The Impact of PTAs on the Duration of Antidumping Protection

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Abstract

This paper examines the impact of preferential trade agreements on the duration of antidumping protection. It employs a two-step selection model where the first step accounts for the impact of preferential trade agreement membership on the original antidumping determination, and the second step estimates the impact of preferential trade agreement membership on the duration of duties. Several key findings emerge from the analysis. Most importantly, the duration of antidumping protection is significantly shorter for preferential trade agreement members, compared with targeted countries that are not preferential trade agreement members. The estimates imply that preferential trade agreement membership is associated with a 30 percent reduction in the duration of protection. Second, the impact on duration depends, in part, on whether the preferential trade agreement has rules specifically related to antidumping. On average, over all users and targeted countries, the impact on duration is about twice as large for preferential trade agreements with rules, compared with those without rules (and both have shorter duration than non-preferential trade agreement members). Third, the duration of antidumping measures has increased markedly over time, primarily due to cases in the right tail of the distribution. This is consistent with the widespread belief that the Uruguay Round's sunset review provisions did not produce the result that many World Trade Organization members sought, but it also reflects the growing fraction of cases targeting China. Although the rising fraction of cases against China partly explains why duration has increased, it does not explain the finding with respect to the impact of preferential trade agreements and duration.

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The Impact of PTAs on the Duration of Antidumping Protection

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\textbf{Keywords}: antidumping, duration of protection

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\end{footnotesize}
1. Introduction

In this paper, we offer the first examination of the linkage between the duration of antidumping (AD) measures and preferential trade agreements (PTAs). Both AD duties and PTAs discriminate against trading partners. PTAs often discriminate against non-PTA members by decreasing the tariff rates for members. AD duties increase the level of protection on a set of targeted suppliers. If, in addition to lowering tariffs on member countries, PTAs reduce AD protection against PTA members relative to non-PTA members, then the discretionary nature of AD protection might reinforce the discrimination that is inherent in PTAs. This possibility seems particularly likely for those PTAs that have specific rules related to the use of AD measures against PTA members. More generally, even without explicit additional provisions related to AD, PTAs may engender closer economic and political ties between member countries, which in turn might affect the duration of AD duties imposed on PTA members.Offsetting this logic is the reality that AD protection is often driven by increases in imports; if PTAs deepen trade ties, they could increase, not decrease, AD actions against PTA partners.

The rapid expansion of PTAs and widespread proliferation of AD protection make these two trade policies among the most critical developments in trade policy over the last five decades. As of 2020, nearly 500 PTAs have been notified to the World Trade Organization (WTO), with 306 of these in force (WTO, 2020). Since at least the 1970s, AD has been the most common form of discretionary protection, accounting for about 90% of the administered protection imposed (Bown, 2011). The relevance of AD has increased due to its proliferation. Until the mid-1990s, AD was primarily used by developed, high-income countries; however, in the post-Uruguay Round era AD protection has been increasingly embraced by “new” users, i.e., developing countries.

Previous literature has examined other aspects of the nexus between PTAs and the use of AD measures. Bhagwati and Panagariya (1996) were the first to raise the concern of selective use of AD measures as a means of reinforcing discrimination towards non-PTA members. Their hypothesis was subsequently confirmed by the empirical work of Prusa and Teh (2010) and Prusa (2016) who find that AD provisions in PTAs decrease (increase) AD initiations against partners (non-PTA members). The relevance of this issue is also highlighted in the work of Blonigen (2005) who studied the impact of NAFTA on the U.S. AD activity (during the immediate post-NAFTA period), and Bown and Tovar (2016) who investigated the effect of MERCOSUR on temporary trade barriers for Argentina and Brazil.

In a statistical approach somewhat similar to that used in this paper, Besedes and Prusa (2017) find that AD duties often end trade relationships that had been active for many years (i.e., cause trade from targeted
This study takes advantage of two databases developed by the World Bank — the *Global Antidumping Database* (Bown, 2015) and the *Content of Deep Trade Agreements* database (Mattoo et al., 2020). The former contains all key case information for all AD actions initiated by all major users for the period 1980 to 2015. As part of an expansive project, Prusa (2020) maps AD provisions in 283 PTAs notified to the WTO between 1958 and 2015. By combining the information in the two databases, we are able to determine for each case when AD measures were imposed and when, if ever, the measures were removed. We are also able to determine if the AD user and AD target were members of a PTA, and if so, whether the AD measure was in place before, during, or after PTA membership.

We begin our analysis by presenting graphs using the non-parametric Kaplan-Meier estimation approach to depict the duration trends and patterns before and after the formation of PTAs. We then estimate duration using a Heckman selection model to adjust for potential selection bias. The fact that PTA membership might affect the likelihood of an affirmative AD determination creates the possibility of non-random selection in the data. The Heckman selection model corrects for such bias. Several key findings emerge from our analysis. First, and most importantly, we find compelling evidence that the duration of AD protection is significantly lower for PTA members. The median duration of AD measures for PTA members falls 9–14 quarters (relative to duration before PTA membership). The impact on duration is even greater for cases with duration above the median. At the 75th percentile, the PTA membership lowers duration by about 40 quarters. Overall, our estimates imply AD duration for PTA members has decreased by approximately 30 percent relative to non-members.

Second, we examine whether the identified PTA effect is simply attributable to PTA membership or whether it is driven by AD rules. We find that rules matter – the impact on the duration of AD protection is about twice as large for PTAs with rules as compared to PTAs without rules.

Third, all else equal, we find that AD measures are in place considerably longer in more recent years. One possible explanation is the proliferation of AD protection and the greater use by (and against) developing countries. However, we find no robust differences in duration as a function of the user country’s income level; the PTA effect on the duration of AD measures is not driven by income levels of the target or user. There is one important exception. The duration of AD protection against China is significantly longer than for other targeted countries. Nevertheless, the treatment of China does not affect our finding that PTAs, especially those with AD rules, have shorter duration.

The remainder of the paper is structured as follows. Section 2 describes the databases
we use. Section 3 summarizes some descriptive statistics. Section 4 begins with illustrations of duration by using the non-parametric Kaplan-Meier survival approach; we then carry out a formal econometric analysis, discuss the results, and present a series of robustness checks. Section 5 concludes.

2. Background and Data Description

2.1. Global Antidumping Data Set

The World Bank’s Global Antidumping Dataset (GAD) provides details about worldwide AD proceedings from 1980 until 2015 (Bown, 2015). Using official documentation and reports from national governments the GAD organizes information on the investigative procedures and outcomes of AD activity across importing countries (so-called users) against each country subject to an AD investigation (so-called targets). Because the aim of this paper is to understand whether PTAs exert any effect on the duration of AD measures, our focus is on AD case initiations that resulted in affirmative final determinations. However, as we will discuss below, our estimation procedure involves two steps and the first step controls for the impact of PTA membership on the decision to apply AD duties. Hence, all initiations – both that result in duties and those that do not – are part of the first step of the estimation procedure.

In the GAD, there are more than 7,100 AD cases initiated by 50 countries in the period 1980–2015; over 4,100 cases resulted in AD measures. To get a sense of how the AD landscape has evolved, we list the most active AD users between 1980–2015 in Table 1. To streamline the table and to avoid year-to-year fluctuations, we have aggregated the annual statistics into five-year intervals. For most of the last three decades, the overall usage of AD has been relatively steady at about 100 measures per year. However, as illustrated in the table, there has been a significant change in what countries are using AD protection. In the 1980s the four “traditional” users, namely the U.S., the EU, Canada, and Australia, stood alone. They have remained active over time, but they have not been the primary users of AD since the mid-1990s. Thanks in large part to changes in the Uruguay Round agreement (e.g., lower bound tariff rates, inclusion of the Antidumping Agreement into the main text) a large number of countries that had not used AD, and in many cases did not even have their own

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2Table 1 and Table 2 are based on measures imposed; the patterns do not change if we instead used AD case initiations.

3The database has information on a handful of AD cases that were underway pre-1980. All such cases were technically reinitiated on January 1, 1980 under the new Tokyo Round rules. Our formal statistical analysis will use the date the preliminary duty was imposed. For reporting convenience in the following two tables we will consider these pre-1980 cases as being filed in 1980.
Table 1: The Top 10 Users of AD Measures

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<tbody>
<tr>
<td>United States</td>
<td>626</td>
<td>65</td>
<td>128</td>
<td>132</td>
<td>78</td>
<td>105</td>
<td>65</td>
<td>53</td>
</tr>
<tr>
<td>India</td>
<td>586</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>109</td>
<td>204</td>
<td>149</td>
<td>112</td>
</tr>
<tr>
<td>European Union</td>
<td>460</td>
<td>4</td>
<td>81</td>
<td>106</td>
<td>111</td>
<td>68</td>
<td>53</td>
<td>37</td>
</tr>
<tr>
<td>Canada</td>
<td>270</td>
<td>0</td>
<td>72</td>
<td>65</td>
<td>44</td>
<td>41</td>
<td>10</td>
<td>38</td>
</tr>
<tr>
<td>Argentina</td>
<td>261</td>
<td>0</td>
<td>43</td>
<td>52</td>
<td>65</td>
<td>61</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>253</td>
<td>0</td>
<td>21</td>
<td>45</td>
<td>17</td>
<td>50</td>
<td>116</td>
<td></td>
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<tr>
<td>Turkey</td>
<td>209</td>
<td>0</td>
<td>5</td>
<td>31</td>
<td>9</td>
<td>87</td>
<td>49</td>
<td>28</td>
</tr>
<tr>
<td>Australia</td>
<td>207</td>
<td>0</td>
<td>91</td>
<td>24</td>
<td>33</td>
<td>13</td>
<td>46</td>
<td></td>
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<tr>
<td>China</td>
<td>182</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>82</td>
<td>56</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>174</td>
<td>0</td>
<td>30</td>
<td>91</td>
<td>26</td>
<td>15</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td><strong>Top 10 Users</strong></td>
<td><strong>3,228</strong></td>
<td><strong>69</strong></td>
<td><strong>290</strong></td>
<td><strong>531</strong></td>
<td><strong>573</strong></td>
<td><strong>728</strong></td>
<td><strong>521</strong></td>
<td><strong>516</strong></td>
</tr>
</tbody>
</table>

Notes: The table reports the number of measures imposed by each user country. Authors’ calculations using Global Antidumping Database (Bown, 2015).

domestic AD statute, began to use AD to protect domestic industries (Prusa, 2001). These “new” users, many of whom were middle-income and lower-middle income countries, have shown remarkable enthusiasm for AD protection. As seen, countries like India, Argentina, Brazil, Turkey, China, and South Africa have imposed a large number of AD duties and are now among the top users.

We next reverse the perspective and decompose worldwide AD measures by target country for 1980–2015. As shown in Table 2, China has emerged as the dominant target country since 2000, accounting for approximately 40% of AD measures since 2000. More generally, as one can see by looking at the successive five-year periods, there have been striking developments in the pattern of targeted countries. The general picture that emerges from Tables 1 and 2 reveals that overwhelming shares of AD measures now involve the developing economies, both in the role of user and target.

Table 2: The Top 10 Targets of AD Measures

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<tbody>
<tr>
<td>China</td>
<td>944</td>
<td>6</td>
<td>24</td>
<td>108</td>
<td>110</td>
<td>204</td>
<td>272</td>
<td>220</td>
</tr>
<tr>
<td>Korea, Rep.</td>
<td>288</td>
<td>6</td>
<td>25</td>
<td>43</td>
<td>58</td>
<td>70</td>
<td>36</td>
<td>51</td>
</tr>
<tr>
<td>United States</td>
<td>248</td>
<td>0</td>
<td>23</td>
<td>60</td>
<td>46</td>
<td>47</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td>Japan</td>
<td>227</td>
<td>18</td>
<td>44</td>
<td>38</td>
<td>48</td>
<td>41</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td>Taiwan, China</td>
<td>226</td>
<td>4</td>
<td>20</td>
<td>22</td>
<td>38</td>
<td>55</td>
<td>42</td>
<td>45</td>
</tr>
<tr>
<td>Thailand</td>
<td>152</td>
<td>0</td>
<td>5</td>
<td>18</td>
<td>25</td>
<td>36</td>
<td>35</td>
<td>33</td>
</tr>
<tr>
<td>Brazil</td>
<td>142</td>
<td>4</td>
<td>15</td>
<td>49</td>
<td>23</td>
<td>24</td>
<td>18</td>
<td>9</td>
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<tr>
<td>India</td>
<td>139</td>
<td>0</td>
<td>4</td>
<td>17</td>
<td>35</td>
<td>32</td>
<td>27</td>
<td>24</td>
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<tr>
<td>Indonesia</td>
<td>127</td>
<td>0</td>
<td>3</td>
<td>9</td>
<td>24</td>
<td>35</td>
<td>37</td>
<td>19</td>
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<tr>
<td>Russian Federation</td>
<td>122</td>
<td>0</td>
<td>5</td>
<td>24</td>
<td>41</td>
<td>29</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td><strong>Top 10 Targets</strong></td>
<td><strong>2,615</strong></td>
<td><strong>38</strong></td>
<td><strong>168</strong></td>
<td><strong>388</strong></td>
<td><strong>448</strong></td>
<td><strong>573</strong></td>
<td><strong>526</strong></td>
<td><strong>475</strong></td>
</tr>
</tbody>
</table>

Notes: The table reports the number of measures faced by a target country. Authors’ calculations using Global Antidumping Database (Bown, 2015).
To see this more clearly, we use the World Bank income classification system and group each user (and each target) country into two categories: (i) Developed countries (DC), (ii) Developing Countries (DgC). Using these categories we tallied total AD measures and aggregated the annual statistics into five-year intervals and present the results in Table 3. The table reveals several important insights. First, Panel A confirms that high-income countries dominated AD usage until the late-1990s and account for the majority of the AD activities over the entire sample period. This panel also confirms that AD usage is systematically spreading from rich, developed countries to emerging economies, i.e., moving down the income distribution. Second, Panel B documents a similar trend involving targeted countries. As seen, there has been a clear shift in targeting of AD protection from developed to developing countries. A large reason for the increase is due to the imposition of AD measures on China. By contrast, developed countries were targeted less frequently by AD actions over the 2005–15 period relative to the preceding decade. Over time, AD has become an increasingly important trade policy for developing countries, both from the perspective as users and as targets.

Table 3: The Income level of User and Target Country

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<tbody>
<tr>
<td>PANEL A — User Country’s Income Level</td>
<td></td>
<td></td>
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<tr>
<td>Developed Countries</td>
<td>1,768</td>
<td>70</td>
<td>295</td>
<td>424</td>
<td>312</td>
<td>288</td>
<td>181</td>
<td>198</td>
</tr>
<tr>
<td>Developing Countries</td>
<td>2,334</td>
<td>0</td>
<td>25</td>
<td>214</td>
<td>445</td>
<td>626</td>
<td>525</td>
<td>499</td>
</tr>
<tr>
<td>PANEL B — Target Country’s Income Level</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Developed Countries</td>
<td>1,795</td>
<td>52</td>
<td>203</td>
<td>308</td>
<td>376</td>
<td>376</td>
<td>208</td>
<td>272</td>
</tr>
<tr>
<td>Developing Countries</td>
<td>2,307</td>
<td>18</td>
<td>117</td>
<td>330</td>
<td>381</td>
<td>538</td>
<td>498</td>
<td>425</td>
</tr>
</tbody>
</table>

Notes: Each column of this table reports the number of measures imposed (faced) by a user (target) country. Authors’ calculations using Global Antidumping Database (Bown, 2015).

2.2. PTA and Mapping of AD Rules

The World Bank’s Content of Deep Trade Agreements database contains detailed information on the AD provisions in all economically large PTAs and all PTAs involving the most active users of contingent protection. In addition, the PTAs are geographically diverse, covering almost every corner of the world: Europe, North America, the Caribbean, Latin America, Eastern Europe, Asia, the Pacific, Africa, and the Middle East. To the best of our knowledge, this is the most comprehensive database of contingent protection rules in PTAs.

The database allows us to classify PTAs into three mutually exclusive categories. The first category includes those PTAs that disallow AD actions among members. The second category includes PTAs that have no specific language or provisions on AD. The third category includes...
PTAs that allow AD against PTA members but include specific provisions on how AD is to be implemented against PTA members. Many PTAs with language pertaining to AD rules have what Prusa (2020) refers to as “weak” rules. PTAs with weak rules most often simply reference the WTO AD provisions. Other PTAs only state that AD is permissible but do not specify any changes to WTO AD rules for PTA members. In either case it is unclear how such language amounts to a significant change from WTO practice regarding how PTA members should conduct AD investigations, determine findings, or sunset orders. (The removal of an AD measure is often referred to as “sunsetting” the measure.) We treat PTAs with weak rules as being the same as those not having rules. This means we have 153 PTAs with no rules and 109 PTAs with AD rules. Only a small number (21) prohibit the use of AD provisions.

The next step involves merging the GAD with the PTA AD database. For each AD case we determined whether each user/target country pair were members of a PTA. For each pair of PTA members, we then identified whether the case was initiated before or after the implementation of the PTA. Between 1980 and 2015, there were 4,064 AD measures imposed by 40 countries. Of this total, 1,044 cases involved country pairs that are in a PTA and 3,020 involved non-PTA countries. We also note that PTAs are common across countries in all income levels. PTAs involving AD users from developed countries include the North American Free Trade Agreement (NAFTA), European Economic Area (EEA), and European Union–Republic of Korea Free Trade Agreement (EU-Korea). PTAs involving AD users from developing countries include the Southern Common Market (Mercosur), Latin American Integration Association (LAIA), Dominican Republic–Central America Free Trade Agreement (CAFTA-DR), and Southern African Development Community (SADC).

For each case we compute the number of quarters that AD protection was applied. The quarter when the preliminary AD duty was imposed is defined as the starting point. The ending point is defined as either the quarter (i) when the measure was revoked or (ii) when the sample period ends. The difference in those dates is called the spell length.

About 37% of the AD measures were still in place at the end of the 2015. The survival

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4For PTAs with rules, the database includes information on specific provisions of the agreement. In this paper we do not utilize this second level categorization because only a handful of PTAs have explicit language referring to duration or the sunset review process. Most rules apply to the imposition of AD protection.

5Cases involving PTAs that eliminate the application of AD between members are dropped from our analysis. In such a scenario the pre-existing AD measures are immediately sunset when the PTA is enacted. The highest profile example is the European Union, where member states cannot use AD against imports from another member state and all pre-existing AD measures are terminated. For example, when Spain joined the EU in 1986 all existing EU AD measures against Spain were immediately revoked.

6We also identified whether a PTA was implemented after the AD measure was implemented. In such cases, the PTA might not have affected the original determination but could affect the sunset decision.
analysis literature refers to those cases as being “censored.” For example, consider a case where the duties were first imposed in 2014-Q4. The spell length for this case would be 5 (as the GAD ends in 2015-Q4). However, it would be incorrect to infer that the AD measure lasted only 5 quarters; rather, censoring means all we know is that the AD measure lasted at least 5 quarters. For censored cases, the duration will be longer than the observed spell length. Henceforth, all the statistics presented will account for the censoring issue.

The Uruguay Round mandated that all measures receive a “sunset review” five years after the final AD order. Given that preliminary duties are in place for (approximately) two quarters prior to the final order and that a sunset review can take 2 to 6 quarters to complete, a median duration of 22–28 quarters is a reasonable prior expectation for how long AD measures will be in place — at least post-1995. We stress that the Uruguay Round only mandated a sunset review, not that the AD measure be revoked.

3. General statistics

**Overall Trends**

Before looking at the impact of PTAs it might be useful to consider the overall duration of AD measures. Throughout this paper we use the non-parametric Kaplan-Meier survival function to estimate the duration. Figure 1 depicts the Kaplan-Meier curves for our entire sample. Three lines are depicted: the black solid line is the survival experience for all targeted countries, the green solid line is the survival experience for cases targeting China, and the red solid line is the survival experience for AD measures other than those against China. For a given quarter, each line reports what fraction of AD measures remain in place (i.e., survived). Higher lines are interpreted as cases with longer duration. For example, at quarter 40, 40% of AD measures against all targeted countries remain in place; for AD against countries other than China about 35% of measures remain in force, and for AD measures against China nearly 60% remain in place.

As seen in the figure, across all AD measures half were revoked within 27 quarters (as depicted by the black line and as reported in Table 1). Said differently, the median duration across all AD measures against all targeted countries over the entire 1980–2015 sample is 27 quarters, or just about 7 years. Given the prior discussion about the timing of mandatory sunset review, our finding of a median of 27 quarters seems reasonable.

We once again stress that the Uruguay Round did not require mandatory sunset of AD measures, but only mandated a “review”. This weaker language has allowed many AD measures to remain in place for far longer (Moore 1999). Notably, the 75th percentile of AD measures is 52 quarters, or about 13 years. Given that after 13 years at least two sunset
reviews should have been completed, the results imply that 25 percent of AD measures remain in place after their second sunset review.

The data also suggests that China fares worse than other targeted countries. The survival curve for cases that exclude China (red solid line) is very similar to the overall average. The median duration for this group is 25 quarters. By contrast, looking just at AD measures against China, we see a very different picture: the median duration for China is 49 quarters, far longer lived than those against other countries. In fact, the median duration for cases involving China is longer than the 75th percentile for cases against all non-China targets. This finding gives *prima facie* evidence that China faces discriminatory treatment relative to other targeted countries, at least with respect to the duration of AD protection.

<table>
<thead>
<tr>
<th>Table 4: Est. Survival Time: All Users</th>
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<tr>
<td><strong>Survival Time</strong></td>
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<td></td>
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<tr>
<td># of Cases</td>
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<tr>
<td>All Cases</td>
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<tr>
<td>Excluding Cases Targeting China</td>
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<td>Cases Targeting China</td>
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</table>

*By Development Status*

In Figure 2 we consider the survival experience partitioning countries by their development status. In the left panel, we depict the duration of AD measures from the user side, whereas the right panel displays the duration of AD measures from a target country perspective. As shown in the left panel, there is little difference in patterns between the users from developed
and developing countries (median duration of 28 and 26 quarters, respectively). The patterns are also broadly similar across different targeted countries, with developed and developing countries (which excludes China) all having the same median duration of 25 quarters. The income group of developing countries (which includes China) has somewhat longer median duration of 30 quarters, which is entirely driven by China.

7Detailed descriptive statistics are given in Table A1. As seen from the second part, excluding China as the target from the developing income group leads to all income categories having nearly identical survival experience.

4. Impact of PTAs

Our analysis of how PTAs affect the duration of AD measures proceeds in two steps. We will begin by using the non-parametric Kaplan-Meier survival approach to illustrate how PTAs affect the duration of AD measures. We then turn to a more formal parametric regression approach to quantify how PTAs alter the patterns of AD measures.

In order to understand the impact of PTAs, we must consider the evolution in the duration of AD protection over time. For example, the Uruguay Round’s sunset review provision might have affected the duration of AD measures. It is our understanding that many WTO Members felt AD duties often remained in place for many years longer than the warranted and hoped the sunset provision would reduce the duration of AD protection. Many members had hoped that requiring authorities to review all AD measures would result in revoking orders on weaker cases or where circumstances had changed such that AD protection was no longer warranted. On the other hand, duration of AD protection could have easily increased over time. To begin with the specific language governing the sunset review gives great
latitude to investigative authorities (like the International Trade Commission in the U.S. or the European Commission in the EU). In addition, since 1995 resentment toward trade and globalization has grown in many countries and authorities might be more reluctant to remove protection for fear of a political backlash. These evolving time effects are important because the changing attitude toward protection coincided with the enactment of many of the PTAs in our sample. We need to distinguish between the duration effects truly tied to PTAs and duration effects related to other factors.

To get a sense of the time effect, we begin by examining the pre- and post-PTA duration for each AD using country. For purposes of this paper, we do not use a specific year for all users to define the pre-period vs. the post-period. Rather, we allow the pre-/post-period to vary by AD user. This approach allows us to identify a country-specific “early” and “late” period. For all country pairs that are PTA members, we use the PTA inception date as the date that defines pre vs. post. For country pairs that are not PTA members, we define the demarcation for the pre- and post-period as the date of each AD using country’s most economically significant PTA. For many countries, the most significant PTA is the same as their first PTA, but for others we designate a PTA other than the first PTA. For example, the U.S signed and enacted several PTAs prior to NAFTA (e.g., US-Israel in 1985). But, in our judgement NAFTA was the PTA that had the largest impact on U.S. trade patterns and policy.

With this timing established, we can compare length of protection in the early period versus the more recent period. The results are shown in Figure 3. As seen in Table 5, the median duration is about the same in the pre- and post-periods, 25 and 28 quarters, respectively. However, this does not imply there has not been a change in duration. Rather, it appears
countries are applying much more scrutiny for the upper-half of cases. The 75th percentile duration in the early period is 48 quarters as compared to 70 quarters in the later period, a considerable increase in the length of protection.

A broadly similar trend — longer duration for the upper-half of cases — is seen for users of all development statuses. As shown in Table 5, the median duration is about the same pre-and post-PTA for all users of all development levels. However, in each income category the upper-half of cases have much longer duration in the later period than in the early period.

We note that even if we exclude China as a target there has been an increase in duration, albeit not as great an increase as when China is included (see Table A2). The analysis with and without China suggests that AD measures on China are rarely sunset in the first review (i.e., within 22–28 quarters) and that China also fares poorly at the second review (i.e., 50–55 quarters) which results in long duration for AD duties against China.

<table>
<thead>
<tr>
<th>Table 5: Est. Survival Time: Pre- and Post-PTA by Income (Using Countries)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival Time</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Pre-PTA</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Post-PTA</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

The next step is to overlay the pre-/post- analysis with the information on whether the user and target are in a PTA. The results are depicted in Figure 4. The differences among the three classifications — (i) no PTA, (ii) PTA with no rules, and (iii) PTA with rules — are modest. It is nevertheless interesting to compare how the estimated survival functions vary over time. As seen, in the left panel, before the PTA was enacted, AD cases involving PTA members had longer duration than those not involving PTA members. By contrast, in the right panel we see that once the PTA is enacted, the ordering is flipped. Cases among PTA members have shorter duration as compared to those against non-PTA members. These figures suggest that PTAs do reduce the length of AD protection, a finding that will be confirmed by the formal econometric estimates.

As seen in Table 6, the median duration increased by 12 quarters for targeted countries that are not PTA members but decreased for those that were PTA members: 4 quarters for those that were in PTAs without AD rules and 15 quarters for those in PTAs with rules.
differential impact suggests that the impact of PTA membership on duration might not only be due to PTA rules. Rather, the fall in duration for targets without PTA AD rules might reflect the beneficial effects of the “closeness” associated with PTA membership.

Table 6: Est. Survival Time: Pre-/Post-PTA, by PTA Rules Classification

<table>
<thead>
<tr>
<th></th>
<th>Survival Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Cases</td>
</tr>
<tr>
<td><strong>Pre-PTA</strong></td>
<td></td>
</tr>
<tr>
<td>No PTA</td>
<td>1,308</td>
</tr>
<tr>
<td>PTA No Rules</td>
<td>174</td>
</tr>
<tr>
<td>PTA Rules</td>
<td>184</td>
</tr>
<tr>
<td><strong>Post-PTA</strong></td>
<td></td>
</tr>
<tr>
<td>No PTA</td>
<td>1,712</td>
</tr>
<tr>
<td>PTA No Rules</td>
<td>480</td>
</tr>
<tr>
<td>PTA Rules</td>
<td>206</td>
</tr>
</tbody>
</table>

Given our prior discussion, we are concerned about the extent to which these differential effects are caused by China. To investigate this issue, we re-did the analysis excluding China as a target. As shown in Table 7, excluding China indeed reduces the pre-/post- effect but does not alter our results regarding the impact of PTA membership. It appears the enactment of PTAs shortens the duration of AD measures between members (with no effect or perhaps a slight increase in duration for non-members).

4.1. Parametric Regression Analysis

The above discussion based on the non-parametric analysis presents evidence that there are changes that relate to both time (pre- vs. post-) and also PTA membership. We provide
<table>
<thead>
<tr>
<th></th>
<th># of Cases</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-PTA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No PTA</td>
<td>1,159</td>
<td>21</td>
<td>24</td>
<td>45</td>
</tr>
<tr>
<td>PTA No Rules</td>
<td>117</td>
<td>22</td>
<td>41</td>
<td>68</td>
</tr>
<tr>
<td>PTA Rules</td>
<td>167</td>
<td>23</td>
<td>37</td>
<td>52</td>
</tr>
<tr>
<td><strong>Post-PTA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No PTA</td>
<td>1,160</td>
<td>22</td>
<td>27</td>
<td>52</td>
</tr>
<tr>
<td>PTA No Rules</td>
<td>315</td>
<td>21</td>
<td>24</td>
<td>46</td>
</tr>
<tr>
<td>PTA Rules</td>
<td>202</td>
<td>19</td>
<td>23</td>
<td>38</td>
</tr>
</tbody>
</table>

A formal regression analysis into the question of whether countries discriminate in favor of their PTA members with respect to the duration of AD duties relative to non-members. Because PTA members may be less likely to have affirmative determinations in the first place, we employ a Heckman selection model to control for the non-random selection issue. In particular, we observe the length of the protection only for AD cases that resulted in measures being applied. For those AD investigations that were rejected (no duties applied) or were “settled,” we do not have any information on duration. If the decision to impose AD duties is systematically correlated with unobservables that also affect the duration, using only the AD measures might produce biased estimators.

The Heckman method corrects for such selection. In the first stage, a selection equation investigates the binary decision whether or not to impose AD measures, estimated through a probit. In the second stage, the outcome equation focuses on the length of the protection conditional on an affirmative determination. The selection equation includes the same independent variables as the outcome equation, except for the selection variables. The key feature of this procedure is to include variables which affect the decision of whether measures are imposed, but which are not relevant for the duration regression. In our case, we include the bilateral exchange rate and the AD using country’s GDP as the selection variables. These two variables control for unobserved macroeconomic shocks such as business cycles or exchange rate fluctuations, which can have significant effects on the AD activities as shown by Knetter and Prusa (2003). The bilateral exchange rate is lagged by one year based on the case initiation time at \( t' \). This reflects that most authorities base the less than fair value calculation on the most recent year. By contrast, following the logic of Knetter and Prusa

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8The bilateral exchange rate is expressed as the number of AD targeting currency units per AD using country currency.
GDP is lagged three years from case initiation time at $t'$ based on the typical time frame for the injury investigation.

We estimate a probit binary choice model of the form

$$\Pr(\text{Determination} = 1)_{ij} = \Phi(\alpha_0 + \alpha_1 \ln GDP_{i(t'-3)} + \alpha_2 \ln ER_{ij(t'-1)} + \alpha_3 \text{Post}_{ijt} + \alpha_4 \text{PTA}_{ij} + \delta (\text{PTA}_{ij} \times \text{Post}_{ijt}) + \delta_i + \delta_j + \mu_{ijt}),$$  \tag{1}

and an outcome equation of the form

$$\ln(\text{duration})_{ij} = \theta_0 + \theta_1 \text{Post}_{ijt} + \theta_2 \text{PTA}_{ij} + \phi (\text{PTA}_{ij} \times \text{Post}_{ijt}) + \delta_i + \delta_j + \hat{\lambda} + \epsilon_{ijt},$$ \tag{2}

where $\Phi(\cdot)$ is a standard normal distribution function, Determination$_{ij}$ denotes whether the original investigation resulted in duties being applied, GDP$_{i(t'-3)}$ is the using country’s GDP three years prior to the initiation date $t'$, and ER$_{ij(t'-1)}$ is the bilateral exchange rate between the using country (i) and the targeted country (j) one year prior to the initiation date $t'$; log(duration)$_{ij}$ denotes the log duration of an AD measure imposed by country i on country j; Post$_{ijt}$ is a dummy variable which takes the value of 1 if the duty imposed at $t$ occurs after countries i and j has embraced a PTA, 0 otherwise; for country pairs who are not PTA members, Post$_{ijt} = 1$ if the duty imposed at $t$ occurs after country’s i most economically significant PTA, 0 otherwise. PTA$_{ij}$ is a dummy variable indicating whether countries i and j are members of the same PTA while the case was active. The parameter $\theta_1$ captures the duration effect due to changes over time, $\theta_2$ controls for time invariant differences in duration between members and non-members. The parameter of primary interest is $\phi$, which measures the change in AD duration that can be attributed to PTA membership after the PTA is enacted. Intuitively, this specification compares the difference in the duration of AD measures imposed on PTA members after a PTA is formed with the change in the length of AD measures imposed on non-PTA members. $\hat{\lambda}$ denotes the inverse Mill's ratio, i.e., the ratio of the probability distribution function and the cumulative distribution function that is predicted from the probit estimation in equation (1). This inverse Mill’s ratio is used in the outcome equation (2) to control and test for sample selection. Selection bias is present if the inverse Mill’s ratio is statistically different from zero. Importantly, given our dependent variable measures a duration, which is naturally right-censored, it is inappropriate to use OLS. We therefore use the censored normal regression model to estimate equation (2).

We include both AD using country and targeting country fixed effects (i.e., $\delta_i$ and $\delta_j$) to take into account all time-invariant country-level characteristics. The former controls for unobserved cultural and institutional factors that might affect the decision on the duration
of AD measures, while the latter captures the unobserved targeting country heterogeneity such as specific market distortions. In particular, it might be the case that there exist certain country characteristics that trigger AD measures more easily than others. By controlling for targeting country dummies, we can account for these unobservable fixed characteristics. We cluster standard errors by AD investigations instead of AD cases, which means that we allow for determinations within the same AD investigation that targets multiple countries to be correlated.

4.2. Empirical Results

Benchmark Results

Table 8 reports the benchmark estimation results using the Heckman selection procedure and thus accounts for potential sample selection. Each of the coefficients, when multiplied by 100, gives the estimated percentage change in expected duration given a ceteris paribus increase of one unit in the corresponding explanatory variable. We note that the estimation results for equation (1) are reported in Table A3. The benchmark results for the first stage (used for obtaining the inverse Mill’s ratio, \( \hat{\lambda} \)) is showed in column (1) of Table A3. As expected, a strong domestic currency increases the likelihood of an imposition of AD protection. In contrast, weaker AD using country’s GDP negatively affects the probability of imposition of the measures.

Column (1) of Table 8 reports the results when the sample includes all cases initiated by all user countries. We see that the estimates are consistent with the non-parametric results discussed above. In particular, we see that overall, regardless of PTA membership, duration has increased by 12 percent in the recent period. This is consistent with the trends depicted in Figure 3. Interestingly, the PTA dummy estimate implies members have an approximately 20% longer duration. While this seems perplexing, recall that the PTA dummy is measuring the impact for country pairs pre- and post-PTA. The positive coefficient is consistent with the view that PTAs are often composed of countries who have deep trade relationships; it is the depth of the trading relationship that creates the trade tensions that spur AD actions and this, in turn, results in longer lived measures. Critically, the interaction effect is quite large and statistically significant. Specifically, we find that a PTA leads to a sharp reduction by over 30 percent in the duration of AD measures for its members (“PTA × Post”).

In columns (2)–(7) we check whether the PTA effects depend on the development status of

---

9A single investigation can involve multiple cases. For example, an investigation might involve ball bearings from France, Japan, and Korea (three cases). Country specific information is collected but the cases within the same investigation often proceed on identical timelines. Each targeted country would get its own determination. The investigative authority might reject duties for France but apply duties on Japan and Korea.
Table 8: The Effect of PTA Membership

<table>
<thead>
<tr>
<th>Case</th>
<th>All</th>
<th>DC</th>
<th>DC</th>
<th>DC</th>
<th>DgC</th>
<th>DgC</th>
<th>DgC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post&lt;sub&gt;ij&lt;/sub&gt;</td>
<td>0.115***</td>
<td>0.033</td>
<td>0.042</td>
<td>-0.016</td>
<td>0.180***</td>
<td>0.043</td>
<td>0.247***</td>
</tr>
<tr>
<td>PTA&lt;sub&gt;ij&lt;/sub&gt;</td>
<td>0.200*</td>
<td>0.394*</td>
<td>0.634**</td>
<td>0.325</td>
<td>0.264**</td>
<td>0.639***</td>
<td>0.206</td>
</tr>
<tr>
<td>PTA&lt;sub&gt;ij&lt;/sub&gt; × Post&lt;sub&gt;ij&lt;/sub&gt;</td>
<td>-0.271**</td>
<td>-0.352</td>
<td>-0.614*</td>
<td>-0.066</td>
<td>-0.353**</td>
<td>-0.506***</td>
<td>-0.312</td>
</tr>
<tr>
<td>λ</td>
<td>-0.016</td>
<td>0.005</td>
<td>0.085</td>
<td>0.041</td>
<td>0.179</td>
<td>0.615**</td>
<td>-0.058</td>
</tr>
<tr>
<td>δ&lt;sub&gt;i&lt;/sub&gt;</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>δ&lt;sub&gt;j&lt;/sub&gt;</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>3,817</td>
<td>1,636</td>
<td>764</td>
<td>872</td>
<td>2,181</td>
<td>875</td>
<td>1,306</td>
</tr>
</tbody>
</table>

Note: The dependent variable is the log of duration of AD measures imposed by country <i>i</i> against country <i>j</i>. The inverse Mill’s ratio, ̂λ, is derived from the column (1) of Table A3. Robust standard errors in parenthesis are clustered at the AD investigation level. Asterisks denote significance levels: * < 0.10, ** < 0.05, *** < 0.01.

In column (2), we restrict the sample to AD measures imposed by developed countries (DC) and find that the estimated effect of PTA membership on duration is roughly similar in magnitude as the previous column but is not statistically significant at standard confidence levels. To gain insight into this puzzle, we estimate two additional specifications that separate the DC cases targeting developed countries from those targeting developing countries (DgC). While the effect of PTAs in reducing the length of AD measures for partners is still present but with a lower level of precision for bilateral DC–DC income group (column (3)), the significance of all estimated coefficients disappear entirely for DC–DgC category (column(4)). Part of the explanation for this result could be the type of DgCs that enter in PTAs with DCs and the nature of the PTAs. That is, the DgC targets might be poorly organized so as to not properly defend themselves (i.e., lack the wherewithal to get the case sunset).

In specifications (5)–(7), we change our focus to AD cases initiated by developing countries. As seen, the signs of the effects are similar to those in (1). In particular, deeper trade ties (i.e., country pairs who eventually join a PTA) is associated with 30 percent longer duration; importantly, once the PTA is enacted, PTA membership decreases the AD duration for members by more than 40 percent. These large effects are also found in the DgC–DC sub-sample, as demonstrated in column (6). Lastly, column (7) restricts our sample to DgC–DgC group and find the magnitude of coefficient is roughly equal to the coefficient in column (5). However, the lack of statistical significance is similar to what we found in column (4) when DgCs were targeted by DCs.
Table 9: The Heterogeneous Effect of PTA Membership

<table>
<thead>
<tr>
<th></th>
<th>All Cases</th>
<th>All Cases</th>
<th>DC DgC</th>
<th>DgC DgC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Post_{ijt}</td>
<td>0.177***</td>
<td>0.130***</td>
<td>0.008</td>
<td>0.280***</td>
</tr>
<tr>
<td></td>
<td>(0.056)</td>
<td>(0.044)</td>
<td>(0.094)</td>
<td>(0.089)</td>
</tr>
<tr>
<td>PTA_{ij}</td>
<td>0.214**</td>
<td>0.281**</td>
<td>0.280</td>
<td>0.297</td>
</tr>
<tr>
<td></td>
<td>(0.098)</td>
<td>(0.115)</td>
<td>(0.348)</td>
<td>(0.227)</td>
</tr>
<tr>
<td>PTA_{ij} × Post_{ijt}</td>
<td>-0.319***</td>
<td>-0.362***</td>
<td>-0.090</td>
<td>-0.435</td>
</tr>
<tr>
<td></td>
<td>(0.110)</td>
<td>(0.122)</td>
<td>(0.369)</td>
<td>(0.252)</td>
</tr>
<tr>
<td>DC_i × Post_{ijt}</td>
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<td></td>
<td></td>
</tr>
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<td>(0.079)</td>
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<tr>
<td>DC_i × PTA_{ij}</td>
<td>0.220**</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.102)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC_i × PTA_{ij} × Post_{ijt}</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.139)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China_j × Post_{ijt}</td>
<td>-0.060</td>
<td>-0.068</td>
<td>-0.087</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.079)</td>
<td>(0.124)</td>
<td>(0.118)</td>
<td></td>
</tr>
<tr>
<td>China_j × PTA_{ij}</td>
<td>-0.222*</td>
<td>0.103</td>
<td>-0.223</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.124)</td>
<td>(0.206)</td>
<td>(0.175)</td>
<td></td>
</tr>
<tr>
<td>China_j × PTA_{ij} × Post_{ijt}</td>
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<td>0.273</td>
<td></td>
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<tr>
<td></td>
<td>(0.152)</td>
<td>(0.291)</td>
<td>(0.219)</td>
<td></td>
</tr>
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<td>\hat{\lambda}</td>
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<td>0.002</td>
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<td>(0.152)</td>
<td>(0.403)</td>
<td>(0.388)</td>
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<td>\delta_i</td>
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<td>Yes</td>
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<td>Yes</td>
</tr>
<tr>
<td>\delta_j</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>3,817</td>
<td>3,817</td>
<td>872</td>
<td>1,306</td>
</tr>
</tbody>
</table>

Note: The dependent variable is the log of duration of AD measures imposed by country i against country j. The inverse Mill’s ratio, \hat{\lambda}, in column (1) is derived from column (2) of Table A3. The inverse Mill’s ratio, \hat{\lambda}, in columns (2) – (4) is derived from column (3) of Table A3. Robust standard errors in parenthesis are clustered at the AD investigation level. Asterisks denote significance levels: * < 0.10, ** < 0.05, *** < 0.01.

Finally, we note that, by and large, the inverse Mill’s ratio is statistically insignificant across various sample compositions, suggesting that sample selection bias seems not to be a problem in our framework.

The results of Table 8 confirm the findings from the graphical analysis. Namely, there is evidence of a general trend toward longer duration of AD measures with a significant reduction in duration for PTA members.

**Heterogeneous Effects of PTAs**

We now examine whether the large PTAs effects identified earlier apply to all countries or whether they are largely due to rich, developed AD using countries. To answer this question, we add an income-specific triple interaction term to distinguish between two income groups. This term aims to capture whether the expected effect of PTAs on shortening the duration of AD measures is magnified if users are higher-income countries. As seen from column (1) of Table 9, the triple interaction term is negative, albeit insignificant, implying that the
Table 10: The Effect of PTA Membership and PTA Rules

<table>
<thead>
<tr>
<th></th>
<th>All Cases</th>
<th>DC</th>
<th>All DC</th>
<th>DC DgC</th>
<th>All DgC</th>
<th>DC DgC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post_{ijt}</td>
<td>0.114***</td>
<td>0.034</td>
<td>0.055</td>
<td>-0.016</td>
<td>0.166***</td>
<td>0.050</td>
</tr>
<tr>
<td>(0.042) (0.065) (0.091)</td>
<td>(0.088)</td>
<td>(0.056)</td>
<td>(0.072)</td>
<td></td>
<td>(0.078)</td>
<td></td>
</tr>
<tr>
<td>PTA_{ij} AD Rules</td>
<td>0.268**</td>
<td>0.447**</td>
<td>0.709**</td>
<td>0.390</td>
<td>0.190</td>
<td>0.554***</td>
</tr>
<tr>
<td>(0.108) (0.207) (0.285)</td>
<td>(0.137)</td>
<td>(0.184)</td>
<td>(0.262)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTA_{ij} No AD Rules</td>
<td>0.184*</td>
<td>0.305</td>
<td>1.138***</td>
<td>0.375</td>
<td>0.259*</td>
<td>0.928***</td>
</tr>
<tr>
<td>(0.107)</td>
<td>(0.488)</td>
<td>(0.309)</td>
<td>(0.134)</td>
<td></td>
<td>(0.245)</td>
<td></td>
</tr>
<tr>
<td>PTA_{ij} AD Rules × Post_{ijt}</td>
<td>-0.422***</td>
<td>-0.427*</td>
<td>-0.683**</td>
<td>-0.268</td>
<td>-0.404**</td>
<td>-0.542**</td>
</tr>
<tr>
<td>(0.127) (0.223) (0.315)</td>
<td>(0.162)</td>
<td>(0.231)</td>
<td>(0.283)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTA_{ij} No AD Rules × Post_{ijt}</td>
<td>-0.214*</td>
<td>-0.224</td>
<td>-1.167***</td>
<td>0.046</td>
<td>-0.296**</td>
<td>-0.673***</td>
</tr>
<tr>
<td>(0.114) (0.278) (0.577)</td>
<td>(0.143)</td>
<td>(0.237)</td>
<td>(0.199)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>λ</td>
<td>0.027</td>
<td>0.016</td>
<td>0.257</td>
<td>0.114</td>
<td>0.117</td>
<td>0.669**</td>
</tr>
<tr>
<td>(0.140) (0.251) (0.365)</td>
<td>(0.351)</td>
<td>(0.202)</td>
<td>(0.284)</td>
<td></td>
<td>(0.331)</td>
<td></td>
</tr>
<tr>
<td>δ_i</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>δ_j</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>3,817</td>
<td>1,636</td>
<td>764</td>
<td>872</td>
<td>2,181</td>
<td>875</td>
</tr>
</tbody>
</table>

Note: The dependent variable is the log of duration of AD measures imposed by country i against country j. The inverse Mill’s ratio, $\hat{\lambda}$, is obtained from column (4) in Table A3. Robust standard errors in parenthesis are clustered at the AD investigation level. Robust standard errors in parenthesis are clustered at AD investigation level. Asterisks denote significance levels: * < 0.10, ** < 0.05, *** < 0.01.

developed AD users did not further reduce the length of the protection for their PTA partners beyond the broad-based impact of PTAs across all income categories.

In columns (2) to (4) we examine whether the PTA effect is attenuated for China, the most heavily AD targeted country. Across specifications, there is no robust evidence of the PTA effect for China is diminished. While the estimated coefficient on the PTA effect on China is frequently positive, it is not statistically significant. Nevertheless, by comparing the results of column (4) with column (7) in Table 8, we find that distinguishing China strengthens the interaction term for capturing the impact of PTAs on the duration of AD protection— the estimate is now negative and statistically significant. The inverse Mill’s ratio across specifications are obtained from using the same independent variables listed in each column plus the two selection variables, i.e., GDP_{i(t′−3)} and ln ER_{ij(t′−1)}.

Rules vs. No Rules

The aforementioned analysis does not distinguish whether specific AD provisions in PTAs exert a greater impact on the duration of such measures. To address this issue, we modify our regression to separate the impact for PTAs with rules vs. PTAs without rules. Table 10 reports the results. The findings are broadly consistent with those in Table 8. As seen in column (1), the duration of AD measures for country pairs with a PTA with rules is shorter, on average, than country pairs with a PTA without rules, which in turn is shorter
than country pairs not in a PTA. As seen in column (1), cases with PTAs with rules are associated with more than a 50 percent reduction in duration, and cases with PTAs with no rules have about 25 percent shorter duration than cases not involving PTA members.\(^\text{10}\)

We make two caveats with respect to these findings. First, the parameter estimates for the impact of *rules vs. no rules* are not statistically different from one another. Second, the ranking (*rules* have a larger impact than *no rules*) is not found across all income pairs. In general, for the income pairs from Table 8 where PTA membership lowered duration (i.e., columns (2), (3), (5), and (6)), we find PTAs *with rules* have larger impact than those *without rules*. For the specifications where we did find a PTA effect, the comparable specifications in Table 10 also do not show that PTAs *with rules* have more significant impact than PTAs *without rules*.

### 4.3. Robustness Checks

In this section, we estimate a set of additional specifications aimed at testing the robustness and sensitivity of our results. Table 11 presents the results of various specifications which do not incorporate any control for sample selection. In the first column, we show the results of a regression analogous to column (1) in Table 8, as seen the parameter estimates are quite similar. In both specifications, PTA members are spared from AD action (“duration reduced”), but non-PTA members face even more greater AD scrutiny (“duration extended”).

In column (2), we allow for the possibility that the PTA effect differs across different income levels from the users’ side. Our estimates are similar in magnitudes, identical in signs and significances to those reported in column (1) in Table 9, implying the PTA policies that favor the discrimination against members in AD duration are not accentuated by wealthier, more developed users.

In column (3), we examine possible differences due to China, the most targeted country. This specification can be compared with column (3) of Table 9. The PTA effect of reducing AD duration remains qualitatively the same. The triple interaction term identifying additional PTA effect for China is positive and becomes significant but only at the 10% level. In column (4), we analyze the impact of PTAs with AD *rules vs. no rules*. Again the results did not differ from column (1) of Table 10; in particular PTAs with AD *rules* are important factors for altering the pattern of AD duration.

We also carry out additional robustness tests. For example, we drop the most prominent

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\(^{10}\) The inverse Mill’s ratio is calculated from column (4) in Table A3. The coefficient on this variable based on different subsamples has a small *t*-statistic, suggesting that our specifications are less prone to be subject to selection bias.
Table 11: Robustness check: One-Step Estimation (no control for sample selection)

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post$_{ijt}$</td>
<td>0.105***</td>
<td>0.175***</td>
<td>0.114***</td>
<td>0.101**</td>
</tr>
<tr>
<td></td>
<td>(0.039)</td>
<td>(0.055)</td>
<td>(0.041)</td>
<td>(0.039)</td>
</tr>
<tr>
<td>PTA$_{ij}$</td>
<td>0.212***</td>
<td>0.155***</td>
<td>0.253***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.040)</td>
<td>(0.051)</td>
<td>(0.045)</td>
<td></td>
</tr>
<tr>
<td>PTA$<em>{ij}$ × Post$</em>{ijt}$</td>
<td>-0.283***</td>
<td>-0.273***</td>
<td>-0.334***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.061)</td>
<td>(0.074)</td>
<td>(0.069)</td>
<td></td>
</tr>
<tr>
<td>DC$<em>i$ × Post$</em>{ijt}$</td>
<td>-0.134*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.076)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC$<em>i$ × PTA$</em>{ij}$</td>
<td>0.190**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.083)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC$<em>i$ × PTA$</em>{ij}$ × Post$_{ijt}$</td>
<td>-0.081</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.129)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China$<em>j$ × Post$</em>{ijt}$</td>
<td></td>
<td>-0.055</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.078)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China$<em>j$ × PTA$</em>{ij}$</td>
<td></td>
<td>-0.222*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.118)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China$<em>j$ × PTA$</em>{ij}$ × Post$_{ijt}$</td>
<td></td>
<td>0.248*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.150)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTA$_{ij}$ AD Rules</td>
<td></td>
<td></td>
<td>0.256***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.053)</td>
<td></td>
</tr>
<tr>
<td>PTA$_{ij}$ No AD Rules</td>
<td></td>
<td></td>
<td>0.164***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.057)</td>
<td></td>
</tr>
<tr>
<td>PTA$<em>{ij}$ AD Rules × Post$</em>{ijt}$</td>
<td></td>
<td>-0.408***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.082)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTA$<em>{ij}$ No AD Rules × Post$</em>{ijt}$</td>
<td></td>
<td>-0.191**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.075)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$\delta_i$  Yes  Yes  Yes  Yes
$\delta_j$  Yes  Yes  Yes  Yes
$N$  4,064  4,064  4,064  4,064

Note: The dependent variable is the log of duration of an AD measure imposed by country $i$ against country $j$. Robust standard errors in parenthesis are clustered at the AD investigation level. Asterisks denote significance levels: * $< 0.10$, ** $< 0.05$, *** $< 0.01$.

PTAs, i.e., NAFTA and EC/EU PTAs, to see whether the pattern remains held. Our primary concern is that the countries involved in these PTAs are not only economically important but also are among the largest users of AD, and this is the reason we find a large effect of PTA. For this purpose, we re-estimate all of our specifications in Table 11 in the absence of the cases initiated by the EU and US and the results are showed in Table A4. We find that subtracting AD cases initiated by these prominent users does not remove the PTA effect since the estimated coefficients are basically unchanged.

Our final set of robustness checks employs an alternative definition of the inverse Mill’s ratio. The results are reported in Table A5. We derive the inverse Mill’s ratio uniformly from column (1) in Table A3 and incorporate it into various second stage specifications. The first and second columns of this table repeat the triple-interaction specifications of columns (1)
and (2) in Table 9, allowing heterogeneous PTA effects. Again, we do not find the effect of PTA on AD duration either strengthened for richer AD users or weakened for China. The third column splits the PTAs with AD rules vs. no rules to explore the impact of rules. Here, the signs, significance, and relative magnitude of the effects mirror those found in column (1) of Table 10.

In conclusion, the robustness and sensitivity checks confirm the results presented earlier. We find compelling evidence that PTAs have a strong effect on decreasing the duration of AD protection. Moreover, we show that closer economic ties between the two nations result in increased duration of AD protection. Additionally, the results consistently confirm that AD protection has become longer-lived in the recent period.

5. Conclusion

Two of the most significant developments in trade policy over the last five decades are the expansion of PTAs and proliferation of AD protection. Despite their importance, economists and policy makers are only beginning to analyze the relationship between them. This paper makes an initial attempt to identify the linkage between PTAs and the duration of AD measures. To do so, we combine information on AD provisions contained in the PTA data set with information in the Global Antidumping Database.

First and foremost, we present novel evidence that PTAs alter the duration of AD duties, tilting the playing field further in favor of the member countries. We find that PTAs shorten the duration of AD measures among partners relative to the duration of non-partners. Furthermore, there has been a trend toward increasing the duration of such measures over time, partly (but not entirely) due to a large share of AD measures targeting China. Our key findings with respect to the impact of PTAs of the duration of protection, however, remain essentially unchanged after distangling cases targeting China from the analysis. Consequently, our results indicate that AD measures increase the discrimination that occurs due to discriminatory PTA tariffs.

We believe our study is particularly relevant in the context of the current trade policy arena, which is dominated by PTAs and AD protection. One important relationship derived from our research is that after the implementation of a PTA, AD measures on PTA non-partners remain in place for longer periods of time, further reinforcing the preferences already inherent in the PTA. Our results also suggest that the reason why governments seek to differentiate between PTA partners and non-partners in how they apply ADs after implementation of a PTA may be attributed to the political goodwill generated from the enactment of a PTA.
References


### Table A1: Descriptive statistics: By Users’ and Targets’ Development Status

<table>
<thead>
<tr>
<th></th>
<th>Survival Time</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td># of Cases</td>
<td>25%</td>
</tr>
<tr>
<td><strong>User</strong></td>
<td></td>
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</tr>
<tr>
<td>Developed Countries</td>
<td>1,746</td>
<td>22</td>
<td>28</td>
</tr>
<tr>
<td>Developing Countries</td>
<td>2,318</td>
<td>21</td>
<td>26</td>
</tr>
<tr>
<td><strong>Target</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developed Countries</td>
<td>1,778</td>
<td>22</td>
<td>25</td>
</tr>
<tr>
<td>Developing Countries</td>
<td>2,286</td>
<td>22</td>
<td>30</td>
</tr>
<tr>
<td>Developing Countries (excluding China)</td>
<td>1,342</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>China</td>
<td></td>
<td>944</td>
<td>23</td>
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</table>
Table A2: Pre- and Post-PTA Duration: Excluding China

<table>
<thead>
<tr>
<th>Survival Time</th>
<th># of Cases</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
</tr>
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<tr>
<td><strong>Pre-PTA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Users</td>
<td>1,443</td>
<td>21</td>
<td>25</td>
<td>47</td>
</tr>
<tr>
<td>Developed Countries Users</td>
<td>856</td>
<td>21</td>
<td>25</td>
<td>49</td>
</tr>
<tr>
<td>Developing Countries Users</td>
<td>587</td>
<td>21</td>
<td>25</td>
<td>47</td>
</tr>
<tr>
<td><strong>Post-PTA</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Users</td>
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<td>21</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>Developed Countries Users</td>
<td>537</td>
<td>23</td>
<td>28</td>
<td>62</td>
</tr>
<tr>
<td>Developing Countries Users</td>
<td>1,140</td>
<td>21</td>
<td>25</td>
<td>47</td>
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</tbody>
</table>
Table A3: Probit Estimation for First Stage

<table>
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<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln GDP(_{it-3})</td>
<td>-0.509***</td>
<td>-0.515***</td>
<td>-0.510***</td>
<td>-0.512***</td>
</tr>
<tr>
<td></td>
<td>(0.121)</td>
<td>(0.121)</td>
<td>(0.121)</td>
<td>(0.121)</td>
</tr>
<tr>
<td>ln ER(_{it-1})</td>
<td>0.012</td>
<td>0.011</td>
<td>0.011</td>
<td>0.011</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.010)</td>
<td>(0.010)</td>
<td>(0.010)</td>
</tr>
<tr>
<td>Post(_{ijt})</td>
<td>0.257***</td>
<td>0.187*</td>
<td>0.235***</td>
<td>0.259***</td>
</tr>
<tr>
<td></td>
<td>(0.079)</td>
<td>(0.107)</td>
<td>(0.082)</td>
<td>(0.079)</td>
</tr>
<tr>
<td>PTA(_{ij})</td>
<td>1.868***</td>
<td>1.638***</td>
<td>1.811***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.166)</td>
<td>(0.231)</td>
<td>(0.171)</td>
<td></td>
</tr>
<tr>
<td>PTA(<em>{ij}) × Post(</em>{ijt})</td>
<td>-1.867***</td>
<td>-1.655***</td>
<td>-1.770***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.176)</td>
<td>(0.242)</td>
<td>(0.184)</td>
<td></td>
</tr>
<tr>
<td>DC(<em>i) × Post(</em>{ijt})</td>
<td>0.112</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.131)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC(<em>i) × PTA(</em>{ij})</td>
<td>0.444</td>
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</tr>
<tr>
<td></td>
<td>(0.322)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC(<em>i) × PTA(</em>{ij}) × Post(_{ijt})</td>
<td>-0.337</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(0.348)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China(<em>j) × Post(</em>{ijt})</td>
<td></td>
<td>0.124</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.107)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China(<em>j) × PTA(</em>{ij})</td>
<td></td>
<td>3.441***</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>(0.197)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China(<em>j) × PTA(</em>{ij}) × Post(_{ijt})</td>
<td></td>
<td>-3.622***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.230)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTA(<em>{ij})(</em>{AD\text{ Rules}})</td>
<td></td>
<td></td>
<td>1.622***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.179)</td>
<td></td>
</tr>
<tr>
<td>PTA(<em>{ij})(</em>{No AD\text{ Rules}})</td>
<td></td>
<td></td>
<td>9.197***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.306)</td>
<td></td>
</tr>
<tr>
<td>PTA(<em>{ij})(</em>{AD\text{ Rules}}) × Post(_{ijt})</td>
<td></td>
<td></td>
<td>-1.605***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.197)</td>
<td></td>
</tr>
<tr>
<td>PTA(<em>{ij})(</em>{No AD\text{ Rules}}) × Post(_{ijt})</td>
<td></td>
<td></td>
<td>-9.204***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.315)</td>
<td></td>
</tr>
<tr>
<td>δ(_i)</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>δ(_j)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Pseudo (R^2)</td>
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<td>0.124</td>
<td>0.125</td>
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<td>(N)</td>
<td>6,587</td>
<td>6,587</td>
<td>6,587</td>
<td>6,587</td>
</tr>
</tbody>
</table>

Note: Robust standard errors in parenthesis are clustered at the AD investigation level. Asterisks denote significance levels: * < 0.10, ** < 0.05, *** < 0.01.
Table A4: Robustness: Drop NAFTA & EC/EU PTAs

<table>
<thead>
<tr>
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<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post$_{ijt}$</td>
<td>0.190***</td>
<td>0.180***</td>
<td>0.182***</td>
<td>0.180***</td>
</tr>
<tr>
<td></td>
<td>(0.051)</td>
<td>(0.054)</td>
<td>(0.054)</td>
<td>(0.051)</td>
</tr>
<tr>
<td>PTA$_{ij}$</td>
<td>0.286***</td>
<td>0.266***</td>
<td>0.322***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.104)</td>
<td>(0.099)</td>
<td>(0.118)</td>
<td></td>
</tr>
<tr>
<td>PTA$<em>{ij}$ $\times$ Post$</em>{ijt}$</td>
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<td>(0.112)</td>
<td>(0.128)</td>
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*Note: The dependent variable is the log of duration of an AD measure imposed by country $i$ against country $j$. We exclude the prominent PTAs (NAFTA & EC/EU PTAs). The inverse Mill’s ratio, $\lambda$, is derived from the corresponding column in Table A3. Robust standard errors in parenthesis are clustered at the AD investigation level. Asterisks denote significance levels: * $<$ 0.10, ** $<$ 0.05, *** $<$ 0.01.*
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<td>-0.388***</td>
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<td>0.210**</td>
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<td>(0.155)</td>
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**Note:** The dependent variable is the log of duration of AD measures imposed by country \(i\) against country \(j\). The inverse Mill’s ratio, \(\hat{\lambda}\), is derived from column (1) in Table A3. Robust standard errors in parenthesis are clustered at the AD investigation level. Asterisks denote significance levels: * < 0.10, ** < 0.05, *** < 0.01.