choice of $\mathcal{P}$ that results in a violation complaint into a choice of $\mathcal{R}$ that results in a non-violation complaint (and here again the non-violation clause acts as a substitute for violation claims). As Figure 1c depicts, this possibility occurs for $\theta \in (\frac{q}{2}, q)$ when $\gamma^{\mathcal{P}}(s) \in (\max[\frac{c}{(q-\theta)}, \frac{c}{q\theta}], \frac{c}{q(q-\theta)})$, resulting in an impact on joint surplus given by $[-q(1-\theta)\gamma^{\mathcal{P}}(s)]$ which is strictly negative. And a third possibility converts an undisputed choice of $\mathcal{R}$ into a choice of $\mathcal{R}$ that results in a non-violation complaint. As Figure 1c depicts, this possibility occurs when $\gamma^{\mathcal{P}}(s) \in (\frac{c}{q\theta}, \frac{c}{(q-\theta)})$, resulting in an impact on joint surplus given by $[-(1-q)\Gamma^{\mathcal{R}}(s) - (c+c^{*})]$ which can be positive or negative in $\sigma^{\mathcal{FT}}$ but is guaranteed to be positive when q, c and c^{*} are each sufficiently small.

With the set of potential on- and off-equilibrium impacts that the ability to bring non-violation claims can have according to our model now described, we next impose the parameter restrictions suggested by the observed GATT/WTO dispute behavior according to Proposition 3 and its Corollary to identify those impacts whose significance is consistent with the observed dispute behavior. In this way we can then assess the implied value of the non-violation clause in terms of its impact on the expected joint welfare of the Home and Foreign governments. In particular, to develop a benchmark calculation we focus on the parameter restrictions described in the Corollary to Proposition 3.

Two of these parameter restrictions have especially important impacts on the implied value of the non-violation clause. The first is that δ approaches the level $\tilde{\delta}_0(\frac{c^{*}}{q})$ from above. Recalling the definition of $\tilde{\delta}_0(\frac{c^*}{q})$, this ensures in turn that $\Pr(\gamma^*(s) > \frac{c^*}{\delta q}|\sigma^{\mathcal{R}}) \to 0$ and $\Pr(\gamma^*(s) > \frac{c^*}{\delta q}|\sigma^{\mathcal{P}}) \to 0$. But as Figure 2a illustrates, with this restriction on the level of δ we may then conclude that the non-violation clause has no impact on expected joint surplus for states in $\sigma^{\mathcal{R}}$. And as Figure 2b illustrates, in $\sigma^{\mathcal{P}}$ we may then conclude that the impact on expected joint surplus of the non-violation clause is restricted to the set of states defined by $\sigma_1^{\mathcal{P}} \equiv \{s \in \sigma^{\mathcal{P}}$ such that $\gamma^*(s) \in (\frac{c^*}{q}, \frac{c^*}{\delta q})$ and $\gamma^{\mathcal{R}}(s) \in ((1-q)\gamma^{\mathcal{P}}(s) - c, \gamma^*(s))\}$, where what would have been an undisputed choice of $\mathcal{R}$ is converted into a choice of $\mathcal{P}$ that results in a violation complaint.

The other parameter restriction described in the Corollary to Proposition 3 that has especially important impacts on the implied value of the non-violation clause is that $\theta \in (0, \frac{q}{2})$. As Figure 2c illustrates, with this restriction on the level of θ, in $\sigma^{\mathcal{FT}}$ we may then conclude that the impact on expected joint surplus of the non-violation clause is attributable to the impact in five sets of states. Two sets of states, where what would have been an undisputed choice of $\mathcal{R}$ is converted into a first-best choice of $\mathcal{FT}$, are defined by $\sigma_1^{\mathcal{FT}} \equiv \{s \in \sigma^{\mathcal{FT}}$ such that $\gamma^{\mathcal{P}}(s) \leq \frac{c}{q}\}$ and $\sigma_2^{\mathcal{FT}} \equiv \{s \in \sigma^{\mathcal{FT}}$ such that $\gamma^{\mathcal{P}}(s) \in (\frac{c}{q}, \frac{c}{(q-\theta)})$ and $\gamma^*(s) \geq \frac{c^*}{(1-q)q}\}$. A third set of states, where what would have been an undisputed choice of $\mathcal{R}$ is converted into a choice of $\mathcal{P}$ that results in a violation complaint, is defined by $\sigma_3^{\mathcal{FT}} \equiv \{s \in \sigma^{\mathcal{FT}}$ such that $\gamma^{\mathcal{P}}(s) \in (\frac{c}{q}, \frac{c}{(q-\theta)})$ and $\gamma^*(s) < \frac{c^*}{(1-q)q}\}$. A fourth set of states, where what would have been a choice of $\mathcal{P}$ that resulted in a violation complaint is converted to a first-best choice of $\mathcal{FT}$, is defined by $\sigma_4^{\mathcal{FT}} \equiv \{s \in \sigma^{\mathcal{FT}}$ such that $\gamma^{\mathcal{P}}(s) \in (\frac{c}{(q-\theta)} \frac{2c}{qq})$ and $\gamma^*(s) \geq \frac{c^*}{(1-q)q}\}$. And a final set of states, where what would have been a choice of $\mathcal{P}$ that resulted in a violation complaint is converted to a choice of $\mathcal{P}$ that results in both a violation and a non-violation complaint, is defined by $\sigma_5^{\mathcal{FT}} \equiv \{s \in \sigma^{\mathcal{FT}}$ such that $\gamma^{\mathcal{P}}(s) \geq \frac{2c}{qq}$ and $\gamma^*(s) \geq \frac{c^*}{(1-q)q}\}$.

Using these sets and the associated joint surplus measures described above, we now state:

Proposition 5. *Under the parameter restrictions described in the Corollary to Proposition 3, the impact of the non-violation clause on expected joint surplus is given by*

$$\begin{aligned}\nabla E[\Omega] \equiv & \sum_{s \in \sigma_1^{\mathcal{P}}} p(s)[(1-q)\Gamma^{\mathcal{P}}(s) - \Gamma^{\mathcal{R}}(s) - (c+c^*)] + \sum_{s \in \{\sigma_1^{\mathcal{FT}} \cup \sigma_2^{\mathcal{FT}}\}} p(s)[-\Gamma^{\mathcal{R}}(s)] + \\ & \sum_{s \in \sigma_3^{\mathcal{FT}}} p(s)[q\Gamma^{\mathcal{P}}(s) - \Gamma^{\mathcal{R}}(s) - (c+c^*)] + \sum_{s \in \sigma_4^{\mathcal{FT}}} p(s)[-q\Gamma^{\mathcal{P}}(s) + (c+c^*)] + \\ & \sum_{s \in \sigma_5^{\mathcal{FT}}} p(s)[-(1-q)q\Gamma^{\mathcal{P}}(s) - (c+c^*)].\end{aligned}$$

Together the terms in the expression in Proposition 5 describe four impacts of the non-violation clause whose potential significance is consistent with the observed behavior of GATT/WTO disputes, three off-equilibrium impacts and one on-equilibrium impact. The three off-equilibrium impacts are that, what would have been an undisputed choice of $\mathcal{R}$ is converted either to a choice of $\mathcal{P}$ that results in a violation complaint (for $\sigma_1^{\mathcal{P}}$ and $\sigma_3^{\mathcal{FT}}$) or to a first-best choice of $\mathcal{FT}$ (for $\{\sigma_1^{\mathcal{FT}} \cup \sigma_2^{\mathcal{FT}}\}$); and that, what would have been a choice of $\mathcal{P}$ resulting in a violation complaint is converted to a first-best choice of $\mathcal{FT}$ (for $\sigma_4^{\mathcal{FT}}$). The on-equilibrium impact is that, what would have been a choice of $\mathcal{P}$ resulting in a violation complaint is converted to a choice of $\mathcal{P}$ that results in both a violation and a non-violation complaint (for $\sigma_5^{\mathcal{FT}}$).

The on-equilibrium impact described just above and the first of the described off-equilibrium impacts can either increase or reduce expected joint surplus, while the second and third described off-equilibrium impacts must strictly increase expected joint surplus. Hence, despite the paucity of DSB rulings on non-violation claims and their low rate of success, Proposition 5 indicates that these observed features of GATT/WTO disputes are not inconsistent with a valuable role for the non-violation clause. A stronger conclusion can be stated under further parameter restrictions, which we record in the following:

Corollary. *Under the parameter restrictions described in the Corollary to Proposition 3 and for q, c and c^* sufficiently small, the impact of the non-violation clause on expected joint surplus is strictly positive, and is approximated by*

$$\nabla E[\Omega] \cong \sum_{s \in \sigma_1^{\mathcal{P}}} p(s) \cdot [\gamma^{\mathcal{P}}(s) - \gamma^{\mathcal{R}}(s)] + \sum_{s \in \{\sigma_1^{\mathcal{FT}} \cup \sigma_2^{\mathcal{FT}} \cup \sigma_3^{\mathcal{FT}}\}} p(s) \cdot \gamma^*(s) > 0.$$

Notice that under the conditions of the Corollary, the on-equilibrium impact of the non-violation clause on expected joint surplus goes to zero, and all that is left is a set of off-equilibrium impacts, which under these conditions must be strictly positive, and could potentially be large. These off-equilibrium impacts reflect the set of states in which what would have been an undisputed choice of $\mathcal{R}$ is either converted to a choice of $\mathcal{P}$ that results in a violation complaint (in $\sigma_1^{\mathcal{P}}$ and $\sigma_3^{\mathcal{FT}}$, which under these conditions then secures the first-best policy with near certainty and insignificant dispute costs) or converted directly to a first-best choice of $\mathcal{FT}$ (in $\{\sigma_1^{\mathcal{FT}} \cup \sigma_2^{\mathcal{FT}}\}$).

In effect, then, the Corollary to Proposition 5 describes a world consistent with the observed features of non-violation claims in GATT/WTO disputes and in which the non-violation clause can nevertheless have important impacts. In this world, governments make market access commitments with contracts over border measures while preserving policy autonomy over domestic taxes and regulations, and the non-violation clause functions mostly off-equilibrium to reroute policy interventions into forms that are explicitly addressed by the GATT/WTO contract and thereby prevent the circumvention of these market access commitments, a function that is in line with the role emphasized by economists (see, e.g., Bagwell and Staiger, 2001, and Staiger and Sykes, 2011) and legal scholars (see, e.g., Petersmann, 1977, p. 172) and envisioned by the drafters of GATT (see, e.g., Hudec, 1990).

7. Conclusion

The non-violation clause was a major focus of the drafters of GATT in 1947, and its relevance was revisited and reaffirmed with the creation of the WTO in 1995. And according to the terms-of-trade theory of trade agreements, it has an important role to play in facilitating the success of the "shallow integration" approach that the GATT/WTO has adopted. Yet despite the prominence given to the non-violation clause by its legal drafters and suggested by economic theory, in GATT/WTO practice the observed performance of the non-violation complaint has been weak. Can a model account for the observed features of the usage and outcomes of non-violation claims? And if so, what is implied by these weak performance measures about the (on- and off-) equilibrium impacts of the non-violation clause on the joint welfare of the GATT/WTO member governments? In this paper we have developed a model of non-violation claims in trade agreements, demonstrated that it can account for the observed features of the usage and outcomes of non-violation claims, and shown that the weak performance measures of observed non-violation claims are not inconsistent with a valuable role for the non-violation clause in the GATT/WTO.

To derive these results we have simplified along a number of important dimensions. In this light, we conclude by discussing some of the most important directions for future work.

First, we have attempted to let the salient institutional features of the GATT/WTO guide our modeling of violation and non-violation claims, but we have not shown that these features could be optimal in the environment that we consider. A more complete analysis would push at least some distance in this direction. For example, in our model as in the GATT/WTO dispute system, the Foreign government (complainant) is allowed to choose both whether to file against a Home government policy choice and what claims to bring. Given that in our model the Foreign government knows more in any state about the true payoff level of the Home government than does the DSB, and therefore knows more in any state about the likely Home policy response to a successful non-violation (liability rule) claim, it seems possible that, at least when the DSB is sufficiently accurate, it would indeed be optimal to delegate these decisions to the complainant (rather than, for example, letting the complainant make the decision of whether or not to initiate a dispute but allowing the DSB to choose the claims to investigate).[28] But the optimality of these and other features are worthy of formal investigation.

Second, we have ruled out the use of ex-post transfers to settle disputes. As we have indicated however (see notes 7 and 27), while efficient transfer mechanisms in the context of GATT/WTO dispute resolution are typically unavailable, settlement is nevertheless an important part of the GATT/WTO dispute resolution process in practice. Moreover, as Maggi and Staiger (2012) have shown, allowing for settlement ex post in the presence of costly transfers can generate interesting predictions about the optimality of liability versus property rules in the GATT/WTO system. Hence, both because settlement features prominently in GATT/WTO dispute resolution, and because allowing for settlement in the model could pave the way for establishing conditions under which it would be optimal to design certain (violation) claims as property rules and other (non-violation) claims as liability rules, the introduction of settlement possibilities into our model is an important if challenging direction for future research.

Third, as we have indicated (see note 13), we have modeled violation complaints as property rules, but in reality the distinction for violation complaints in the GATT/WTO between property and liability rules is less clear cut than we have assumed. Thus, an important question is how our results might change under the alternative assumption that both non-violation and violation claims were treated as liability rules. Here it is straightforward to show that nothing would change under this alternative assumption for states in $\sigma^{\mathcal{R}}$ or $\sigma^{\mathcal{FT}}$. And for states in $\sigma^{\mathcal{P}}$, we can show that $\Pr(\{\mathcal{R} : NV\}|\sigma^{\mathcal{P}})$ must drop under this alternative, for the intuitive reason that in the range of states where only one claim would be filed there is now no benefit for Home to switch to $\mathcal{R}$ so as to avoid a violation claim on $\mathcal{P}$, and similarly in the range of states where $\mathcal{P}$ would induce the filing of both a violation and non-violation claim there is now less of a reason for Home to switch to $\mathcal{R}$. And if the DSB is accurate enough, we can show that this is sufficient to ensure that $NV^{success}$ would be higher when the violation claim is also modeled

[28] Intuitively, the Foreign government uses its knowledge of the Home government payoff from protection in a given state in deciding whether or not to add a non-violation claim on top of the violation claim, and the Foreign government therefore tends to tilt its use of the non-violation claim toward states where protection is inefficient (and hence where a successful non-violation claim would result in the removal of protection) and away from states where protection is efficient (and hence where a successful non-violation claim would simply result in compensation), something that the DSB would not be capable of doing on its own.

as a liability rule. Hence, while a systematic exploration of our model under this alternative assumption is beyond the scope of this paper, our preliminary investigation of this extension indicates that it yields some interesting further predictions.[29]

And finally, as we discuss in more detail in Staiger and Sykes (2013), our formal model is too narrow to capture a number of additional avenues that may be important for understanding the observed performance of non-violation claims in the GATT/WTO. These would include the possibility of adding policies to the contract over time (as well-illustrated by the evolution of the treatment of domestic subsidies in the GATT/WTO–see Sykes, 2005), allowing the level of DSB accuracy to depend on the level of guidance given to it by the contract (so that DSB accuracy in the context of violation claims might be naturally higher than DSB accuracy in the context of non-violation claims), and considering in depth both the optimality and the practicality of setting the level of damages equal to the harm suffered by the claimant in the dispute. We see each of these avenues as representing a promising direction for future research.

8. References

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[29] For example, the success rate of non-violation claims appears to have been higher in the GATT era than it has been since the creation of the WTO; and many legal scholars (e.g., Jackson, 2007) argue that GATT violation claims were treated as liability rules at least in the early GATT era but transitioned largely to a system of property rules by the WTO era. Our finding here that $NV^{success}$ would be higher when the violation claim is also modeled as a liability rule than when it is modeled as a property rule would thus provide one possible explanation for this evolution in the success of non-violation claims in the GATT/WTO. Of course, many other changes were also occurring over this period, so at best this can be only a partial explanation, but we view it as evidence of the value of pursuing this extension of our model more systematically.

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Figure 1a: $s \in \sigma^R$ for fixed $\gamma^P(s)$

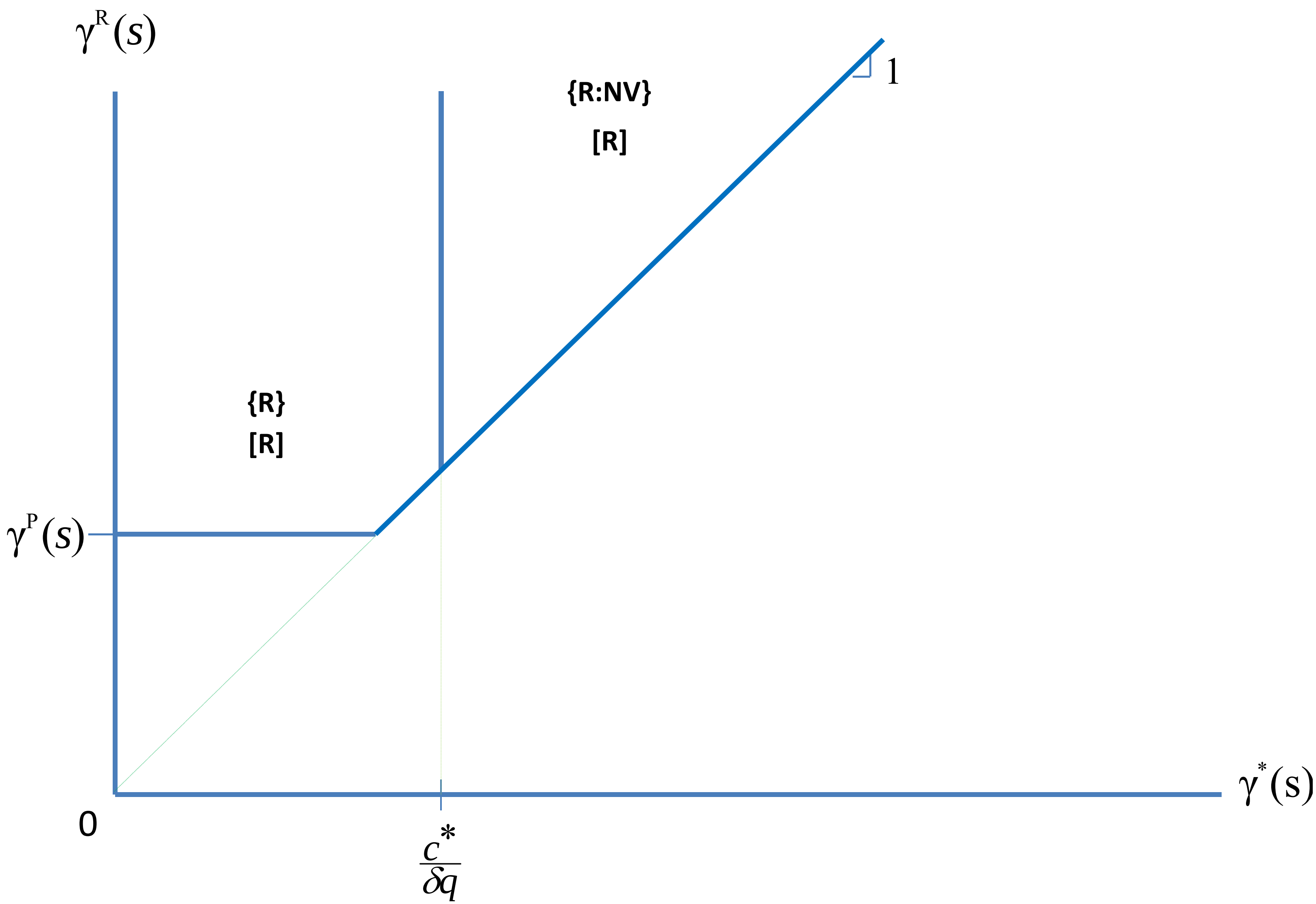

Figure 1b: $s \in \sigma^P$ for fixed $\gamma^P(s)$

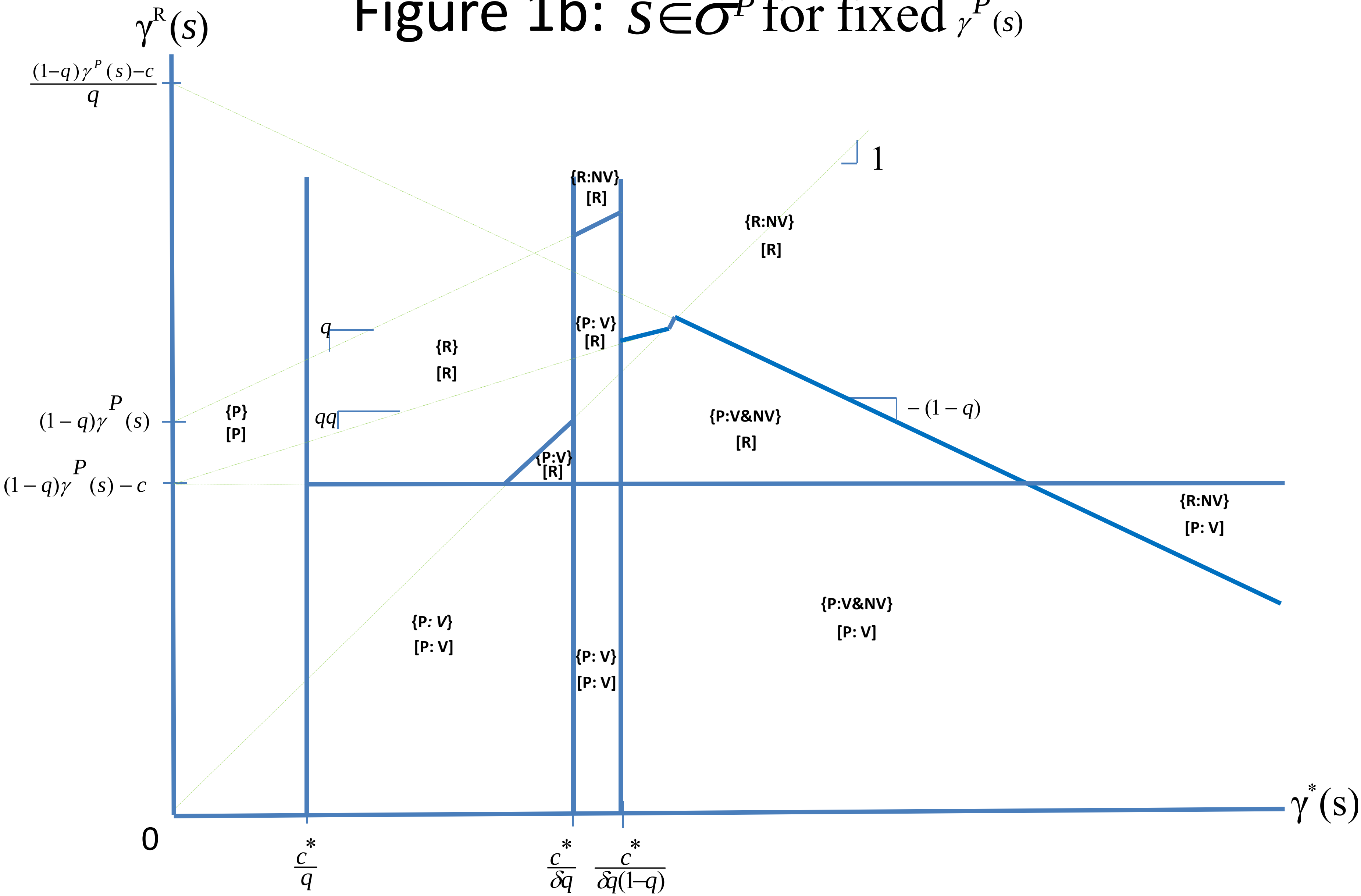

Figure 1c: $s \in \sigma^{FT}$ for $\theta \in (0,1)$

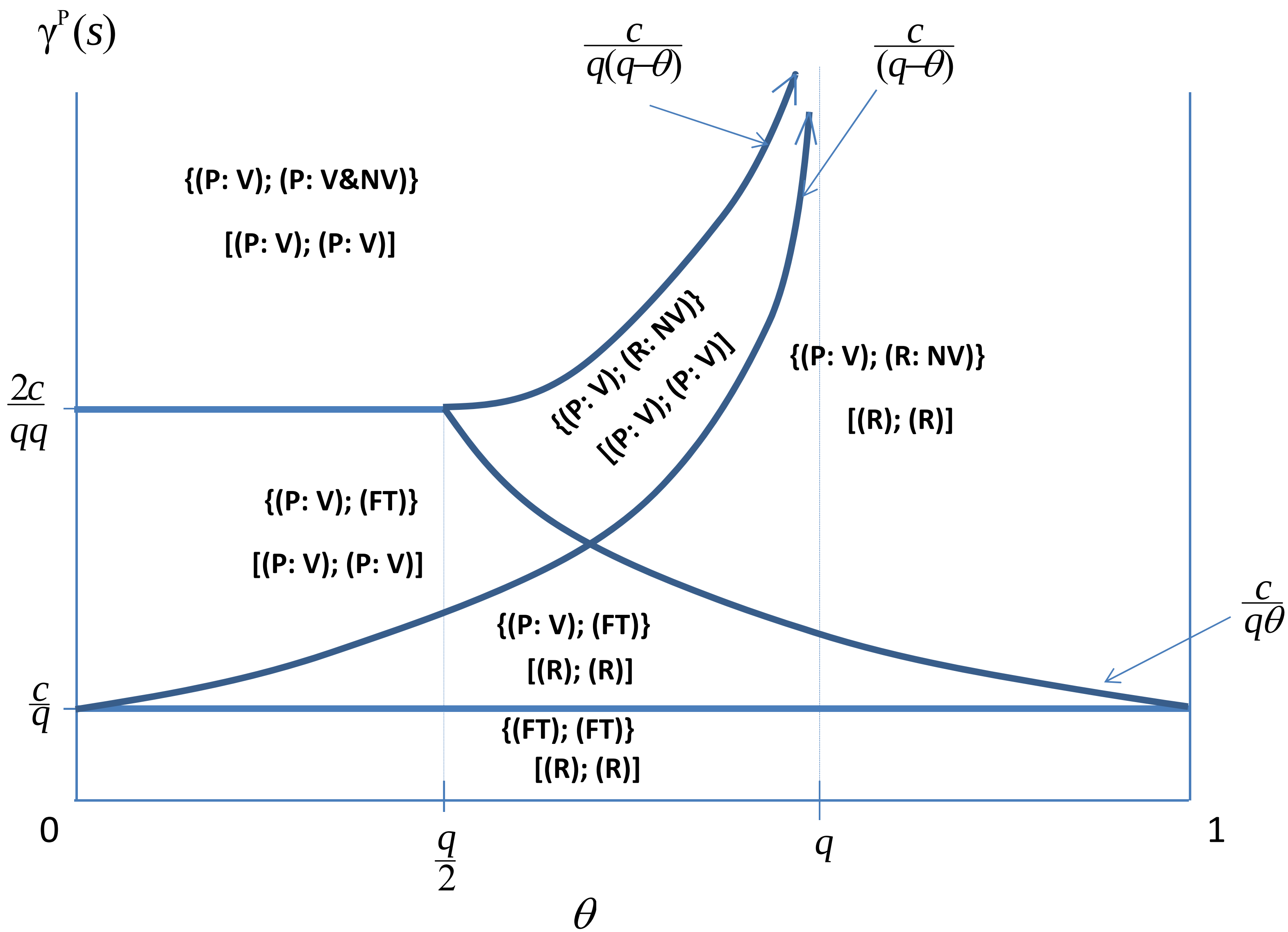

Figure 2a: $s \in \sigma^R$ for fixed $\gamma^P(s)$

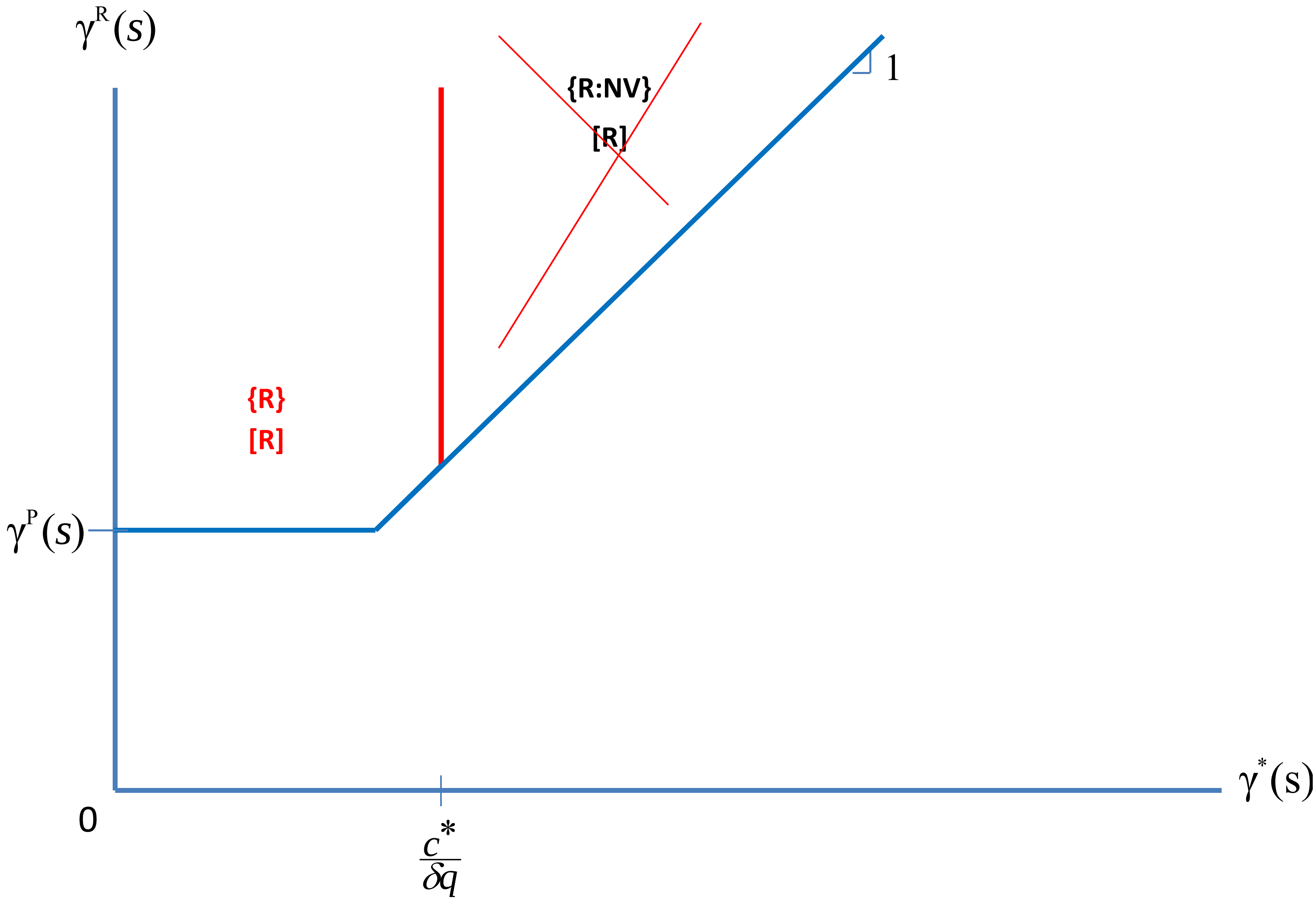

Figure 2b: $s \in \sigma^P$ for fixed $\gamma^P(s)$

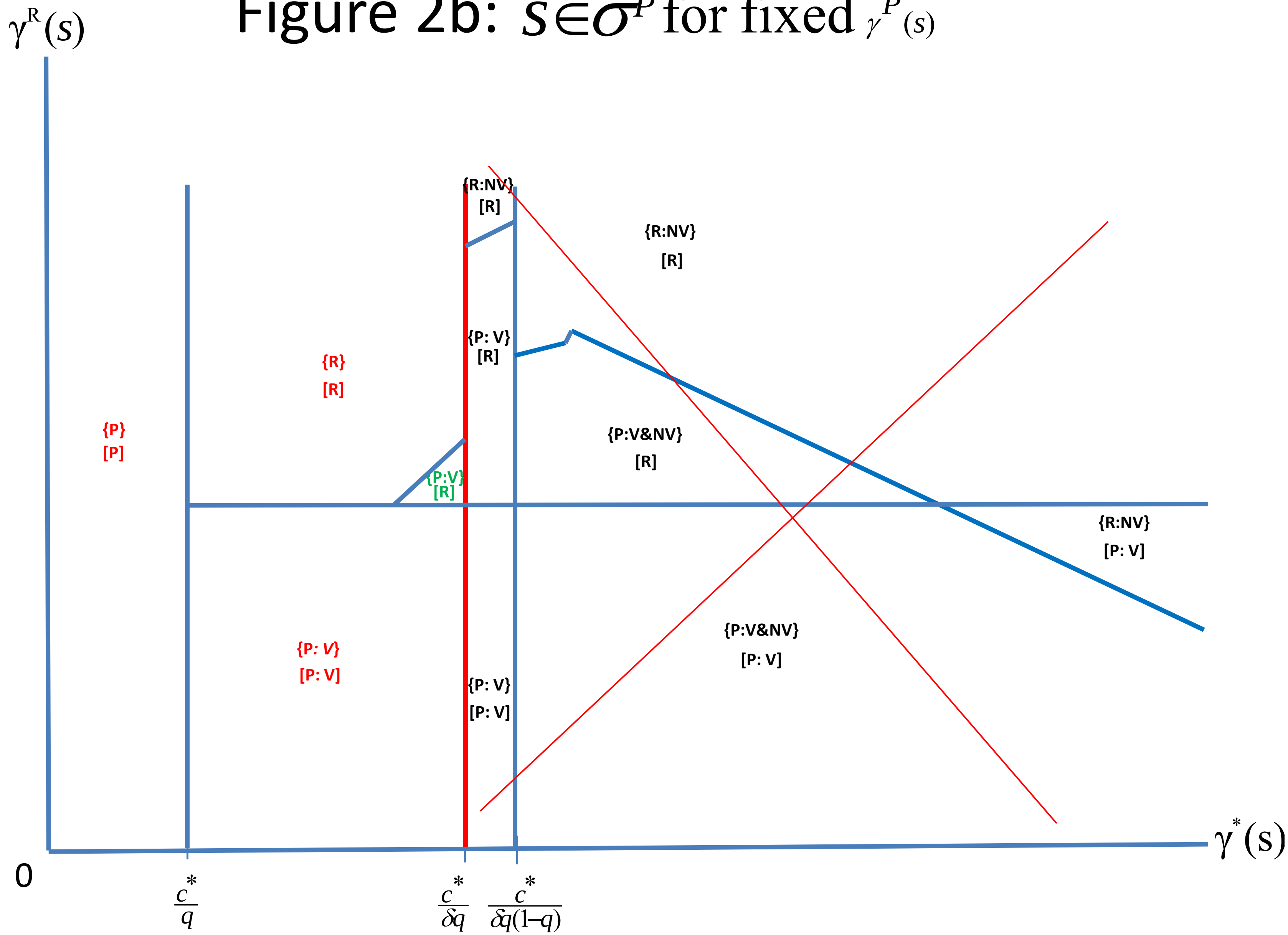

Figure 2c: $s \in \sigma^{FT}$ for $\theta \in (0,1)$