

## Has the Byrd Amendment Affected U.S. Imports?

*Philip G. Gayle\**

*Thitima Puttitanun<sup>†</sup>*

Kansas State University

San Diego State University

May 2008

### Abstract

The Continued Dumping and Subsidy Offset Act (CDSOA), also known as the Byrd Amendment, allows the U.S. government to distribute revenues from antidumping duties to domestic firms alleging harm. Prior to the amendment these revenues were not distributed to firms. In this article, we formally test the hypothesis that the Byrd Amendment effectively provides double protection to U.S. firms to the extent that it further restricts U.S. imports, as argued by the E.U. and eleven other U.S. trading partners. Using a rich panel of 362 U.S. manufacturing industries for the period 1998 to 2003, we find that whether or not the Byrd Amendment restricted U.S. imports depends crucially on the level of competitiveness in the import-competing industry. Specifically, we find that the Byrd Amendment served to restrict imports only in industries where competition is relatively weak, while the amendment is associated with an increase in imports in more competitive industries.

*JEL Classification:* F13

*Keywords:* Antidumping; Byrd Amendment.

**Acknowledgement:** We thank two anonymous referees for very helpful comments and suggestions.

---

\* PHILIP G. GAYLE: Department of Economics, 320 Waters Hall, Kansas State University, Manhattan, KS 66506; Tel. (785) 532-4581; Fax: (785) 532-6919; email: gaylep@ksu.edu.

<sup>†</sup> THITIMA PUTTITANUN: Department of Economics, San Diego State University, 5500 Campanile Dr., San Diego, CA 92182; Tel. (619) 594-3556; Fax: (619) 594-5062; email: tputtita@mail.sdsu.edu; Corresponding author.

# 1. INTRODUCTION

According to United States International Trade Commission (April, 2007), dumping, is defined as selling a product in the United States at a price less than fair value. A U.S. firm may file an antidumping petition to U.S. Department of Commerce and the U.S. International Trade Commission<sup>1</sup> alleging that an industry in the U.S. is significantly injured or threatened by dumping. Such a petition may trigger the imposition of antidumping duties on the imported product.

In October 2000, the U.S. Congress passed a bill called the Continued Dumping and Subsidy Offset Act (CDSOA), also known as the Byrd Amendment.<sup>2</sup> Essentially, the CDSOA changed the disposition of funds collected from antidumping duties. Prior to the amendment, those funds were deposited in the General Fund of the U.S. Treasury.<sup>3</sup> The Act specifies that the funds be distributed to the U.S. firms that supported the original petition of the existing antidumping order.<sup>4</sup> In other words, the Act is intended to provide a legal framework for the disbursement of revenues collected from antidumping duties to U.S. firms that have been adversely affected by the dumping of foreign goods on U.S. markets. In principle, such

---

<sup>1</sup>Antidumping and countervailing duty laws are administered jointly by the U.S. International Trade Commission and the U.S. Department of Commerce [see United States International Trade Commission (April, 2007)].

<sup>2</sup>This law was named after its chief sponsor Senator Robert Byrd, Democratic Senator of West Virginia.

<sup>3</sup>See Brander and Spencer (1984a, 1984b, 1985), Dixit (1984, 1988), Collie (1991), Anderson (1992, 1993), Prusa (1992, 1994), Reitzes (1993), Marvel and Ray (1995), and Zanardi (2004) for studies of export subsidies and dumping in the traditional context. See Finger, Hall, and Nelson (1982), Blonigen and Prusa (2003), and Irwin (2005) for issues related to administered protection and the political economy of anti-dumping. For a review of the U.S. import laws including the anti-dumping and countervailing measures see Stiglitz (1997).

<sup>4</sup>See Grimmett and Jones (2005) and Reynolds (2006) for a detailed discussion of the petition process that firms are required to follow for compensation under the CDSOA.

disbursements should facilitate the restoration of domestic supply and employment by U.S. firms.

After the Byrd Amendment took effect in 2001, the E.U. and eleven other U.S. trading partners<sup>5</sup> requested the World Trade Organization (WTO) to examine the Byrd Amendment. Their claim was on the ground that the offset payments under the CDSOA were not a legal response to dumping and subsidies. It would create incentives for U.S. firms to petition for more anti-dumping or countervailing duties and it would make it more difficult for foreign exporters who are subject to U.S. anti-dumping or countervailing claims to export to the U.S.. The WTO ruled in January 2003 that the Byrd Amendment violates the international agreement on subsidies and allowed complaint countries to implement retaliatory duties on U.S. products. Finally, after the growing pressure, the U.S. Congress repealed the Byrd Amendment in February 2006 where it became effective in October 2007.

Even though the Byrd Amendment has already been repealed, learning its effects is useful and important for future trade policies. Despite the attention that the Byrd Amendment has received, analysis of the amendment in the economic literature is still very thin. Few studies offer theoretical analysis on U.S. welfare (Jung and Lee (2003), Chang and Gayle (2007)), price level (Evenett (2006)), dumping margin (Falvey and Wittayarungruang Sri (2007)), and level of anti-dumping duty (Collie and Vandebussche (2006), Chang and Gayle (2006)). With regards to formal empirical analysis of the effects of the Byrd Amendment, we are only aware of Reynolds (2006) who confirms that the amendment encourages firms to file more claims.<sup>6</sup>

---

<sup>5</sup>Australia, Brazil, Chile, the EU, India, Indonesia, Japan, Korea, and Thailand initially requested the WTO to examine the Byrd Amendment. By the end of January 2001, Argentina, Canada, and Mexico had also joined the negotiations.

<sup>6</sup>Another empirical piece related to the Byrd Amendment is Liebman and Reynolds (2006). They explore the relationship

However, a question that has not been addressed empirically is how the Byrd Amendment affects the level of U.S. imports. In other words, is there evidence that foreign exporters were adversely affected vis a vis U.S. competitors in U.S. markets?

In this paper, we expand the empirical analysis of the Byrd Amendment to study whether it necessarily provides double protection to the U.S. firms to the extent that it further restricts U.S. imports. To accomplish this we employ a difference-in-differences econometric approach to test whether U.S. imports changed differently in industries that took advantage of the Byrd Amendment compared to industries that did not. In essence this empirical strategy provides a direct comparison of the trade effects of the traditional antidumping policy, under which antidumping revenues were not disbursed to domestic firms, to the Byrd Amendment policy regime.

Using a rich panel of 362 manufacturing industries over the years 1998 to 2003, our empirical estimates suggest that whether the Byrd Amendment is associated with a restriction of U.S. imports depends crucially on the degree of domestic competition (measured by four-firm industry concentration ratio) in the import-competing industry, a result consistent with theoretical predictions in Chang and Gayle (2006). Specifically, we find that for industries with concentration levels above a certain threshold (less competitive industries), the Byrd Amendment served to reduce U.S. imports, but for industries with concentration levels below the threshold (more competitive industries) the Byrd Amendment served to increase U.S. imports.

The intuition is that for industries in which product market competition is relatively high (low measure of industry concentration), the offset payments to U.S. firms under the Byrd Amendment serves as an incentive for these firms to reduce their own output on the margin,

---

between campaign contributions and legislative outcomes using the evidence from the Byrd Amendment.

which causes foreign firms to increase their production for the U.S. market, which further increases the antidumping revenue going to U.S. firms. In other words, relatively strong competition magnifies the response of foreign firms to a marginal reduction in U.S. firms' output, which in turn magnifies U.S. firms' incentive to act strategically to increase the antidumping revenues they collect. In the case where product market competition is relatively weak (high measure of industry concentration), a marginal reduction in U.S. firms' output will only elicit a small increase in foreign firms' production for the U.S. market. As such, there is little incentive, in this case, for the U.S. firms to strategically try to increase the amount of antidumping revenues they collect via a marginal reduction in their own output. Instead, the more profitable strategy is to use the subsidy from the offset payments to increase their own production at the expense of foreign firms.<sup>7</sup> In summary, the Byrd Amendment only hurts foreign competitors when competition in the U.S. market is relatively weak.

We also find that overall U.S. imports increased during the Byrd Amendment period (2001-2003) relative to the period preceding the amendment (1998-2000). This result supports the theoretical analysis by Evenett (2006), which shows that the imposition of the Byrd Amendment creates a price floor and therefore increases the imports. The intuition is that with Byrd Amendment, domestic firms can anticipate the receipt of antidumping duties which provides incentive for domestic firms to raise price in order to increase the sales of foreign firms, thereby increasing the total value of the antidumping duties that will be distributed to domestic firms.

The rest of the paper is organized as follows. Section 2 presents the econometric models

---

<sup>7</sup>See Chang and Gayle (2006) for a formal discussion of how the Byrd Amendment can influence the strategic incentives of U.S. firms.

used to test for evidence that the Byrd Amendment has impacted U.S. imports. Section 3 discusses the data used in the analysis. Section 4 presents and discusses results. Concluding remarks are made in section 5.

## 2. EMPIRICAL MODEL

The following empirical model uses a difference-in-differences approach to identify the effects of the Byrd Amendment. We estimate the following equation:

$$\ln(I_{jt}) = \beta_0 + \beta_1 \text{Byrd\_Industry} + \beta_2 \text{Byrd\_Policy} + \beta_3 \text{Byrd\_Policy} \times \text{Byrd\_Industry} + \beta_4 \text{Case}_{jt} + \delta_t + \mu_j + \varepsilon_{jt}, \quad (1)$$

where,  $\ln(I_{jt})$  is the natural log of U.S. imports for industry  $j$  in year  $t$ ,  $\text{Byrd\_Policy}$  is a zero-one time period dummy that takes the value one for years after the Byrd Amendment was implemented (after year 2000), and  $\text{Byrd\_Industry}$  is a zero-one industry dummy that takes the value one only for industries that are categorized as industries that react to the Byrd Amendment.

To evaluate robustness of results, we allow for three definitions of  $\text{Byrd\_Industry}$  ( $\text{Byrd\_Ind\_0}$ ,  $\text{Byrd\_Ind\_1}$ , and  $\text{Byrd\_Ind\_2}$ ), and re-estimate equation (1) for each of the three definitions. First,  $\text{Byrd\_Ind\_0}$  selects industries that increased their average annual filings of anti-dumping petitions over the three years subsequent to implementation of the amendment compared to their average annual filings of anti-dumping petitions over the three years prior. Second,  $\text{Byrd\_Ind\_1}$  selects industries that have an increase in their average annual filings that is greater than the sample average increase, when comparing the three year

period subsequent to the Byrd Amendment relative to the three years prior. In other words, relative to the rest of the industries in our sample, an industry has to have a substantial increase in its filing subsequent to implementation of the Byrd Amendment to be classified as a Byrd industry under *Byrd\_Ind\_1* definition. And third, *Byrd\_Ind\_2* selects industries that satisfy both the *Byrd\_Ind\_1* definition and have positive filings prior to implementation of Byrd Amendment.

Other variables in equation (1) include:  $Case_{jt}$ , which is number of filings in industry  $j$  in year  $t$ ,  $\delta_t$ , and  $\mu_j$  which are time-specific and industry-specific effects that control for government policies and other unobserved determinants of imports that vary either by industry, time, or both. We use a full set of year and industry dummies to control for  $\delta_t$  and  $\mu_j$  respectively. Finally,  $\varepsilon_{jt}$  is a random error term.

Our rationale for including  $Case_{jt}$  is based on an anonymous referee's suggestion that there could be a harassment effect whereby imports decrease during the investigation period. As such, we may want to control for number of antidumping initiations.<sup>8</sup>

Reynolds (2006) documents that, conditional on the likelihood that an industry files an antidumping petition, the Byrd Amendment increased the average number of antidumping petitions submitted by industries by over 28 per cent. We use the same data set as Reynolds (2006) who argues that:

---

<sup>8</sup> Analyzing the impact of antidumping on trade, Vandenbussche and Zanardi (2006) control for the extent of antidumping enforcement by using number of antidumping initiations and antidumping measures. They find that antidumping measures and, to a lesser extent, antidumping initiations depressed trade.

*"...antidumping petitions were filed in only 3% of the U.S. industry observations considered in this research. This suggests that there may be something qualitatively different about those observations choosing to file antidumping petitions when compared to those choosing not to file."*

The quote above provides the basis for our identification strategy in the difference-in-differences econometric approach. In other words, if the Byrd Amendment does have an effect on imports, then we should expect that imports within industries that took advantage of the amendment by increasing their annual antidumping petition filing, should behave differently than imports within industries that did not take advantage of the amendment. As such, in the context of the difference-in-differences econometric approach, industries for which  $Byrd\_Industry = 1$  is the treatment group (Byrd industries), while industries for which  $Byrd\_Industry = 0$  is the control group (Non-Byrd industries).

The effect of the amendment on U.S. imports is captured by  $\beta_3$ . To see this, note that from equation (1) we have,

$$\Delta \ln(I_j) = \ln(I_{jByrd\_Policy=1}) - \ln(I_{jByrd\_Policy=0}) = \beta_2 + \beta_3 Byrd\_Industry.$$

Furthermore,

$$\Delta \ln(I_{Byrd\_Industry=1}) - \Delta \ln(I_{Byrd\_Industry=0}) = \beta_3,$$

where  $\Delta \ln(I_{Byrd\_Industry=1}) - \Delta \ln(I_{Byrd\_Industry=0})$  measures differences in the change of imports in Byrd industries compared to Non-Byrd industries. Therefore,  $\beta_3 < 0$  implies that, on average, the amendment reduced imports in Byrd industries compared to Non-Byrd industries,



*ceteris paribus*, while  $\beta_3 > 0$  implies that, on average, the amendment increased imports in Byrd industries compared to Non-Byrd industries, *ceteris paribus*.

To identify whether the effect of the Byrd Amendment depends on the level of competitiveness of the U.S. domestic industry, we estimate the following model on the subsample of industries that took advantage of the Byrd Amendment (i.e., industries for which  $Byrd\_Industry = 1$ ):

$$\ln(I_{jt}) = \gamma_0 + \gamma_1 Byrd\_Policy + \gamma_2 Byrd\_Policy \times \ln(Con_{jt}) + \gamma_3 Case_{jt} + \gamma_4 T + \varepsilon_{jt}, \quad (2)$$

where  $\ln(Con_{jt})$  is the natural log of the four-firm concentration ratio of industry  $j$  in year  $t$ , which we use as a measure of the strength of product market competition.<sup>9</sup> If the amendment reduces imports in Byrd industries with concentration above a certain threshold (less competitive industries), but increases imports in Byrd industries with concentration below the threshold (more competitive industries), then we expect  $\gamma_1 > 0$  and  $\gamma_2 < 0$ . Furthermore, the threshold level of concentration that determines the sign of the effect is given by,  $Con_{jt}^* = \exp\left(-\frac{\gamma_1}{\gamma_2}\right)$ .

Finally, variable  $T$  in equation (2) is a time trend. The time trend controls for the possibility that we could get a positive and statistically significant  $\gamma_1$  only because imports trended upwards over the sample period rather than owing to any real effects of the Byrd policy.

---

<sup>9</sup> In our sample of industries, the four-firm concentration ratio variable varies across industries but not over time. As such, we cannot separately identify the effects of concentration on imports if we simultaneously include industry fixed effect in equation (2). This explains why we omit industry fixed effects from equation (2).

So by effectively de-trending imports due to the inclusion of  $T$  in equation (2),  $\gamma_1$  is a better measure of the effects of the amendment.

### 3. DATA

We use Reynolds (2006)<sup>10</sup> data set which covers 362 U.S. manufacturing industries. We are using data from 1998 to 2003 in order to keep the length of time before and after implementation of the Byrd Amendment equal.<sup>11</sup> The industry data are reported at the six-digit North American Industry Classification System (NAICS). Data on U.S. imports come from the U.S. International Trade Commission's dataweb. Data on the number of antidumping filings by industry were drawn from the U.S. Antidumping Database, Constructed by Bruce Blonigen and available from the National Bureau of Economic Research website. As explained in Reynolds (2006), this data was supplemented using information from the Federal Register Notices associated with petitions filed from 1995 to 2003. Data on industry four-firm concentration ratio come from the U.S. Census Bureau's Economic Census Concentration Ratios Summary.<sup>12</sup>

Tables 1 and 2 contain the description and summary statistics for the variables used to estimate the models presented in equations (1) and (2).

---

<sup>10</sup>The data set is available to be downloaded from Kara Reynolds' website. The data description is kindly provided by Kara Reynolds.

<sup>11</sup>We should be cautious in interpreting the results since the time span of our data set is relatively short.

<sup>12</sup>See Reynolds (2006) for more detail on the data set and its construction.

**Table 1: Description of Variables**

| <b>Variable</b>    | <b>Description</b>  |
|--------------------|---|
| <i>I</i>           | Real U.S. imports in billions of 1989 dollars; adjusted by consumer price index.  |
| <i>Byrd_Policy</i> | Time period dummy variable = 1 after the year that Byrd Amendment is implemented (after the year 2000).   |
| <i>Byrd_Ind_0</i>  | Industry dummy variable = 1 for industries which have an increase in average annual filing of antidumping claims over the 3 years subsequent to implementation of the Byrd Amendment compared to the 3 years prior the Byrd Amendment.                                |
| <i>Byrd_Ind_1</i>  | Industry dummy variable = 1 for industries that have an increase in their average annual filings that is greater than the sample average increase, when comparing the 3 year period subsequent to implementation of the Byrd Amendment relative to the 3 years prior. |
| <i>Byrd_Ind_2</i>  | Industry dummy variable = 1 for industries that satisfy both the <i>Byrd_Ind_1</i> definition and have positive filings prior to implementation of Byrd Amendment.  |
| <i>Case</i>        | Number of antidumping petitions filed by industry.  |
| <i>Con</i>         | Industry's four-firm concentration ratio (measured in percentage).  |

**Table 2: Summary Statistics**

| <b>Variable</b>    | <b>Obs</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------------|------------|-------------|------------------|------------|------------|
| <i>I</i>           | 2171       | 1.536001    | 3.22607          | .0000199   | 65.55919   |
| <i>Byrd_Policy</i> | 2171       | .4997697    | .5001151         | 0          | 1          |
| <i>Byrd_Ind_0</i>  | 2171       | .0773837    | .2672608         | 0          | 1          |
| <i>Byrd_Ind_1</i>  | 2171       | .0331644    | .1791071         | 0          | 1          |
| <i>Byrd_Ind_2</i>  | 2171       | .0138185    | .1167641         | 0          | 1          |
| <i>Case</i>        | 2171       | .1234454    | 1.552895         | 0          | 48         |
| <i>Con</i>         | 2171       | 41.72653    | 20.31131         | 4.1        | 98.9       |

As mentioned in the previous section, each regression uses either *Byrd\_Ind\_0*, *Byrd\_Ind\_1* or *Byrd\_Ind\_2*. *Byrd\_Ind\_2* can be viewed as the most stringent filter used to identify industries that took advantage of the Byrd Amendment. Of the 362 industries in the sample, 28 are classified as Byrd industries according to the definition of *Byrd\_Ind\_0*, 12 are classified as Byrd industries according to the definition of *Byrd\_Ind\_1*, while 5 are classified as Byrd industries according to the definition of *Byrd\_Ind\_2*.

## 4. RESULTS

Table 3 reports parameter estimates for equation (1). A full set of industry and year dummies are included when estimating the model even though the coefficient estimates for these dummies are not reported. The first column of estimates uses the relatively weaker definition (*Byrd\_Ind\_0*) to define Byrd industries. The estimated coefficient on *Byrd\_Industry* suggests that the Byrd industries tend to import significantly more than (approximately 356 per cent more) Non-Byrd industries over the entire sample period. This result provides evidence that, based on imports, the industries we define as Byrd industries are fundamentally different from the Non-Byrd industries. However, this does not tell us anything about whether the amendment is responsible for import levels being different between Byrd versus Non-Byrd industries.

**Table 3: Model Estimates for Equation (1)**

|                                    | Dependent Variable: $\ln(I_{jt})$ |                               |                               |
|------------------------------------|-----------------------------------|-------------------------------|-------------------------------|
|                                    | Byrd_Industry =<br>Byrd_Ind_0     | Byrd_Industry =<br>Byrd_Ind_1 | Byrd_Industry =<br>Byrd_Ind_2 |
| Byrd_Industry                      | 3.566**<br>(0.062)                | 5.280**<br>(0.068)            | 3.566**<br>(0.067)            |
| Byrd_Policy                        | 0.176**<br>(0.020)                | 0.176**<br>(0.020)            | 0.176**<br>(0.019)            |
| Byrd_Policy $\times$ Byrd_Industry | -0.003<br>(0.023)                 | -0.011<br>(0.037)             | -0.002<br>(0.056)             |
| Case                               | 0.003<br>(0.006)                  | 0.003<br>(0.006)              | 0.003<br>(0.006)              |
| Constant                           | -2.408**<br>(0.060)               | -2.408**<br>(0.060)           | -2.407**<br>(0.060)           |
| Number of Observations             | 2171                              | 2171                          | 2171                          |
| R-Squared                          | 0.9862                            | 0.9862                        | 0.9862                        |

Notes: All regressions include a full set of industry and year dummies even though their coefficient estimates are not reported in the table. Regressions are estimated using ordinary least squared. Robust standard errors are in parentheses. \*\* indicates statistical significance at the 1% level.

The estimated coefficient on *Byrd\_Policy* suggests that, on average, imports went up (approximately 17.6 per cent) across all industries during the Byrd Amendment period compared to the period preceding the amendment. Interestingly, even though the coefficient on *Byrd\_Policy*  $\times$  *Byrd\_Industry* is negative, which would normally suggest that the Byrd Amendment served to restrict imports on average across the Byrd industries, this coefficient is not statistically significant at conventional levels of significance. As such, the evidence thus far is weak that the amendment restricted imports on average across the Byrd industries. The qualitative results are similar even when the more stringent definitions of Byrd industries are used (*Byrd\_Ind\_1* or *Byrd\_Ind\_2*).<sup>13</sup>

Table 4 reports parameter estimates for equation (2). Recall that equation (2) is estimated on the subsample containing only Byrd industries. The first column of estimates is based on using *Byrd\_Ind\_0* to define the Byrd industries. The coefficient estimates in this column suggest that imports decrease in Byrd industries that have four-firm concentration ratios greater than 28.78 per cent, while imports increase in Byrd industries that have four-firm concentration ratios below 28.78 per cent. The coefficient estimates when the more stringent definition (*Byrd\_Ind\_1* or *Byrd\_Ind\_2*) of Byrd industries is applied yields similar qualitative results.

---

<sup>13</sup>We also experiment with another definition of *Byrd\_Industry* where *Byrd\_Industry* is defined as an industry that increase its average filing after Byrd Amendment by 100% or more conditional on positive filings before the Byrd Amendment. The results are qualitatively the same here as well as in tables 4 and 6.

**Table 4: Model Estimates for Equation (2) for Subsample where Byrd\_Industry = 1**

|  | Dependent Variable: $\ln(I_{jt})$ |                               |                               |
|--|-----------------------------------|-------------------------------|-------------------------------|
|  | Byrd_Industry =<br>Byrd_Ind_0     | Byrd_Industry =<br>Byrd_Ind_1 | Byrd_Industry =<br>Byrd_Ind_2 |
| Byrd_Policy                            | 3.699**<br>(0.9501)               | 5.154**<br>(1.619)            | 9.673**<br>(2.227)            |
| Byrd_Policy $\times$ $\ln(\text{Con})$ | -1.101**<br>(0.247)               | -1.537**<br>(0.442)           | -2.762**<br>(0.610)           |
| Case                                   | 0.130*<br>(0.073)                 | 0.076<br>(0.087)              | 0.017<br>(0.077)              |
| Year ( $T$ )                           | 0.030<br>(0.140)                  | 0.053<br>(0.235)              | 0.035<br>(0.222)              |
| Constant                               | -61.03<br>(280.27)                | -106.27<br>(469.91)           | -68.772<br>(443.38)           |
| Number of Observations                 | 168                               | 72                            | 30                            |
| R-Squared                              | 0.08                              | 0.11                          | 0.35                          |

Notes: Regressions are estimated using ordinary least squared. Robust standard errors are in parentheses. \*\* and \* indicate statistical significance at the 1% and 10% level, respectively.

Of the 28 Byrd industries in our sample, 16 have a four-firm industry concentration ratio greater than 28.78 per cent. Using the following difference equation which is derived from equation (2),

$$\Delta \ln(I_j) = \ln(I_{j\text{Byrd\_Policy}=1}) - \ln(I_{j\text{Byrd\_Policy}=0}) = \gamma_1 + \gamma_2 \times \ln(\text{Con}_j),$$

along with the estimates of  $\gamma_1 = 3.699$  and  $\gamma_2 = -1.101$  from Table 4, we compute point estimates of the predicted amendment's effect on imports for each of the Byrd industries as reported in Table 5. We also report standard errors for these point estimates. The sign pattern of the point estimates in Table 5 is consistent with the argument that the amendment has a decreasing effect on imports in industries with concentration above the 28.78 per cent concentration threshold, while the amendment has an increasing effect on imports in industries with concentration below the threshold. However, except for four industries (two on either end

of the industry concentration spectrum in our data), we cannot reject the null hypothesis that the point estimates are statistically equal to zero at conventional levels of significance.

**Table 5: List of Byrd Industries (Byrd\_Ind\_0 = 1), their four-firm concentration ratios, and estimated percentage change in imports associated with the Byrd Amendment.**

| Industry Name   | Four-firm Concentration Ratio | Predicted Percent Change in Import (Point Estimate) | Standard Error of Point Estimate |
|---|-------------------------------|---|----------------------------------|
| Flat Glass Manufacturing  | 77.4                          | -100** <sup>a</sup>                                 | 53.74                            |
| Aluminum Sheet, Plate, and Foil Manufacturing                           | 65                            | -89.70*   | 51.88                            |
| Cyclic Crude and Intermediate Manufacturing                             | 61.7                          | -83.96  | 51.38                            |
| Electrometallurgical Ferroalloy Product Manufacturing                   | 60.6                          | -81.98  | 51.22                            |
| Abrasive Product Manufacturing  | 60.4                          | -81.61  | 51.19                            |
| Nitrogenous Fertilizer Manufacturing                                    | 54.2                          | -69.69  | 50.27                            |
| Plastics Packaging Film and Sheet (including Laminated) Manufacturing   | 52.1                          | -65.34  | 49.96                            |
| Switchgear and Switchboard Apparatus Manufacturing                      | 49.6                          | -59.93  | 49.61                            |
| Synthetic Organic Dye and Pigment Manufacturing                         | 42                            | -41.62  | 48.61                            |
| Poultry Processing  | 40.6                          | -37.88  | 48.45                            |
| Fluid Power Valve and Hose Fitting Manufacturing                        | 40.3                          | -37.07  | 48.42                            |
| Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing | 38.5                          | -32.04  | 48.22                            |
| Roasted Nuts and Peanut Butter Manufacturing                            | 37.5                          | -29.14  | 48.12                            |
| Porcelain Electrical Supply Manufacturing                               | 32.4                          | -13.05  | 47.73                            |
| All Other Basic Inorganic Chemical Manufacturing                        | 31.1                          | -8.54   | 47.67                            |
| Audio and Video Equipment Manufacturing                                 | 29.8                          | -3.84   | 47.62                            |
| Metal Household Furniture Manufacturing                                 | 26.2                          | 10.34   | 47.64                            |
| Seafood Canning   | 25.9                          | 11.61   | 47.65                            |
| Plastics Material and Resin Manufacturing                               | 25.6                          | 12.89   | 47.66                            |
| All Other Basic Organic Chemical Manufacturing                          | 25.3                          | 14.19   | 47.68                            |
| Folding Paperboard Box Manufacturing                                    | 24.5                          | 17.73   | 47.73                            |
| Gasket, Packing, and Sealing Device Manufacturing                       | 23.5                          | 22.31   | 47.81                            |
| All Other Miscellaneous Chemical Product and Preparation Manufacturing  | 19.6                          | 42.29   | 48.43                            |
| Institutional Furniture Manufacturing                                   | 18.8                          | 46.88   | 48.63                            |
| Unlaminated Plastics Film and Sheet (except Packaging) Manufacturing    | 17.6                          | 54.14   | 48.99                            |
| Sawmills  | 16.8                          | 59.27   | 49.28                            |
| Other Fabricated Wire Product Manufacturing                             | 11.8                          | 98.16*  | 52.21                            |
| All Other Miscellaneous Fabricated Metal Product Manufacturing          | 11.8                          | 98.16*  | 52.21                            |

<sup>a</sup> Even though the model would predict 108.92% here, we report 100 since imports cannot fall by more than 100%. \*\* and \* indicate statistical significance at the 5% and 10% level, respectively.

The results in Tables 4 and 5 offer an explanation why we only found weak effects for the Byrd Amendment in Table 3. The idea is that the Byrd Amendment affects the imports of Byrd industries in different ways. For some of these industries the amendment caused imports to fall, while for others it caused imports to rise. Since the regressions in Table 3 can only pick up the average effects on imports of the amendment across Byrd industries, the opposing effects of the amendment across these industries appear to be roughly cancelling out each other and masking the fact that the amendment does affect imports. Furthermore, level of competitiveness in the import-competing industry appears to be the crucial determinant of the effect that the amendment has on imports.

To check whether the results in Table 4 only apply to the Byrd industries, we re-estimate the model in Table 4 on the subsample of Non-Byrd industries. These results are reported in Table 6. Recognize that the coefficient estimates that relate to the effect of Byrd in Table 6 are statistically insignificant and their sign patterns are inconsistent with the results in Table 4. In other words, there is no evidence that the amendment affected imports of the Non-Byrd industries.



**Table 6: Model Estimates for Equation (2) for Subsample where Byrd\_Industry = 0**

|  | Dependent Variable: $\ln(I_{jt})$ |                         |                         |
|--|-----------------------------------|-------------------------|-------------------------|
|  | Excluding<br>Byrd_Ind_0           | Excluding<br>Byrd_Ind_1 | Excluding<br>Byrd_Ind_2 |
| Byrd_Policy                            | -0.668<br>(0.456)                 | -0.532<br>(0.443)       | -0.406<br>(0.438)       |
| Byrd_Policy $\times$ $\ln(\text{Con})$ | 0.1498<br>(0.117)                 | 0.113<br>(0.113)        | 0.076<br>(0.112)        |
| Case                                   | 0.094**<br>(0.017)                | 0.094**<br>(0.017)      | 0.095**<br>(0.017)      |
| Year ( $T$ )                           | 0.060<br>(0.046)                  | 0.059<br>(0.044)        | 0.060<br>(0.044)        |
| Constant                               | -120.96<br>(91.86)                | -119.18<br>(88.92)      | -120.43<br>(88.54)      |
| Number of Observations                 | 2003                              | 2099                    | 2141                    |
| R-Squared                              | 0.01                              | 0.009                   | 0.0089                  |

Notes: Regressions are estimated using ordinary least squared. Robust standard errors are in parentheses. \*\* indicates statistical significance at the 1% level.

The largest user of antidumping protection in the U.S. is the steel industry. As such, one might question the influence of this industry on our qualitative results. To check whether our results are robust to the exclusion of the steel industry, we re-estimate all regressions on samples that exclude the steel industry. All qualitative results in Tables 3, 4, and 6 proved to be robust to the exclusion of the steel industry.<sup>14</sup>

Another question that naturally arises is: Why does industry competitiveness play a role in determining the effect that the Byrd Amendment has on imports in an industry? Chang and Gayle (2006) provide a formal theoretical analysis of this issue. The intuition of the argument they posit is as follows. A domestic firm that receives antidumping revenues from its government may do one of two things: (1) it may strategically try to increase the amount of antidumping revenue it gets from the government by inducing its foreign competitor to export

<sup>14</sup>The definition of the steel industry is defined following Reynolds (2006). It includes iron and steel mills, steel wire drawing,

more goods to the domestic market; (2) it may use the revenues to increase its own production in an attempt to gain a competitive advantage over its foreign competitor in the domestic market. Option (1) is more attractive when product market competition is relatively high (low measure of industry concentration) since foreign competitors' increased output response to a marginal reduction in the domestic firm's output is relatively large. On the other hand, when competition in the industry is relatively weak (high measure of industry concentration), option (2) is more profitable compared to option (1) because foreign competitors' increased output response to a marginal reduction in the domestic firm's output is relatively small.<sup>15</sup>

The results in our paper are also consistent with theoretical arguments in Evenett (2006) that the Byrd Amendment creates an incentive for the domestic firm to raise its price in order to increase the sales of foreign firm (increase imports). By doing so, it increases the total value of the antidumping duties distributed back to the domestic firm.

### **a. Potential Endogeneity Issues**

It may be argued that a surge in imports within a given industry may prompt firms in the industry to file for antidumping protection. As such, by using increased filings of antidumping

---

rolled steel-shape, and iron and steel pipe industries.

<sup>15</sup> Another possible explanation for the importance of industry competitiveness on imports is in terms of coordination costs among domestic firms as explained in Zanardi (2004). In particular, Zanardi (2004) shows that antidumping petitions may be withdrawn because of a collusive agreement between domestic and foreign firms. One of the key determinant to withdraw is the coordination costs among domestic firms within the industry, which can be proxied by an industry concentration ratio (high concentration ratio reduces the coordination costs). Low coordination costs lead to a high probability of collusion that may lead to a decrease in imports. However, his analysis captures the effect of antidumping law in general and does not extend to the effect of the Byrd Amendment where antidumping duties are also distributed to domestic firms.

petitions to define Byrd industries introduces endogeneity into equation (1). It is therefore instructive to explore how this endogeneity problem might affect results and conclusions.

If firms increase their filings for antidumping protection following a surge in imports, assuming these filings are successful, we should expect imports to fall in these industries following their successful filing for antidumping protection. In the case where the increased antidumping filings in response to the previous surge in imports coincide with implementation of the Byrd Amendment, we would have mistakenly classified such industries as "Byrd" industries. This would result in attributing a larger negative effect on imports to the Byrd Amendment than is warranted. In other words,  $\beta_3$  would be biased downward.

In light of our findings from estimating equation (2) for the subsample of our defined Byrd industries, we believe that this endogeneity problem is not severe since imports actually increase in some of these industries. We would be more concerned if all results suggest that the Byrd Amendment is only associated with a decline in imports. In such a case, we would have to try and sort out how much of the import decline is truly associated with the amendment versus how much is associated with the imposition of antidumping duties that were not spurred by the amendment.

## **5. CONCLUSION**

In this article, we formally test the hypothesis that the Byrd Amendment effectively provides double protection to U.S. firms to the extent that it further restricts U.S. imports, as argued by the E.U. and eleven other U.S. trading partners. Using a rich panel of 362 U.S. manufacturing industries for the period 1998 to 2003, we find that whether or not the Byrd Amendment restricted U.S. imports depends crucially on the level of competitiveness in the import-competing

industry. Specifically, we find that the Byrd Amendment served to restrict imports only in industries where competition is relatively weak, while the amendment is associated with an increase in imports in more competitive industries. These results therefore suggest that the Byrd Amendment does not necessarily put firms that export goods to the U.S. at a disadvantage vis-a-vis U.S. competing firms.

What are the welfare effects of the Byrd Amendment? What determines who are the winners and losers of this policy and are the net welfare effects positive? Jung and Lee (2003), Collie and Vandebussche (2006), and Chang and Gayle (2007), have shed some light on these questions from a theoretical perspective, but to the best of our knowledge these questions have not been addressed empirically. We believe that providing empirical perspectives on the welfare effects of the Byrd Amendment is a particularly promising direction for future research to take.

## REFERENCES

- Anderson, J. E. (1992), 'Domino Dumping I: Competitive Exporters', *American Economic Review*, 82, 65-83.
- Anderson, J. E. (1993), 'Domino Dumping II: Anti-dumping', *Journal of International Economics*, 35, 133-150.
- Blonigen, B. A. and T.J. Prusa (2003), 'Antidumping', in E.K. Choi and J. Harrigan (eds.), *Handbook of International Trade*, (Oxford, U.K. and Cambridge, MA: Blackwell).
- Brander, J. A., and B. J. Spencer (1984a), 'Trade Warfare: Tariffs and Cartels', *Journal of International Economics*, 16, 227-242.
- Brander, J. A., and B. J. Spencer (1984b), 'Tariff Protection and Imperfect Competition', in H.

- Kierzkowski (ed.), *Monopolistic Competition and International Trade*, (Oxford University Press).
- Brander, J. A., and B. J. Spencer (1985), 'Export Subsidies and International Market Share Rivalry', *Journal of International Economics*, 18, 83-100.
- Chang, Yang-Ming and Philip G. Gayle (2006), 'The Continued Dumping and Subsidy Offset Act: An Economic Analysis', *Southern Economic Journal*, 73, 530-545.
- Chang, Y.M. and P. G. Gayle (2007), 'The Continued Dumping and Subsidy Offset Act: A Welfare Analysis and Policy Implications', Manuscript, *Kansas State University*.
- Collie, D. R. (1991), 'Export Subsidies and Countervailing Duties', *Journal of International Economics*, 31, 309-324.
- Collie, D. R., and H. Vandenbussche (2006), 'Tariffs and the Byrd Amendment', *European Journal of Political Economy*, 22, 750-758.
- Grimmet, J. J., and V. C. Jones (2005), 'The Continued Dumping and Subsidy Offset Act ("Byrd Amendment")', *CRS Report for Congress*, Congressional Research Service Order Code RL33045.
- Dixit, A. K. (1984), 'International Trade Policy for Oligopolistic Industries', *Economic Journal* 94, 1-16.
- Dixit, A. K. (1988), Anti-dumping and Countervailing Duties under Oligopoly, *European Economic Review*, Vol. 32, 55-68.
- Evenett, S. (2006), 'The Simple Analytics of U.S. Antidumping Orders: Bureaucratic Discretion, Anti-Importer Bias, and the Byrd Amendment', *European Journal of Political Economy*, 22, 732-749.
- Falvey, R., S. Wittayarungruangri (2007), 'Antidumping Regulation and the Byrd Amendment:

- Does Revenue Redistribution Reduce Dumping?', *Journal of Accounting and Economics*, 14, 3, 255-77.
- Finger, J. M., H. K. Hall, D. R. Nelson (1982), 'The Political Economy of Administered Protection', *American Economic Review*, 72, No. 3, 452-66.
- Irwin, D. (2005), 'The Rise of U.S. Antidumping Actions in Historical Perspective', *The World Economy*, 28, 651-668.
- Jung, Y. and S. H. Lee (2003), 'The Legacy of the Byrd Amendment Controversies: Rethinking the Principle of Good Faith', *Journal of World Trade*, 37, 921-958.
- Liebman, B. H. and K. M. Reynolds (2006), 'The Returns from Rent-Seeking: Campaign Contributions, Firm Subsidies and the Byrd Amendment', *Canadian Journal of Economics*, 29, 4, 1345-1369.
- Marvel, H. P. and E. J. Ray (1995), 'Countervailing Duties', *Economic Journal*, 105, 127, 1576-93.
- Prusa, T. J. (1992), 'Why Are So Many Antidumping Petitions Withdrawn?', *Journal of International Economics*, 33, 1-2, 1-20.
- Prusa, T. J. (1994), 'Pricing Behavior in the Presence of Antidumping Law', *Journal of Economic Integration*, 9, 2, 260-289.
- Reitzes, J. D. (1993), 'Antidumping Policy', *International Economic Review*, 34, 745-763.
- Reynolds, K. M. (2006), 'Subsidizing rent-seeking: Antidumping protection and the Byrd Amendment', *Journal of International Economics*, 70, 490-502.
- Stiglitz, J. E. (1997), 'Dumping on Free Trade: The U.S. Import Trade Laws', *Southern Economic Journal*, 64, 402-424.
- U.S. Antidumping Database. Website: <http://darkwing.uoregon.edu/~bruceb/adpage.html>.

United States International Trade Commission (April, 2007), 'Antidumping and Countervailing Duty Handbook', *United States International Trade Commission*, Twelfth Edition, Publication 3916, Website: [http://www.usitc.gov/trade\\_remedy/731\\_ad\\_701\\_cvd/handbook.pdf](http://www.usitc.gov/trade_remedy/731_ad_701_cvd/handbook.pdf).

Vandenbussche, H. and M. Zanardi (2006), 'The Global Chilling Effects of Antidumping Proliferation', *Center for Operations Research and Econometrics Discussion Paper*, 38.

Zanardi, M. (2004), 'Antidumping Law as a Collusive Device', *Canadian Journal of Economics*, 37, 1, 95-122.