Can Macroeconomic Factors Predict Antidumping Filings in the United States?

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Abstract

Antidumping (AD) petitions have often been associated with macroeconomic conditions in the filing country. Using quarterly data on AD filings at the USITC from 1993-2017, we analyze if the observed trends in these filings can be linked to key macroeconomic indicators such as output, exchange rates, trade balance and employment. A simple out-of-sample forecast test is used in our analysis to distinguish between alternate and competing specifications and identify the macroeconomic variables and specifications that have the most success in predicting AD filings at the USITC. Overall, we find that macroeconomic variables, with the exception of exchange rates, have very little predictive power for AD filings in the United States.

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1. Introduction

Each year, the Commerce Department and the International Trade Commission (USITC) receive a number of petitions from U.S. firms seeking antidumping (AD) duties on imported goods.[1] The general motivation for AD laws in the global trading system is to provide domestic firms an avenue to combat "unfair" foreign competition, with the expectation that countries will not be relying on them as an instrument of trade policy. Nevertheless, empirical studies have generally found evidence that AD petitions are closely related with the broader macroeconomic conditions in the filing country. Our goal in this paper to examine if macroeconomic factors are driving AD filings in the United States in recent years and whether we can use this information to predict the number of AD petitions firms will file in the near future.

Drawing on the existing academic literature, we first determine the main macroeconomic factors that are often associated with the volume of AD filings, and then construct suitable econometric models to analyze the observed trends in these AD filings. Using a simple out-of-sample test, we are able to distinguish between alternate and competing specifications and identify the macroeconomic variables and specifications that have the most success in predicting AD filings. The selected models are then applied to predict the number of filings in the upcoming year. Overall, we find that macroeconomic variables, with the exception of exchange rates, have very little predictive power as it relates to AD filings in the United States.

2. Related Literature

In many countries, including the United States, a negative injury determination is one of the main reasons why an AD petition may be rejected by domestic trade agencies (Neils and Francois,

[1]Firms can also petition for countervailing duties and safeguard protections; however, filings for these cases have generally been much smaller when compared to AD filings (Agarwal, 2004).

2006).[2] Thus, a number of studies cite the overall health of the economy as a key determining factor in antidumping filings as it is easier for firms to show financial injury during periods of economic downturns. Feinberg (1989) and Leidy (1997), for instance, find that firms are more likely to file when chances for successful AD petitions are higher.[3] Conversely, the authors find that firms are less likely to file if economic conditions are good and the industry appears to be performing well. Effects of the most recent recession may also affect the recent filing patterns of petitioning firms (Fritz and Wermelinger, 2009).

The literature generally distinguishes between macroeconomic variables that capture domestic stresses and variables that capture external pressures. Domestic variables typically include common macroeconomic indicators such as real Gross Domestic Product (GDP), industrial production, capacity utilization, and unemployment. External influences can be captured by indicators such as real exchange rates, import penetration, and trade balance. While our focus is on macroeconomic determinants, some recent country-level studies find that strategic considerations, such as retaliation and deterrence, may also affect the frequency of AD filings.[4]

Most studies find evidence that aggregate output is a major determining factor in AD filing decisions. Knetter and Prusa (2003) find that one standard deviation drop in real GDP growth led to a 23 percent increase in AD filings.[5] Likewise, Feinberg (2005) finds that a one-percentage point increase in the 3-year growth rate of real GDP led to a 2 percent reduction in filings.[6] Interestingly, Moore and Zanardi (2008) find that output growth has different effects on filing behavior in developed and developing countries, with lower output growth in developing countries correlated

[2] Findings of dumping margins are a much more common occurrence in these investigations.
[3] Feinberg (1989) uses quarterly U.S. antidumping filings against imports from Japan, Brazil, Mexico, and Korea from 1982-1987. Leidy (1997) examines the yearly number of petitions in the United States from 1980 to 1995.
[4] See for example Blonigen and Bown (2003), Feinberg and Reynolds (2007) and Moore and Zanardi (2008).
[5] Knetter and Prusa (2003) examine filing data on an annual basis during 1980-1998 of the "primary users" of antidumping process (Australia, Canada, the European Union, and the United States).
[6] Feinberg (2005) examined country-specific AD petitions, on a quarterly basis, filed by U.S. firms against 15 countries during 1991-1998.

with a higher probability of AD filing activity.[7] However, they find no such link between economic output and AD filings in developed economies.

Manufacturing output is another factor that may affect the number of AD filings. Niels and Francois (2006)[8] show that both domestic and world manufacturing output have a statistically significant negative relationship with the number of AD complaints in Mexico.

Similar to output, the unemployment rate is another relevant measure of the economy's overall health. Leidy (1997) finds that the number of AD filings in the United States increases with the unemployment rate and decreases with the rate of industrial capacity utilization. On the other hand, Moore and Zanardi (2008) find that changes in the employment level may not be a significant factor in the filing of AD cases.

Studies examining AD filing patterns often use the real exchange rate as a proxy to capture the external pressure on domestic firms, since a real appreciation of the dollar can lead to a reduction in the price of imports. A rising dollar may increase import volumes and thus assist domestic firms in claiming injury from imports during AD investigations.

Empirical evidence has generally shown a positive relationship between AD petitions and real exchange rates. Knetter and Prusa (2003) find that a one standard deviation appreciation of the petitioning country's exchange rate leads to a 33 percent increase in AD filing activity. Feinberg (2005) finds similar strong effects for filing patterns in the United States.

In addition to the real exchange rate, import penetration and trade balances have also been shown to affect AD filings. Neils and Francois (2006) show that a worsening of Mexico's current account balance led to a higher number of complaints, indicating that demand for trade protection is likely

[7] Moore and Zanardi (2008) examine 29 developing countries and 7 developed countries for 1991-2002.
[8] Niels and Francois (2006) use bi-annual data on Mexican AD filings for the period 1987-2000.

to be higher as the size of the trade deficit increases. Bown (2008) determines that developing countries which face substantial import competition and declining industry output are more likely to use AD measures. Finally, Jallab et al (2006) find that the intensification of foreign competition (measured by the import penetration rate) increases the number of AD filings in the United States, but did not find similar results in the EU.[9]

3. Data

Our quarterly data on AD filings is based on the dataset in Thomsen (2015) and includes all AD petitions filed in the U.S. between January 1993 and March 2017. Along with AD cases, firms can also seek countervailing duty (CVD) remedies against exporting countries due to unfair export subsidies. We include these petitions in our final number of cases filed as we expect filing behavior for these petitions to be similarly impacted by macroeconomic conditions as AD filings.[10] In our study, a petition is only counted once even if it seeks both antidumping and countervailing duties. Since the focus of our work is on the decision to file an AD petition and not on the particular countries targeted, we also do not distinguish between single-country petitions and multiple-country petitions, even though multiple-country petitions have become a more common feature in recent AD filings.

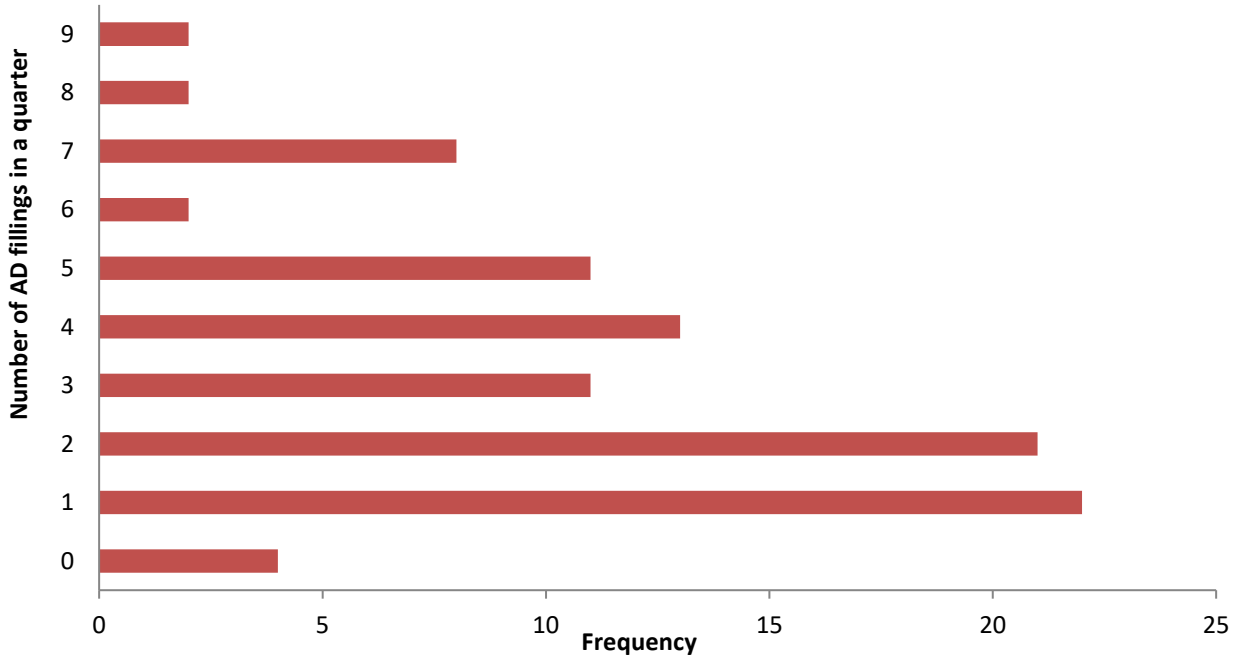
Our analysis of AD activity is based on the total number of petitions filed in a given quarter. In general, the number of AD petitions filed in a period is a good proxy for the domestic industry's demand for antidumping relief since some investigations never reach the final phase of investigation. Some petitions are terminated at the preliminary investigation stage, some are postponed due to out-of-court settlements between the domestic industry and foreign producers,

[9] Jallab et al. (2006) use quarterly data on AD cases filed in the U.S. and the EU from 1990-2002.
[10] As noted in Thomsen (2015), the overwhelming majority of Title VII cases filed involve either allegations of dumping or joint allegations of both dumping and subsidy. Just four filings in this period involved solely CVD investigations.

and others are withdrawn by the petitioner (Thomsen, 2015). Thus, to only consider final decisions of AD proceedings would provide an incomplete picture of the filing patterns.

Figure 1 shows that during this period, most quarters had one or two filings. However, the number of cases filed per quarter is subject to considerable variation and show some periods of unusually low or high filing activity.

Figure 1: USITC AD petition filings, January 1993 to March 2017



Source: Thomsen (2015) and authors' calculations.

Consistent with existing literature, we categorize the macroeconomic determinants of AD filings as either domestic or external in nature. Our domestic variables include measures for total economic output, industrial activity, and employment. Data for these variables is obtained from the Federal Reserve Bank of St. Louis's economic database (FRED).[11] We use the real GDP (RGDP) as our

[11] Federal Reserve at Saint Louis, https://fred.stlouisfed.org/categories. Accessed May 2017.

measure of aggregate domestic output.[12] Along with the real GDP, we also use FRED's index of Domestic Industrial Production (DIP) that records real output of U.S. manufacturing, mining, and electric and gas utilities. Since the AD statute covers only trade in goods, this index of domestic production may be a more appropriate indicator for petition filings than aggregate GDP. Lastly, the Total Nonfarm Payroll is used as the measure for employment (EMP).[13] We note that this measure accounts for approximately 80 percent of the workers contributing to U.S. GDP.[14]

The exchange rate is our primary variable capturing external pressure on the economy. We use FRED's real exchange rate index (REXCH), which is constructed using trade weights based on annual trade flows. An increase in the real exchange rate index represents a real appreciation of the U.S. dollar against its major trading partners. For robustness, we also use the import penetration rate (IMPEN) and overall trade balance (TBAL) as two other measures of external effects. Similar to Jallab et al. (2006), we construct the import penetration measure as $IMPEN_t = \frac{M_t}{DD_t}$ where M_t is total imports and DD_t is the domestic demand in the importing country (calculated by excluding Net Exports from the GDP). The trade balance is recorded as Net Exports as a share of nominal GDP. Since the United States had a trade deficit throughout this period, we take the absolute value of this variable so that an increase indicates a larger trade deficit. Data on U.S. imports and exports are obtained from the BEA's national income accounts.

Lastly, we also considered relative growth rates as potential factors affecting AD filing rates. These relative growth rates are captured by taking the difference between the growth rate in the imports relative to the real GDP (GIM), and the difference in the rate of economic growth between the OECD

[12] Real GDP is measured in 2009 U.S. dollars.
[13] This variable excludes proprietors, household employees, volunteers, farm workers, and the self-employed.
[14] We also excluded services and only looked at manufacturing employment since services are not subject to AD petitions. However, our main results do not change.

countries and the United States (GOECD).[15] Data on the growth of real GDP for the OECD block of countries, excluding the U.S., is taken from OECD STAT database. Table 1 shows the correlation between the explanatory variables in our analysis.

Table 1: Correlation between Macroeconomic Indicators

(a) Output Variables

	RGDP	DIP	EMP
RGDP	1.00		
DIP	0.87	1.00	
EMP	0.78	0.77	1.00

(b) External Variables

	REXCH	NEXCH	IMPEN	TBAL	GIM	GOECD
REXCH	1.00					
NEXCH	0.80	1.00				
IMPEN	-0.26	-0.25	1.00			
TBAL	0.14	0.48	0.85	1.00		
GIM	-0.14	-0.21	0.14	0.13	1.00	
GOECD	0.05	0.31	0.59	0.61	0.11	1.00

Figure 2 shows the movement of AD filings relative to the domestic variables during 1993-2017. To dampen quarterly fluctuations, we use a 4-quarter moving average of the AD filings along with the 1-year growth of the domestic variable during this period.[16] The growth rates of these domestic variables show similar trends, reflecting the high level of correlation between them. Figure 2 shows that a decrease in domestic economic activity is only weakly associated with an increase in AD filings, indicating that other factors besides overall economic activity are driving firms to file AD petitions. For example, while firms may find it easier to show import injury during economic

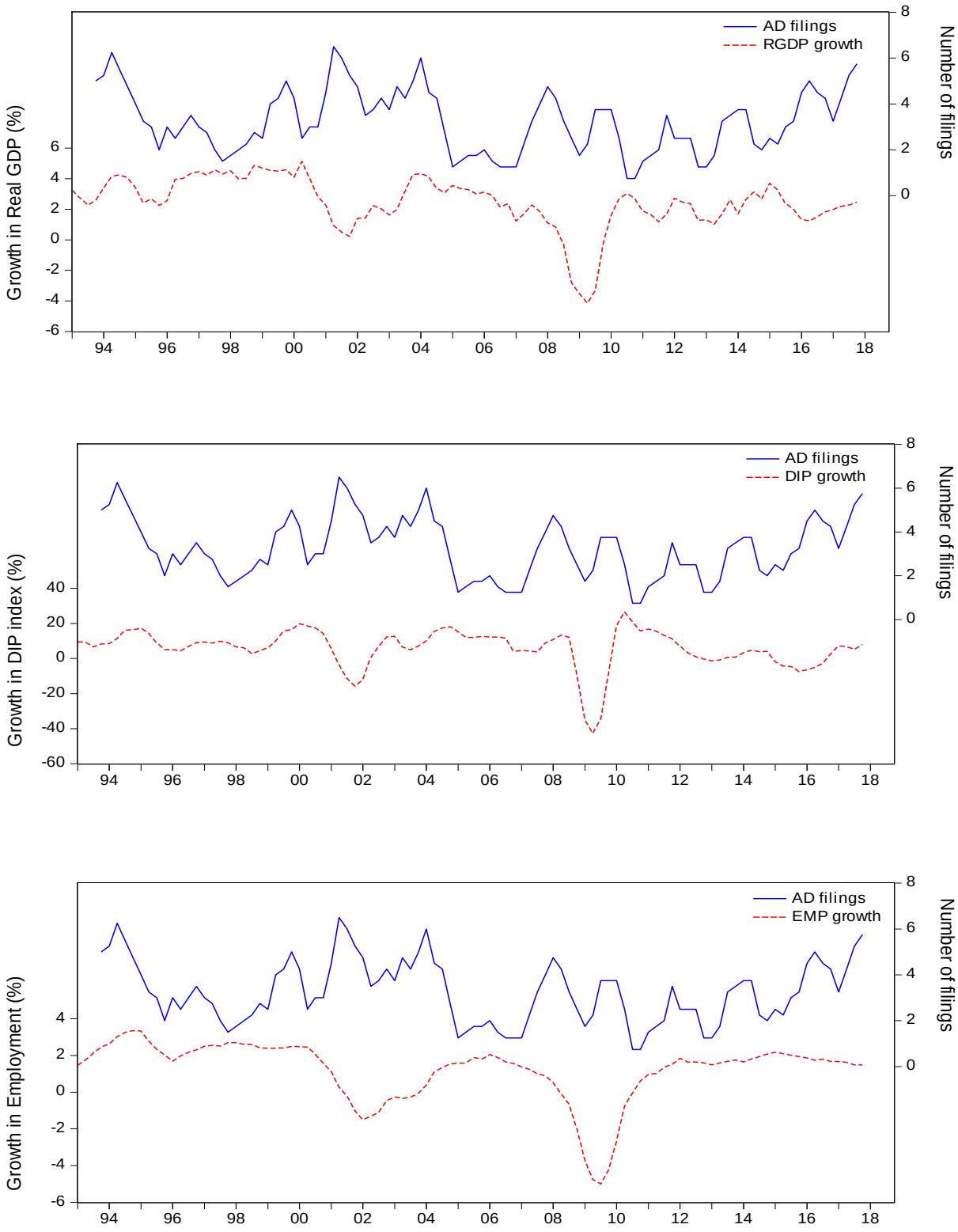
[15] We selected OECD for the relative growth measure since these are advanced economies with a similar economic profile as the United States.

[16] Feinberg (2005) considers growth over three years since the USITC uses a 3-year window in judging whether an industry has suffered material injury. Thus growth over a longer period might be a more appropriate indicator of AD filing patterns. In our model specifications in Tables 2-7, we also examine the 3-year growth rate of domestic variables as a potential explanatory variable.

downturns, they may also have fewer resources to pursue expensive legal options, thereby reducing the pool of potential petitioners. These competing influences may dampen the relationship between the number of AD filings and measures of domestic economic activity.

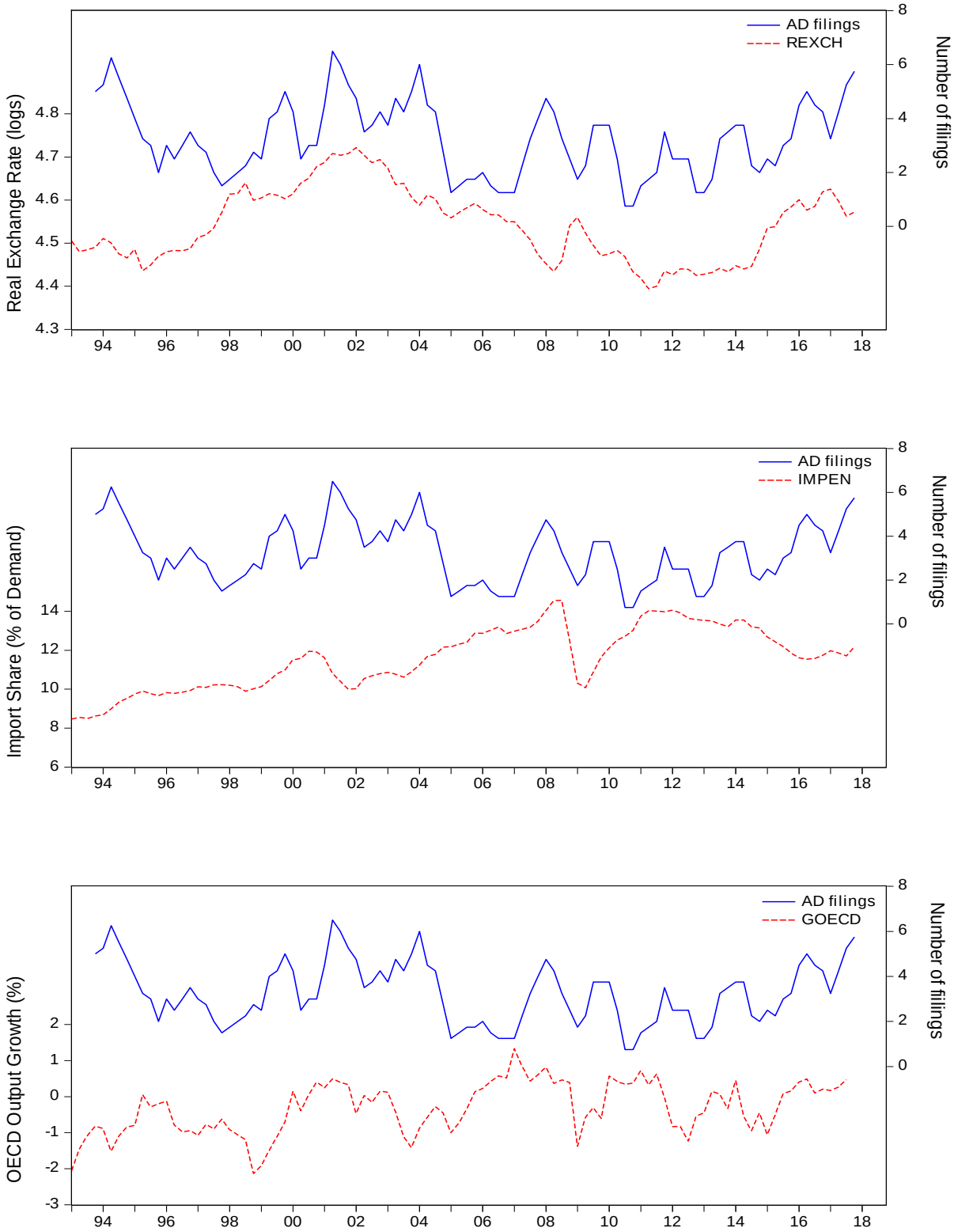
Figure 3 shows the relationship between AD filings and the external variables. A real appreciation of the U.S. dollar coincided with an increase in the number of AD filings in the subsequent quarters. This makes sense because the real appreciation of the U.S. dollar makes U.S.-produced goods less competitive overseas while making foreign goods more attractive to domestic consumers. As relatively more imports enter the United States, firms may decide they will be better able to make a case for injury. Import penetration and trade deficits seem to have less correlation with AD filings, especially in recent periods. Similarly, growth rates in OECD countries, relative to the U.S., do not seem to correlate with AD filings.

Figure 2: AD filings and Output Growth



Notes: AD filings are shown as a 4-quarter moving average along with the 1-year growth rates in real GDP, Domestic Industrial Production index and Employment.

Figure 3: AD filings and External Factors



Notes: AD filings are shown as a 4-quarter moving average along with the real exchange rate, import shares and the growth of real GDP in OECD countries excluding the United States relative to growth in the United States.

4. Empirical Approach

We construct an empirical model to better understand the relationships in figures 2 and 3. In our analysis, the dependent variable is the number of AD filings per quarter, while the growth rates in the domestic economic variables and the external proxies are the main explanatory variables. Since the actual number of AD filings per quarter is a discrete non-negative number, we cannot estimate the relationship between AD filings and our macroeconomic factors using a standard linear regression model as it would result in inefficient and biased estimates.

A popular choice for modelling non-negative count data is the Poisson Regression Model, which assumes that the probability of the dependent variable taking a particular value is determined by a Poisson distribution. The mean of the distribution can then be modeled as a function of the explanatory variables and the resulting non-linear model can be estimated using maximum likelihood. However, the Poisson Model assumes that the conditional mean of the outcome is equal to the conditional variance, which will not hold with AD filings. Thus, we follow Knetter and Prusa (2003) and employ a Negative Binomial Regression model, which incorporates an additional parameter in the Poisson Regression Model so that the conditional variance of the outcome can exceed the conditional mean in the estimation framework.

Our Negative Binomial Regression model for AD filings is given by:

$$AD_t = \exp(\beta_0 + \beta_1 D_{t-r} + \beta_2 X_{t-s} + \varepsilon_t) \quad (1)$$

where AD_t is the number of AD filings each quarter, D_{t-r} is the lagged growth rate of the domestic variable (RGDP, DIP index, and/or EMP), and X_{t-s} is the lagged external variable (REXCH/NEXCH, IMPEN/ TBAL and GIMP/GOECD). ε_t is a random error that is uncorrelated with the other explanatory variables. A number of studies include a lagged dependent variable to model potential depletion effects (Leidy, 1997; Becker and Theuringer, 2000). A significantly negative sign for this

coefficient suggests that a high number of AD filings in one period are followed by fewer AD filings in the following period as the stock of potential AD petitions is exhausted. Including the lagged dependent variable in the exponential mean function is however not as straightforward as in simple linear models, and can cause coefficient estimates to not converge. Thus, we avoid this scenario in the analysis.

In our specifications, we lag the explanatory variables by *r* and *s* periods because it takes some time for firms to develop a record of injury for AD filings. However, the correct lag structure for *r* and *s* is unknown and must be chosen before the estimation. We thus vary *r* and *s* from one quarter and four quarters to get four different lag structures (*r =1, s*=1; *r =1, s*=4; *r =4, s*=1 and *r =4, s*=4). Thus the maximum lag is one year preceding the filing for both variables.[17] By allowing for different lags, we can capture AD filings that may be timed by domestic petitioners to capture investigation periods that are more likely to reflect material injury.

Since our goal is to find the best model to predict future AD filings, we estimate and then evaluate a simple out-of-sample forecast for each specification. In order to conduct the out-of-sample prediction exercise, we estimate equation (1) for any given specification from the first quarter of 1993 until the last quarter of 2014. We then use the estimated coefficients to predict the number of AD filings from the first quarter of 2015 to the last quarter of 2015 (one year ahead). We then re-estimate the model until the last quarter of 2015 and generate quarterly forecasts for 2016. The step is repeated until we have predictions for 2017, so that we have a total of 12 out-of-sample predictions. We note that the out-of-sample predictions are calculated using the actual values of the lagged explanatory variables in these periods. The out-of-sample predictions are then compared to

[17] Determinations on dumping margins by Commerce are based on foreign prices during the four most recently completed fiscal quarters preceding the month in which the petition is filed. See the Enforcement and Compliance 2015 Antidumping Manual http://ia.ita.doc.gov/admanual.

the actual values of AD filings in these periods, and the Root Mean Square Prediction Error (RMSPE), calculated as $\sqrt{\sum_i \frac{(\hat{Y}_i - Y)^2}{n}}$, is used to evaluate the accuracy of each specification.

To summarize our empirical strategy, we run regressions on 144 separate specifications that combine the 1-year and 3-year growth rates of the three domestic terms with the six external variables and four different lag structures. This robust modeling framework enables us to conduct a sensitivity analysis of our results as we consider different regressors and lag structures for equation (1). We can then examine the out-of-sample RMSPE for each specification and, based on this criterion, identify the main macroeconomic determinants and model specifications that are most useful in predicting future AD petition filings.

5. Results

Tables 2-7 report the estimates of model (1) with the main explanatory variables, a combination of different domestic output proxies, and a specific external variable for the entire sample 1993:Q1-2017:Q4 (100 observations). To reduce the number of estimates from the different lag structures, we only report the best out-of-sample fit specification for each case in these tables.[18] Column (1) in Table 2, for instance, corresponds to the specification where both the RGDP and REXCH variables are lagged by one quarter because that particular specification had the best out-of-sample fit of the four lag cases considered. A similar approach is taken for the other columns and tables as well. Along with the estimated coefficients, tables 2-7 also report the calculated RMSPE for each model specification in the out-of-sample period 2015:Q1-2017:Q4.

To ease interpretation, the coefficients in Tables (2)-(7) are expressed as incidence rate ratios (IRR).[19] For a given explanatory variable X, the IRR is able to capture the effect on the rate of AD

[18] The full results are available in the Additional Tables section at the end of the document.
[19] The Incidence Rate Ratio is calculated as the exponential of the estimated coefficients of equation (1).

filings per quarter when X is one unit above its mean (with all other explanatory variables of the model held constant at their mean values). Thus, an IRR of 5.7 for the real exchange rate in column (1) of table 2 indicates that a 100 percent appreciation of the real exchange rate increases the number of AD filings per quarter by nearly a factor of 6.[20] On the other hand an IRR of around 1 for the 1-year growth rate in RGDP indicates that there is little effect on the AD filing rate from changes in output. The rest of the columns in table 2 continue to show that the real exchange rate has a positive and statistically significant effect on AD filings across the different output measures. A similar positive effect on the AD filling rate is seen with respect to nominal exchange rates as well in table 3. So we can conclude that appreciation of the U.S. dollar, both in real and nominal terms, contributed to an increase in AD filings during the 1993-2014 period.

We find that the different proxies for output growth in tables 2 and 3 do not have much effect on AD filings. While the growth rates in RGDP and DIP index have an IRR less than 1, indicating a negative effect on AD filings, these coefficients are not statistically different from 1. Similarly, the level of employment does not seem to have much effect on AD filings, with an IRR close to 1 for both the 1-year and 3-year growth rates. Further, the IRR coefficients for the output proxies do not change much with the different growth horizons, so it seems that we can safely use either the 1-year or 3-year growth rate in these estimations. In terms of RMSPE, specifications with the 1-year growth rate perform better than those with the 3-year growth rate in forecasting AD filings in the out-of-sample period (2015:Q1-2017:Q1).

[20] This IRR value is slightly higher than earlier findings of 3.67 (Knetter and Prusa, 2003) and 2.29 (Feinberg, 2005) for the real exchange rate term.

Table 2: Output Growth and Real Exchange Rate (1993-2017)

	(A1)	(A2)	(A3)	(A4)	(A5)	(A6)
RGDP1	0.96					
	(0.04)					
DIP1		0.98				
		(0.01)				
EMP1			1.06			
			(0.05)			
RGDP3				1.00		
				(0.02)		
DIP3					0.99	
					(0.01)	
EMP3						1.03
						(0.02)
REXCH	5.66**	7.038**	7.950*	7.115**	11.65*	8.877*
	(4.34)	(5.38)	(6.02)	(5.82)	(9.00)	(7.40)
Log Like	-209.3	-207.6	-207.4	-196.6	-194.8	-186.5
RMSFE	2.36	2.17	2.18	2.44	2.26	2.22

Notes: The dependent variable is the number of AD cases each quarter. RGDP1 is the year on year growth in RGDP, while RFDP3 is the growth rate of RGDP over 3 years. A similar notation is employed for the other output variables in the table. Constant and the seasonal dummies are included in the model but not shown in the table. All coefficients are expressed as Incidence Rate Ratio (IRRs) along with similarly transformed standard errors in parentheses. RMSPE calculated for the 2015:Q1-17:Q4 period. Asterisk show IRRs are significantly different from 1 with * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Output Growth and Nominal Exchange Rate (1993-2017)

	(B1)	(B2)	(B3)	(B4)	(B5)	(B6)
RGDP1	0.975					
	(0.04)					
DIP1		0.979				
		(0.02)				
EMP1			1.065			
			(0.05)			
RGDP3				1.002		
				(0.02)		
DIP3					1.000	
					(0.01)	
EMP3						1.031
						(0.02)
NEXCH	2.395	2.004	2.398	7.504*	7.584*	10.49*
	(1.38)	(1.19)	(1.37)	(5.20)	(5.17)	(7.66)
Log Like	-210.7	-210.0	-209.8	-195.4	-195.4	-184.8
RMSFE	2.26	2.24	2.21	2.11	2.11	1.98

Notes: Asterisk show IRRs are significantly different from 1 with * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

In table 4, the import penetration rate is taken as the external variable. We see that across the output variables, the import penetration has an ambiguous effect on AD filings with some specifications resulting in an IRR greater than 1 and others with an IRR less than 1. Further, the import penetration and output growth term are not significant at the 10% level in most cases. As discussed in Becker and Theuringer (2012), the high correlation of the import penetration measure and the output variables (around 0.90 for our sample) leads to inflated standard errors and reduces the significance of each variable. Compared to table 2 and 3, these specifications have higher RMSPEs, with the model that includes the growth in employment (over the 3-year period) having the smallest RMSPE in table 4.

Table 5 reports the results using trade balance as the external variable. We see a more consistent relationship of the trade deficit with AD filings with most specifications have an IRR less than 1 for TBAL, indicating that a widening of the trade deficit leads to more AD filings. However, in nearly all these cases the coefficients are not statistically significant. Output variables, as in tables 2 and 3, have a negligible effect on AD filings, with the exceptions of the 1-year growth in DIP and the 3-year growth in EMP which impact AD filings, but in opposite directions.

In table 6, we examine the specification where the growth in imports relative to domestic output acts as the external variable. Intuitively, we should expect a negative relationship between AD filings and the relative growth in imports as firms may be more likely to file an AD case if they see that imports in their sector are growing faster than their corresponding domestic sales. However, our results show very little evidence of this behavior, with the IRR coefficient of less than 1. Lastly, table 7 presents the results using the growth rate in OECD as a determinant of AD filings, and we see that an IRR coefficient greater than 1, but this is not statistically significant.

Table 4: Output Growth and Import Penetration (1993-2017)

	(C1)	(C2)	(C3)	(C4)	(C5)	(C6)
RGDP1	0.930					
	(0.04)					
DIP1		0.958**				
		(0.02)				
EMP1			1.064			
			(0.05)			
RGDP3				1.013		
				(0.02)		
DIP3					0.995	
					(0.01)	
EMP3						1.056*
						(0.02)
IMPEN	0.922***	0.912**	0.965	1.003	0.976	1.053
	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)
Log Like	-210.3	-208.5	-210.6	-199.4	-199.4	-189.2
RMSFE	2.51	2.40	2.41	2.49	2.47	2.31

Notes: The dependent variable is the number of AD cases each quarter. RGDP1 is the year on year growth in RGDP, while RFDP3 is the growth rate of RGDP over 3 years. A similar notation is employed for the other output variables in the table. Constant and the seasonal dummies are included in the model but not shown in the table. All coefficients are expressed as Incidence Rate Ratio (IRRs) along with similarly transformed standard errors in parentheses. RMSPE calculated for the 2015:Q1-17:Q4 period. Asterisk indicate IRRs are significantly different from 1 with * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Output Growth and Trade Balance (1993-2017)

	(D1)	(D2)	(D3)	(D4)	(D5)	(D6)
RGDP1	0.937					
	(0.04)					
DIP1		0.958**				
		(0.02)				
EMP1			1.060			
			(0.05)			
RGDP3				1.014		
				(0.02)		
DIP3					0.992	
					(0.01)	
EMP3						1.063*
						(0.02)
TBAL	0.912	0.891**	0.969	1.008	0.920	1.103
	(0.05)	(0.05)	(0.05)	(0.07)	(0.06)	(0.07)
Log Like	-210.6	-208.7	-210.8	-199.4	-198.8	-188.7
RMSFE	2.44	2.34	2.38	2.48	2.45	2.30

Notes: Asterisk show IRRs are significantly different from 1 with * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Output Growth and Relative Import Growth (1993-2017)

	(E1)	(E2)	(E3)	(E4)	(E5)	(E6)
RGDP1	1.045					
	(0.05)					
DIP1		1.003				
		(0.03)				
EMP1			1.070			
			(0.05)			
RGDP3				1.030		
				(0.02)		
DIP3					1.004	
					(0.01)	
EMP3						1.043**
						(0.02)
GIM	0.981**	0.985	0.986**	0.981*	0.984**	0.987**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log Like	-209.4	-209.8	-208.6	-196.0	-197.1	-187.7
RMSFE	2.39	2.37	2.28	2.40	2.45	2.30

Notes: Dependent variable number of AD cases each quarter. RGDP1 is the year on year growth in RGDP while RFDP3 is the growth rate of RGDP over 3 years. A similar notation is employed for the other output variables in the table. Constant and the seasonal dummies are not shown. All coefficients expressed as Incidence Rate Ratio (IRRs) along with similarly transformed standard errors in parentheses. RMSPE calculated for the 2015:Q1-17:Q4 period. Asterisk indicate IRRs are significantly different from 1 with * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

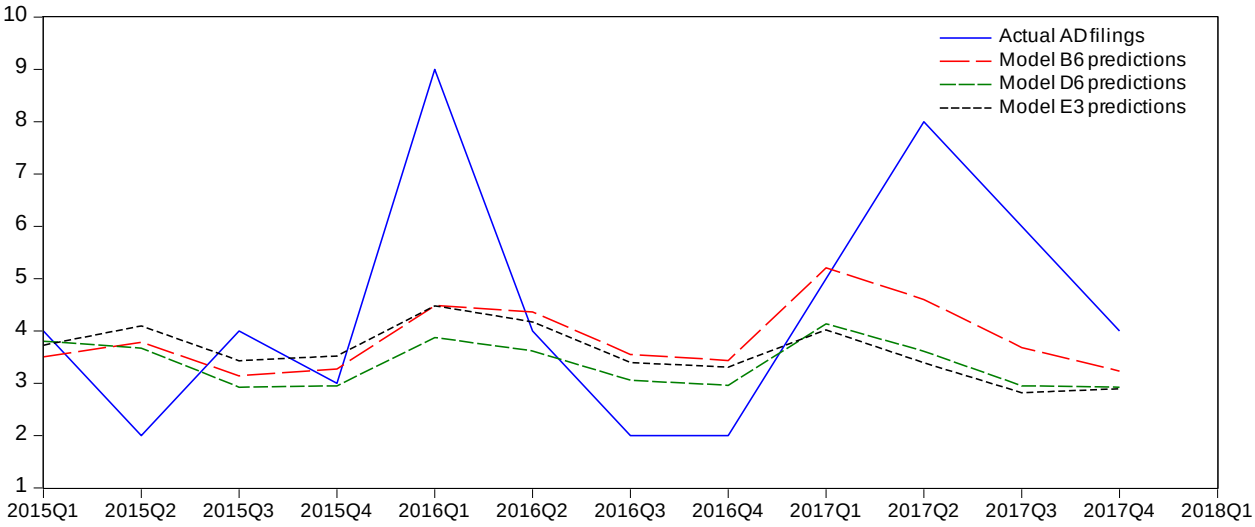
Table 7: Output Growth and Relative OECD Growth (1993-2017)

	(F1)	(F2)	(F3)	(F4)	(F5)	(F6)
RGDP1	1.073					
	(0.05)					
DIP1		1.019				
		(0.02)				
EMP1			1.070			
			(0.05)			
RGDP3				1.014		
				(0.02)		
DIP3					1.000	
					(0.01)	
EMP3						1.049**
						(0.02)
GOECD	1.064	1.013	1.021	1.027	1.084	1.056
	(0.11)	(0.09)	(0.09)	(0.11)	(0.12)	(0.11)
Log Like	-211.0	-211.5	-211.0	-199.4	-199.3	-189.6
RMSFE	2.47	2.55	2.37	2.50	2.51	2.33

Notes: Asterisk show IRRs are significantly different from 1 with * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Our estimated models can now be used to determine the number of AD filings that the United States is likely to see in the near future based on current macroeconomic climate. For this exercise, we select the specifications with the best out-of-sample fit in tables 2-7 as the representative models for a given combination of external variable and output proxies. To be more precise, models B6 in table 3 (EMP3 and NEXCH), D6 in table 5 (EMP3 and TBAL), and E3 in table 6 (EMP1 and GIMP) are chosen. Figure 4 shows the forecasts of these selected models along with the number of AD filings in the out-of-sample period.[21]

Figure 4: Actual and predicted AD petition filings, January 2015 to Dec 2017



We next use the models to forecast the expected number of AD filings. Based on the current macroeconomic conditions, our preferred models predict that around 13 to 17 AD petitions will be filed in the ensuing four quarters (table 8). The fact that these different models are predicting relatively similar AD filings in the next few quarters is not that surprising given that we observed similar RMSPEs for these models in Tables 2-7.

[21] All forecasts are made using the four-quarter lags of the explanatory variables in these models.

Table 8: Expected number of AD/CVD filings, January-December 2018

Quarter	Model B6	Model D6	Model E3
2018Q1	5.52	4.29	4.11
2018Q2	4.87	3.87	3.78
2018Q3	3.67	3.05	3.01
2018Q4	3.38	2.91	2.85
Annual Sum	**17**	**14**	**13**

6. Conclusion

Our results suggest that the rate of AD petitions filed in the United States is only partially related to macroeconomic conditions, such as GDP, industrial production, employment, and exchange rates. We find that the number of AD filings increases when there is an appreciation in the U.S. exchange rates, but find little effect on AD filing patterns from changes in output growth. These findings suggest that macroeconomic conditions alone are not sufficient to predict future AD filings in the United States. Further research on AD filings at the sectoral level may be better able to provide insight on some of the key factors that drive firms to seek antidumping remedies against foreign competitors.

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