The University of Nottingham

research paper series

Political Economy of Globalisation

Research Paper 2014/08

Differences in the Determinants and Targeting of Antidumping: China and India Compared

by

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Acknowledgements: The authors would like to thank Meredith Crowley, Qing Liu and participants of various seminars and conferences for useful comments on earlier drafts. Support from Chinese Ministry of Education (10JJD790030), Hengyi Foundation and CSC are gratefully acknowledged.

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Abstract

Despite both being developing countries, China and India have markedly contrasting patterns in their use and targeting of antidumping (AD) measures. We explore the factors driving AD use by these two countries, considering in turn macroeconomic, strategic and other determinants. We find more regular or systematic features of AD use by China, while India displays a less systematic pattern of AD use. Economic growth, tariff protection and FTA participation are shown to constrain AD use by China. Compared to India, AD use by China is also more sensitive to international conditions. Furthermore, China targets developed countries more than developing countries, while India is less discriminating with respect to the country type it targets.

JEL classification: F1; F5

Keywords: China; India; antidumping

Outline

Non-Technical Summary

Anti-dumping (AD) measures can be used by countries under the World Trade (WTO) rules so that importing countries can protect their local producers against 'unfair' trade practices by specific exporters. Anti-dumping duties can be set where dumping activity and associated material damage are established, in order to deter these 'unfair' trading practices and to compensate the importing country for the harm caused by them. Of course the existence of this opportunity to use this type of administratively managed form of protection of domestic producers means that the discretion exists for policy makers to use such measures where the threat is from competitive, low cost imports rather than genuinely 'unfair' trade. It is also gives policy administrators and local politicians the opportunity to target the anti-dumping measures against exporters from a particular country, that is to use trade policy in a discriminatory manner across trading partners in a way that standard trade measures such tariffs cannot be under the WTO rules. This strategic use of administrative trade policy which allows the targeting of exporters in specific countries has traditionally been an option largely open to larger, industrial countries only. Recent decades have, however, witnessed a dramatic growth in the use of AD measures by developing countries, especially the larger and emerging exporters among them. Copying the behaviour of the industrial countries, they have acquired the legislative capacity and a willingness to apply AD measures. Indeed, the emerging and larger developing economies have become the dominant users of AD measures.

This growth in the use of AD measures has been recorded in a new dataset created by the World Bank, which allow us to observe which countries are applying AD measures, in which year, against what products and from which countries. By exploring econometrically the extent , timing and country targeting of AD usage and the prevailing macroeconomic and policy conditions in the AD-imposing and AD-targeted countries, one can seek to reveal whether there are systematic drivers of AD use by countries, what these drivers are and if they vary across countries. In this paper we report on an empirical analysis of AD usage by two large developing countries (China and India), who account for a significant amount of the recent growth in AD use. Our empirical model allows us to capture the possible influence of macroeconomic conditions in their economies and in those of their trading partners, and of strategic and other factors affecting inter- country trade relations. This latter set of possible determinants includes the influence of retaliatory and trading club effects in the setting of this form of administrative trade policy.

We estimate a model of the determinants of AD usage for China and India separately, and compare the resulting models qualitatively and formally using tests of statistical difference. This analysis leads us to conclude that China is revealed to use AD measures in a systematic fashion according to macroeconomic conditions and inter-country, strategic considerations. China is also revealed to target their AD measures in a systematic fashion against developed, rather than, developing countries. By contrast, it appears that India's AD usage is driven much less by

systematic factors and is not targeted on a particular type of country. We interpret these findings as reflecting the fact that China is more integrated in to and dependent on the global economy than India is., with the associated greater need for China than India to use AD measures in a systematic and strategic manner.

Differences in the Determinants and Targeting of Antidumping: China and India Compared

1. Introduction

Since the late 1980s, especially following the establishment of the WTO in 1995, antidumping (AD) filings have been growing rapidly and evolved into a global phenomenon. Initially traditional users like the United States and the EU accounted for most AD filing cases, but increasingly emerging economies are becoming heavy AD users. India, Argentina, Brazil, China, South Africa and Turkey have become the major AD users globally, having initiated 44% of the total AD cases filed between 1995 and 2011. Emerging economies have gradually become the major users of AD measures. Nowadays, AD is not only a major trade issue in North-South trade, but also an increasingly significant one in South-South trade.

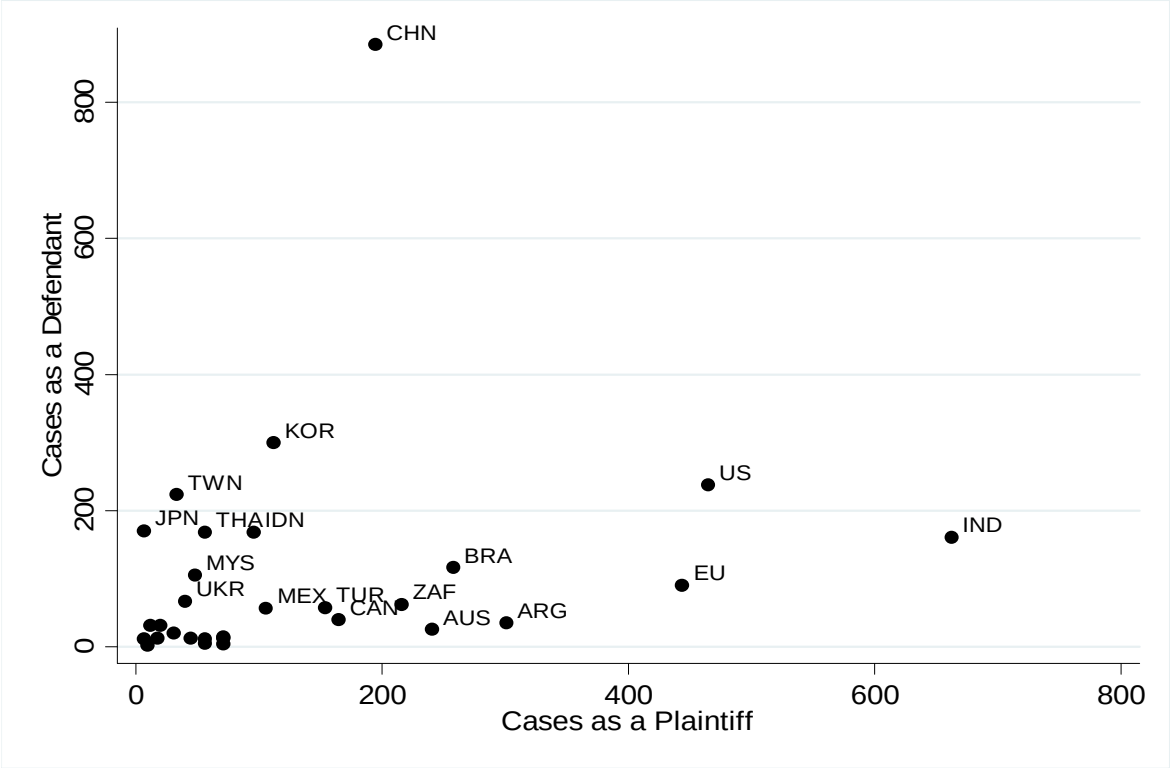

Figure 1: Country Symmetry and Asymmetry as AD Plaintiff and Defendant

As typical emerging economies and new AD users, China and India have both played a significant role in the proliferation globally of AD use. However, there are distinctive differences in AD patterns between the two countries. China, the world's largest AD target, faced 875 AD investigations and initiated 192 AD investigations between 1995 and 2011. In contrast, as the leading AD user in the world, India launched 659 AD investigations and was subject to 158 AD investigations during the same period. Thus, there exists asymmetry between China and India in their roles as a plaintiff and as a defendant with respect to other countries (see Figure 1, CHN for

China and IND for India). India, in contrast to China, has an AD pattern as plaintiff and defendant which is more consistent with developed countries such as the US and the EU. But both China and India, as large developing countries, are considered similar in many ways. They both reformed their inward trade policies: China began its reform and opening up in 1978, while India also began a series of trade liberalization reforms in 1991. Why then are their patterns of AD use so different? This paper examines the determinants of AD use and country targeting by China and India, and the differences between the two countries.

The rest of the paper is organized as follows. Section 2 provides an overview of the factors affecting AD use that have been identified in the literature. Section 3 describes the methodology and data used in this study, while Section 4 describes the empirical findings. Concluding remarks are given in Section 5.

2. Overview of Factors Affecting AD Use

Macroeconomic determinants of antidumping

The influence of the importing country's macroeconomic conditions on AD use has been identified by several studies (Knetter and Prusa, 2003; Feinberg, 2005; Blonigen, 2006; Niels and Francois, 2006; Moore and Zanardi, 2009; Bao and Qiu, 2011). One major finding is that more AD filings are to be expected with slower domestic economic growth. However, no consistent argument is to be found in the literature on the effect of the real exchange rate between the importing and exporting countries' currencies on AD activity. Feinberg (1989) finds that the US dollar depreciation was accompanied by increased AD cases brought by the US, while Francois and Niels (2004) and Vandenbussche and Zanardi (2008) find no statistically significant effect of the real exchange. However, most studies argue that the importing country's currency appreciation will lead to more AD filings (Feinberg, 2005; Irwin, 2005; Blonigen, 2006; Mah and Kim, 2006; Niels and Francois, 2006). Additionally, Blonigen and Bown (2003), Blonigen (2006), Irwin (2005), Mah and Kim (2006) find that an increase in the import penetration ratio has a positive and statistically significant impact on AD filings, but the studies of Leidy (1997) and Sadni-Jallab et al. (2005) find that the effect of the import penetration ratio on AD is generally not statistically significant.

The nature of the relationship between trade liberalization and AD is subject to some ambiguity. On the one hand, Feinberg and Reynolds (2006) argue that trade liberalization, and the associated lowering of traditional sources of protection, has been associated with increased AD use in some developing countries. Similarly, Bown and Tovar (2011) conclude that Indian trade liberalization efforts may have increased the probability of AD filings. After controlling for some other important factors, Moore and Zanardi (2011) also identify a similar relationship. However Finger and Nogués (2005), who analyze the role of AD and safeguard actions in Latin American

countries undergoing trade liberalization, conclude that such measures were a useful tool for dealing with protectionist pressures and may therefore have facilitated the adoption of traditional trade reforms such as tariff reduction.

Bown and Crowley (2013a) estimate the impact of macroeconomic fluctuations on import protection policies before and during the Great Recession. They support the view of Bagwell and Staiger (1990, 2003) that temporary trade barriers increase when macroeconomic conditions in both the importing country and exporting country are weak. Crowley (2010), who investigates the same issue using product level data, also finds that import restrictions increase in response to macroeconomic weakness abroad. Similarly, Bown and Crowley (2013b) find that the impact of macroeconomic shocks on trade policy is similar in emerging economies to those for developed countries.

Strategic determinants of antidumping

In addition to considering macroeconomic factors, Prusa and Skeath (2002, 2004) explore the impact of strategic factors on AD use, finding that importing countries may also consider how their trading partner may react when imposing its own trade protection. They identify that both retaliatory AD of the "tit-for-tat" kind and "country club effects" prevail. Moreover, the strategic motives of traditional AD users are shown to be different from that of new AD users. Blonigen and Bown (2003) find that strategic considerations, in particular the share of US exports in the potential target country, can influence the decision by the US to file an AD case. Aggarwal (2004) and Feinberg and Reynolds (2006) also find a positive relationship between retaliation and AD filings.

In addition to retaliatory factors, strategic determinants include the spread of AD, namely a contagion effect (Bao and Qiu, 2011). Bown and Crowley (2006) consider how AD filings in the US against Japanese exports affected third markets through trade deflection, which raises the probability of trade protection by other countries. Feinberg and Reynolds (2006) consider both retaliatory factors and trade deflection among sets of countries. They find that deflection has an impact on both new and traditional users, but retaliation is mainly adopted by new AD users. Moore and Zanardi (2011) also provide evidence of retaliation and deflection effects as determinants of AD filings. Bao and Qiu (2011) further distinguish a deflection effect from an "echo effect" in both the US and China AD filings, with the latter tending to cause these countries to launch more AD filings against countries that are already receiving AD filings from elsewhere.

Other determinants of antidumping

The proliferation of free trade agreements (FTA) since the 1990s has provoked interest in the effects of this on AD use. On the one hand, FTAs may increase a country's AD filings to protect domestic industries from the increased imports from FTA sources. On the other, FTAs

may create new disciplining mechanisms which reduce the use of AD in order to promote intra-FTA trade (Ahn and Shin, 2011).

Although the literature has focused traditionally on AD use by developed countries like the US and the EU, there are a few studies on global antidumping patterns (e.g. Feinberg and Reynolds, 2006) and increasingly studies are also considering developing countries (Moore and Zanardi, 2009; Bown and Tovar, 2011; Zeng, 2011). As for comparative studies, Aggarwal (2004) compares the AD determinants of developed and developing countries. Meanwhile, Sadni-Jallab et al. (2006) compare AD filings by the US and the EU, and Bao and Qiu (2011) compare China and the US, focusing on whether China is more retaliatory than the US.

In the case of studies focusing on China, the majority of existing research has concerned itself with why China is targeted (see Wang and Xie, 2009; Bao, 2011; Zhang and Xie, 2011) rather than why it targets others. Although there are some articles on India, for example Baruah (2007) and Bown and Tovar (2011) who investigate the effect of trade liberalization on India's AD use, the coverage of the existing literature is limited. Yang and Yao (2012) compare China and India, but concentrate on providing a descriptive summary of AD activity in the two countries. In this paper, we seek to fill the gap in the existing literature. We examine what macroeconomic, strategic and other factors influence AD use in China and India using a broad set of explanatory variables and using a newly available, product-level dataset.

3. Empirical Strategy and Data

The model and methodology

Following our discussion of the related literature in the preceding section, we propose the following benchmark model of the determinants of AD use:

$$AD_{ijt} = a_0 + \alpha' \cdot m + \beta' \cdot s + \gamma' \cdot c + \varepsilon \qquad (1)$$

where the dependent variable AD_{ijt} is the total number of AD filings made by country *i* against the imports from country *j* in year *t*, *m* is a vector of macroeconomic variables, *s* is a vector of strategic variables and *c* is a vector of other variables. Vectors α, β, γ are regression coefficients, while *t* is the time trend and ε is the error term. Since the dependent variable, i.e. the number of AD filings, is a typical nonnegative count variable, we employ a count model to analyze the data.

The explanatory variables

The macroeconomic variables are divided into two sets: one set contains the macroeconomic conditions of the importing country, including real growth rate (*GDP*), the tariff rate (*TAR*), industrial structure (*STR*) and trade dependence (*DEP*); the other contains macroeconomic

variables associated with the exporting countries, such as foreign real GDP growth rate (*FGDP*), real exchange rate (*EX*) and import penetration ratio (*IMP*). As for strategic variables, we seek to capture a general retaliation effect (*RET*), an AD club effect (*CLUB*), a deflection effect (*DEFL*) and echo effect (*ECHO*). (Table 1 below summarizes the measures used to capture these and other effects.) For other variables, we investigate the preferential trade effect (*FTA*), and the economic recession in 2008 (*REC*). Some of these variables have been considered by existing studies while others are new. We discuss their possible effects on AD filings below. Variable definitions, descriptive statistics and expected signs are listed in Table 1, while the relationships between macroeconomic conditions of the importing country and AD filings in China and India are separately shown in Figure 2 and Figure 3. There are obvious differences in macroeconomic conditions between China and India. The real GDP growth rate of China is higher and less volatile than India's over the period 1997-2011, while the magnitude of tariff reduction in India is much larger than in China. In addition, the industrialization level (proxy for industrial structure) and degree of trade dependence in China are higher than in India.

Table 1: Variable Descriptions, Summary Statistics and Expected Signs

Variable		Variable Definition	China		India		Expected Sign
			Mean	Std. Dev.	Mean	Std. Dev.	
Dependent Variable	AD	Antidumping cases	0.52	1.12	0.60	1.56	---
Macroeconomic Variable	GDP_{it}	Real GDP growth rate	9.81	1.73	6.95	1.98	-
	TAR_{it}	Tariff rate	11.69	3.43	28.32	13.07	-
	STR_{it}	Industrial structure	46.48	0.89	26.80	1.14	?
	DEP_{it}	Trade dependence	29.01	6.46	15.25	5.22	-
	$FGDP_{jt}$	Foreign real GDP growth rate	3.20	3.63	3.21	3.64	-
	EX_{ijt}	Real exchange rate	1.30	11.81	3.05	51.04	+
	IMP_{ijt}	Import penetration ratio	0.76	1.03	0.20	0.41	+
Strategic Variable	RET_{it-1}	General retaliation	53.27	16.30	9.05	3.94	+
	$CLUB_{jt-1}$	AD club	5.57	12.25	3.50	9.55	?
	$DEFL_{jt-1}$	Deflection effect	5.13	5.27	3.59	7.71	+
	$ECHO_{jt}$	Echo effect	4.95	5.22	3.52	7.80	+
Other Variable	FTA_{it}	Free trade agreements	3.33	3.32	4.65	3.50	?
	REC	The economic recession	0.27	0.44	0.20	0.40	?

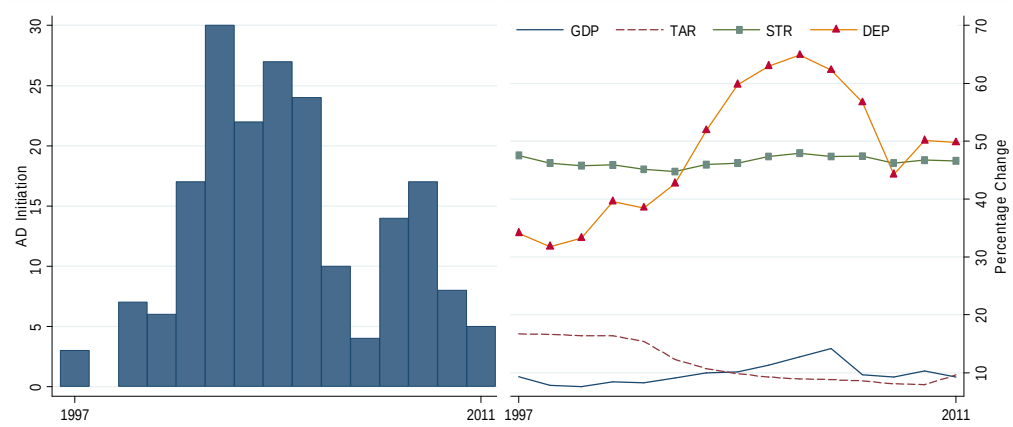

Figure 2: Relationship between Macroeconomic Variables and China's AD Filings

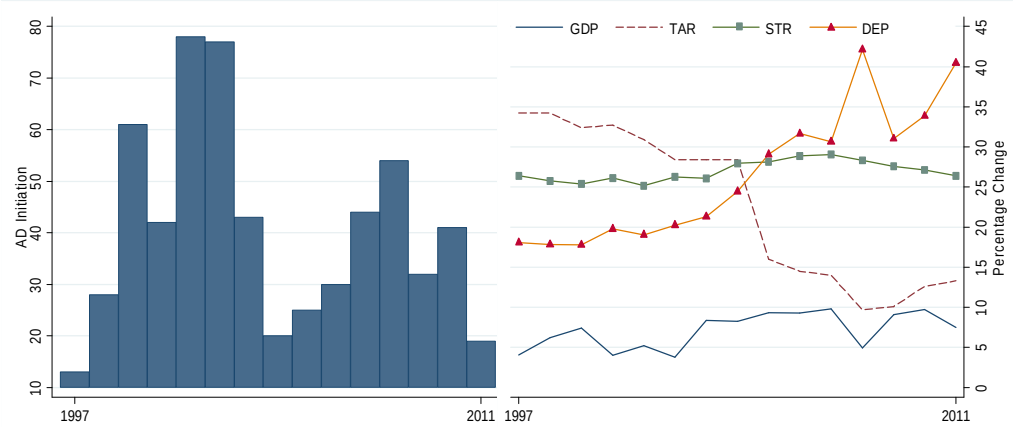

Figure 3: Relationship between Macroeconomic Variables and India's AD Filings

Data and variable definitions

Vector M (macroeconomic variables)

GDP_{it}: Importing country *i*'s real GDP growth rate in year *t*. If growth is relatively slow, domestic firms are more likely to turn to protectionist measures including AD filings to constrain foreign sales and market share. In recessionary conditions foreign firms have incentives to cut prices in order to maintain export volumes, which increases the probability of an affirmative material injury finding by the AD initiators. This suggests that slow growth in the importing country may cause an increase in its AD filings.

TAR_{it}: Importing country *i*'s tariff rate in year *t*. In the process of trade liberalization, tariff reduction may induce national governments to impose AD duties as a substitute for tariffs. Thus, AD filings by the importing country may increase with the lowering of tariffs.

STR_{it}: The ratio of industrial value-added to GDP of the importing country *i* in year *t*. Products involved in AD cases are mainly industrial products, so AD activity is likely to be influenced by industrial development. On the one hand, in a country with a high industrial ratio there will be more industrial products involved in international trade, which may naturally lead to more trade disputes. On the other hand, a low share of industrial activity may indicate that a country is less developed and less internationally competitive, and that the domestic market is more vulnerable to the impact of imported products. Domestic firms may be more likely to seek protection in this situation. Therefore, the influence of the industrial ratio on AD filings is ambiguous *a priori*.

DEP_{it}: The ratio of the trade volume to GDP of the importing country *i* in year *t* captures the dependence of the country's economy on the outside world. Theoretically, the higher the ratio the more dependent the country is on trade, and therefore the greater the government's incentive is to maintain mutually favorable trading partnerships. We expect therefore that greater trade dependence constrains the use of AD filings by the government of the importing country.

$FGDP_{jt}$: Exporting country *j*'s real GDP growth rate in year *t*. Most existing studies have focused on the impact of the importing countries' macroeconomic conditions. Relatively few studies consider the macroeconomic conditions of exporting countries. In view of systematic effects of the global economy, we take the potential effect of the exporting country's real GDP growth into consideration. We assume, in line with Bown and Crowley (2013a), that AD filings may increase as result of a decrease in the exporting countries' GDP growth.

EX_{ijt}: The average exchange rate between country *i*'s currency and country *j*'s currency in year *t*. Domestic firms' competiveness with respect to imports will be weakened by an appreciation of the home country's currency and tend to increase pressures for protection. Furthermore, since the price of the exporting countries' products will fall due to such changes in the exchange rate, it is easier to prove material injury. Therefore, the effect of currency appreciation on AD filings is expected to be positive.

IMP_{ijt}: The ratio of country *i*'s imports from country *j* in country *i*'s GDP in year *t* measures the import penetration in country *i* by country *j*. We take GDP as a proxy of total demand in the importing country. This bilateral import penetration ratio reflects the degree of competitive pressure from the exporting country. Thus, when this ratio increases, domestic firms are expected to seek more protection against imports and increase the use of AD actions by the importing country.

Vector *S* (strategic variables)

$RET_{it-1:}$ The total number of AD filings initiated by all other countries against country *i* in year *t-1*. This variable is included to capture the incentive in country *i* for "tit for tat" retaliation. The importing country is more likely to initiate AD actions against other countries when targeted by

AD filings by other countries in the previous year. We expect an increase in *RET* to increase AD filings by country *i*.

$CLUB_{jt-1}$: The total number of AD filings made by country *j* against all countries in year *t-1*. This indicates whether country *j* is a heavy user of AD filings, i.e. an AD club member. If it is, there will be two effects on country *i*'s AD use. On the one hand, country *i* may reduce AD filings against country *j* for fear of retaliation (Feinberg and Reynolds, 2006). On the other hand, as an AD club member, country *j* is more likely to be targeted, a result captured by the "antidumping club" effect (Prusa and Skeath, 2004). Therefore, the influence of *CLUB* on AD filings is likely to be ambiguous.

$DEFL_{jt-1}$: The total number of AD filings against country *j* by all countries except for country *i* in year *t-1* is used to proxy the "deflection" effect. Cases filed against country *j* may divert its trade flows elsewhere and cause import surges in third countries including country *i*, leading to an increase in AD filings by these countries. We expect an increase in *DEFL* to increase AD filings by country *i*.

$ECHO_{jt}$: The total number of AD filings against country *j* by all countries except for country *i* in year *t* is used to measure the "echo" effect. AD filings against country *j*'s exports by other countries will increase the incentive to file AD cases by firms in country *i*, since it increases these firms' expectation of affirmative determination by the government when AD filings are made. Such behavior is associated with information transmission of AD fillings across the parties involved (Bao and Qiu, 2011).

Vector *C* (other variables)

FTA_{it}: The accumulated number of FTAs country *i* has signed up to by year t. As previously mentioned, FTAs have two conflicting effects on AD filings (Ahn and Shin, 2011) and the net effect of *FTA* is uncertain.

REC: Dummy variable of the global economic recession, the value of this variable is 1 from 2008 to 2011 and 0 before 2008. We introduce this variable to examine what impact global economic recession had on the AD filings of China and India.

TIME: Following the literature (e.g. Bao and Qiu, 2011), we also control for the time trend effect. The value of this variable is equal to 1 in the first year of the sample period for country *i* (for our purposes, 1997 for China and 1992 for India) with 1 added for each subsequent year.

Data sources and estimation method

This study employs the model above to explore the motives of AD filings in China and India. Our sample consists of panel data from 1997 to 2011 with 25 target countries for China and from

1992 to 2011 with 54 target countries for India. In order to capture the changes of trade policy in India since the liberalization reforms in 1991, we employ a different sample period for India than for China. But we also match them consistently when the data are pooled together. For the dependent variable, we use the Global Antidumping Database constructed by Chad Bown as well as information from *WTO Trade Topics*. In addition to the dependent variable, the retaliatory variables are constructed by organizing bilateral AD filing data based on the Global Antidumping Database.

The macroeconomic variables (real GDP growth rate, ratio of industrial value-added to GDP, ratio of trade volume to GDP) are obtained from the World Bank's World Development Indicators. Data on tariff rates is taken from the World Integrated Trade Solution (WITS). The Economic Research Service of the US Department of Agriculture (USDA) provides bilateral real exchange rate indices. Data on bilateral trade required for calculating the import penetration ratios comes from the United Nations Commodity Trade Statistics Database (UN COMTRADE). Data on FTAs is from the World Trade Organization (WTO) Regional Trade Agreements Information System (RTA-IS).

AD cases are discrete data. The widely used nonlinear model for such data is the Poisson model. This, however, requires that the variance of the relevant variable should not exceed its mean, otherwise over-dispersion occurs and the Poisson estimator is inconsistent and the negative binomial model (NBM) performs better than the Poisson model. We employ the method of Cameron and Trivedi (1990) to detect over-dispersion. In accordance with the results of tests for over-dispersion (see Tables A.1, A.2, A.3 and A.4 in Appendix 1), we use the Poisson model for China and the negative binomial model for India. We use maximum likelihood techniques and capture the country fixed effects through the panel data. Furthermore, since the AD cases in our study may contain excess zero-count data, we also apply the zero-inflated model, as well as the Vuong test (Vuong, 1989), to compare the inflated model and the standard count model (see Appendix 2). Consequently, for China we run a panel Poisson regression with and without country fixed effects[1], as well as a zero-inflated Poisson (ZIP) regression to test for robustness. For India, we run a panel negative binomial regression with and without country fixed effects, as well as a zero-inflated negative binomial (ZINB) model to test for robustness[2].

4. Empirical Results

Comparative analysis of AD determinants for China and India

The baseline regression results for China and India are reported in Table 2. We find that for both China and India an increase in domestic real GDP growth significantly reduces AD filings in that year, while a lowering of tariffs significantly increases AD filings. The latter finding supports the idea of substitution between AD measures and traditional trade policy measures such as tariffs.

Table 2: Results for Baseline Estimates for China and India of Determinants of AD Filings

Variables		China		India	
		AD cases		AD cases	
Macroeconomic Variables	*GDP*	-1.178***	-0.978***	-0.103***	-0.107***
		(-3.52)	(-3.02)	(-3.49)	(-3.58)
	TAR	-0.494***	-0.494***	-0.053**	-0.051**
		(-3.72)	(-3.91)	(-2.29)	(-2.16)
	STR	1.001*	0.901*	-0.393***	-0.392***
		(1.91)	(1.76)	(-3.57)	(-3.49)
	DEP	-0.139	-0.147*	-0.093	-0.104*
		(-1.61)	(-1.77)	(-1.55)	(-1.70)
	FGDP	0.070*	0.036	-0.002	-0.002
		(1.80)	(1.07)	(-0.14)	(-0.13)
	EX	0.029***	0.025***	-0.001	-0.001
		(3.23)	(2.99)	(-0.71)	(-0.64)
	IMP	0.223	0.536***	-0.221	0.211
		(1.14)	(5.93)	(-0.98)	(1.17)
Strategic Variables	*RET*	0.034**	0.026*	-0.029*	-0.027
		(2.25)	(1.71)	(-1.66)	(-1.52)
	CLUB	-0.011	-0.004	-0.000	0.001
		(-1.29)	(-0.65)	(-0.02)	(0.19)
	DEFL	0.013	0.033*	0.015**	0.017**
		(0.58)	(1.72)	(2.29)	(2.54)
	ECHO	0.067***	0.078***	0.007	0.012*
		(2.95)	(4.09)	(1.08)	(1.79)
Other Variables	*FTA*	-0.752***	-0.712***	-0.128***	-0.116**
		(-3.39)	(-3.25)	(-2.65)	(-2.36)
	REC	-4.342***	-3.596**	-0.703***	-0.748***
		(-2.84)	(-2.42)	(-2.65)	(-2.75)
	TIME	0.873***	0.797***	0.204***	0.206***
		(2.78)	(2.58)	(3.06)	(3.03)
Regression Method		Poisson	Poisson	Negative Binomial	Negative Binomial
Country Fixed Effect		Yes	No	Yes	No
Observations		375	375	1039	1052
Log Likelihood		-189.27	-249.91	-602.90	-780.00

Notes: ***, **, * denote significance at 1%, 5% and 10%, respectively.

Industrial structure has a significantly positive effect on AD filings in China, while the opposite is true for India. One possible explanation for this is that the stage of industrial development in the two countries is quite different. The industrial ratio is between 44% and 48% for China and between 25% and 29% for India during the sample period. With a relatively higher

industrialization level and increase in the industrial ratio, more industrial products are traded internationally and there is more scope for disputes around the trade of these products, which may lead to more AD filings. As such, the industrial ratio has a positive effect on AD use in China. Whereas, with a substantially lower level of industrialization, the domestic market in India is more vulnerable to the impact of imported products and a fall in the industrial ratio will increase the necessity to seek protection and hence lead to an increase in the number of AD filings. We find that increased trade dependence has a significantly negative effect on AD filings for both China and India if the estimated model does not include a country fixed effect. However, such an effect disappears once the country fixed effect is controlled for.

Table 3: China and India's Integration into the World Economy

Year	Share of Global Trade (IM+EX) (%)		Share of Global (Inward) FDI(%)	
	China	India	China	India
2001	4.10	0.76	6.09	0.75
2002	4.77	0.83	7.84	0.89
2003	5.62	0.87	8.25	0.76
2004	6.23	0.94	7.68	0.81
2005	6.76	1.15	7.54	0.53
2006	7.24	1.23	7.33	1.18
2007	7.79	1.31	6.33	1.02
2008	7.91	1.54	7.81	1.98
2009	8.85	1.78	11.35	3.08
2010	9.78	1.88	18.12	1.97
2011	10.12	2.12	13.31	1.95

Notes: Data obtained from the World Bank's World Development Indicators IM denotes imports, EX denotes exports.

Foreign real GDP growth has a significantly positive effect on AD filings for China in some regressions, but has no significant effect for India. However, this variable has no significant effect for either country when country fixed effects are included. This finding differs from the results of Bown and Crowley's study (2013b). We offer two possible explanations. One explanation for the difference between China and India is that, compared to India, China is more deeply integrated into the world economy (see Table 3) and more influenced by its dependence on the world economy. Another explanation is related to a specific aspect of globalization. Gawande et al. (2011) study the determinants of trade policy responses to the 2008 financial crisis and find that vertical specialization (global fragmentation) is the most powerful economic factor determining trade policy responses. They also find that there is heterogeneity of countries' behavior in their trade policies: pressures from vertically specialized domestic exporters appearing to curb protectionist pressures in countries such as China. India, meanwhile, like some other countries, is influenced by vertically specialized foreign exporters dependent on Indian inputs. Domestic currency appreciation has a significantly positive effect on AD filings for China, but this is not the case for India. The import penetration ratio does not have a significant effect on AD filings for

India or China; a significantly positive effect disappearing once we control for country fixed effects.

We find that the general tit-for-tat retaliation effect is significantly positive for China, but significantly negative for India. This suggests that the retaliatory pattern of AD actions by China is different from that of India. As a new AD user, China has retaliated against AD actions targeting it. However, India's retaliatory pattern is similar to that of traditional users. Bao and Qiu (2011) find that general retaliation has a significantly negative effect on US AD filings, which mirrors what we find in the case of India. An increase in AD filings against each of these countries in the previous year leads to fewer AD filings being initiated by them due to the threat of retaliation. The similarity between India and traditional AD users may be related to India's large stock of AD cases and relatively high frequency of AD filings, features that mirror traditional users' AD patterns.

There is significant echo effect, but no significant deflection effect, in China's AD filing. This indicates that when a country receives AD filings from another country, China is likely to launch its own filing against that country due to strategic considerations or information transmission. As for India, we find that both the echo effect and deflection effect are significant. The latter effect indicates that India also takes more AD filings against a country due to trade diversion caused by AD filings by a third country. Lastly, the AD club effect is not significant for either country. An increase in the total number of FTAs signed has significant negative effects on both China and India's AD filings. In contrast with the theoretical predictions of increasing trade protectionism during economic recessions, we find that the 2008 economic recession had the opposite effect on AD filings by both China and India. One possible explanation is that increased globalization has helped to curb protectionism, and this may also have been reinforced by the active monitoring of trade policy by the WTO, World Bank and pre-emptive statements by the G20 (Declaration of November 2008).

Test of statistical difference

The baseline estimates suggest some similarities and differences between what drives AD filings for China and India. We find that some variables (trade dependence, real exchange, deflection and echo effect) only have significant effects on one country, while others (industrial structure, foreign GDP growth and general retaliation) have significant effects but with different signs. Furthermore, for some variables (domestic GDP growth, tariff rate, FTA and the recession) we identify common effects but with different magnitudes between the two countries. In order to investigate whether the differences are statistically significant, we pool the data for China and India and run the following regression[3]:

$$AD_{ijt} = \delta_0 + A'X + \delta\, india + B'X * india \qquad (2)$$

The explanatory variables, vector *X*, are as in our baseline regression model and the dummy variable *india* takes a value of 1 for India and 0 for China. To find whether the coefficients of explanatory variables for China's AD filings are significantly different from those for India's, we test the null hypothesis H0: $b_{China}=b_{India}$, with $b_{China}=A$ and $b_{India}=A+B$ in this model. The results of this test are reported in Table 4.

Table 4: Results of Test of Coefficient Differences

Variables		China	India	Pooled Data Test
Macroeconomic Variables	*GDP*	-	-	Y
	TAR	-	-	Y
	STR	+	-	Y
	DEP	-(ns)	-(ns)	N
	FGDP	+(ns)	ns	N
	EX	+	ns	Y
	IMP	+(ns)	ns	N
Strategic Variables	*RET*	+	-	Y
	CLUB	ns	ns	N
	DEFL	ns	+	Y
	ECHO	+	+(ns)	N
Other Variables	*FTA*	-	-	Y
	REC	-	-	Y
	TIME	+	+	Y

Notes: "+", "-" and "ns" denote significantly positive, significantly negative, and not significant, respectively. "+(ns)" and "-(ns)" respectively denote significantly positive and significantly negative in some specifications. "Y" and "N" indicates whether China and India are significantly different (Y) or not (N).

According to the test results, there are significant differences both in terms of the sign and the magnitude of specific coefficients between the estimated models for the two countries. Here we focus mainly on the differences in magnitude. For GDP growth and tariff rate, the effects on China's AD filings are greater than on India's. The significantly negative effects of these two variables, especially GDP growth, may partly explain why China initiated much fewer AD filings than India. China has experienced the fastest growth rate among the major economies in the world for several decades, while India has grown more slowly and with more fluctuation. As for the greater effect of the tariff rate on China, a possible reason is that China was previously (pior to WTO membership and the sample period of this study) more inclined to protectionism. AD may have offered some scope for instrument substitution that is for replacement of tariff reduction after China implemented an open trading system and joined the WTO.

The negative FTA effect also differs in magnitude across the two countries, with a larger effect for China than India. On the one hand, this may be because India already participates in more FTAs than China and the marginal effect is diminishing. On the other hand, it may reflect

the fact that China is increasingly engaging in trading partnerships through FTAs and is therefore reducing AD use as it actively expands the number and scope of FTAs. The negative effect of the 2008 economic recession on AD filings is much more pronounced for China than for India. This can be explained by the previous finding, namely that China's AD use is positively associated with foreign GDP growth. Additionally, since 2008 the economic growth of many countries has slowed down. As China is more deeply integrated into world economy, it is more likely to be affected by the global economic recession and it is also more likely to be cautious in adopting protectionist policies which may be prone to proliferation.

Comparative analysis of AD defendants across target countries

We now investigate whether China and India treat target countries differently, and disaggregate our sample between developed and developing countries in the target populations. The results of this estimation are reported in Table 5 (see also the robustness checks for these regressions in Table A.5 in Appendix 3).

In terms of macroeconomic conditions, China's AD filings against developed and developing countries are relatively similar, with the main differences being found for industrial structure and trade dependence. Compared to China's AD filings against developed countries, its filings against developing countries are more heavily influenced by industrial structure and trade dependence. The reason for the former is likely to be that China's exports are mainly low quality manufacturing products though the industrial ratio is high, which means the China's products tend to be similar to and engage in competition with similar products from developing countries. As a result China's AD filing targets are mainly developed countries (the number of AD filings against developed countries is twice that of filings against developing countries). Compared to China, India's AD filings against developed and developing countries are less differentiated, which is also reflected in the fact that there are no developed or developing countries that are India's dominant AD targets. It is evident from the results in table 5 that the AD pattern of India is less regular, with less evidence of systematic drivers of AD targeting by country type.

Although differences exist in terms of the retaliatory patterns between China and India, for both countries the retaliatory effects with respect to developing countries are more significant. The general retaliation and echo effects are the main retaliation motivation for China and these two effects are more significant when targeting developing countries. To some extent, this reflects increasingly how more developing countries than developed countries tend to be defendants of AD cases. In the growth of AD use globally, developing countries are not only replacing developed countries as the major initiators of AD filings, but are also becoming the major targets of AD measures. Disputes between developing countries are on the increase (Bao, 2012).

Table 5: Results of Estimates for Developed and Developing Target Countries

Variables		China		India	
		AD Cases		AD Cases	
		Developing Countries	Developed Countries	Developing Countries	Developed Countries
Macroeconomic Variables	*GDP*	-1.960**	-0.853**	-0.149***	-0.052
		(-2.52)	(-2.05)	(-3.95)	(-1.06)
	TAR	-0.719***	-0.475***	-0.029	-0.069*
		(-2.84)	(-2.65)	(-1.08)	(-1.79)
	STR	2.338*	0.547	-0.171	-0.612***
		(1.89)	(0.80)	(-1.24)	(-3.46)
	DEP	-0.372**	-0.072	-0.126*	-0.140
		(-2.00)	(-0.64)	(-1.69)	(-1.34)
	FGDP	0.022	0.079	-0.010	0.013
		(0.40)	(1.34)	(-0.57)	(0.39)
	EX	0.029**	0.035*	-0.001	-0.002
		(2.22)	(1.86)	(-0.39)	(-0.61)
	IMP	0.043	0.327	0.460	0.029
		(0.09)	(1.49)	(0.85)	(0.10)
Strategic Variables	*RET*	0.061**	0.017	-0.037*	-0.019
		(2.19)	(0.82)	(-1.75)	(-0.62)
	CLUB	-0.017	-0.008	-0.006	-0.002
		(-0.83)	(-0.75)	(-0.63)	(-0.26)
	DEFL	-0.000	0.014	0.0006	0.015
		(-0.00)	(0.41)	(0.92)	(0.60)
	ECHO	0.104***	0.041	-0.003	0.022
		(2.82)	(1.20)	(-0.38)	(0.87)
Other Variables	*FTA*	-1.352***	-0.509*	-0.143**	-0.129
		(-2.62)	(-1.69)	(-2.41)	(-1.53)
	REC	-9.033***	-2.513	-0.583*	-0.760
		(-2.57)	(-1.36)	(-1.95)	(-1.57)
	TIME	1.744**	0.499	0.271***	0.221*
		(2.44)	(1.21)	(3.37)	(1.84)
Regression Method		Poisson	Poisson	Negative Binomial	Negative Binomial
Country Fixed Effect		Yes	Yes	Yes	Yes
Observations		150	225	508	531
Log Likelihood		-60.33	-122.25	-313.07	-275.88

Notes: ***, **, * denote significance at 1%, 5% and 10%, respectively.

Participation in FTAs reduces AD filings against developed and developing countries by China. For India FTA participation significantly reduces its filings against developing countries, but has no significant effect when it comes to developed countries. Finally, we find that the 2008

economic recession was associated with a decline in India's AD filings against both developed and developing countries, but for China a reduction in filings only against developing countries is identified. This may reflect the greater competitive challenge from other developing countries experienced by India than by China.

Robustness checks

In the comparative analysis of AD patterns and the testing of statistical differences, we estimate appropriate count models for China and India both with and without country fixed effects. For further robustness checks, we adjust our model (1) by replacing the dependent variable with the number of product categories involved in AD cases. We use this alternative dependent variable because, on the one hand, the number of AD cases each year is limited and, on the other, the products involved in AD cases are generally from more than one category. We obtain data on products involved in AD cases from the Global Antidumping Database. Given that products are classified in their database into HS6 for some cases and HS8 for others, we classify the products by HS6 to maintain consistency. Regression results based on the new model are reported in Table 6.

By comparing the results in Table 2 with Table 6, we find our results are robust in general, especially when we control for country fixed effects. The sign and the significance of all the variables is largely unchanged for China with the exceptions of the import penetration ratio and AD club variable (which is significant in the new model) and industrial structure, which is now insignificant. The intuition for the change in the significance of import penetration may well be that compared to the number of AD cases, the number of products involved in AD cases is more sensitive to changes in the import penetration ratio. The results for India are also robust in general, though the significance of some macroeconomic variables changes: the effect of import penetration ratio becomes significant in the new model, while the effects of tariff and general retaliation are now insignificant. The positive and significant effect of the import penetration ratio in the new model is consistent with the theoretical discussion. The change in its significance may stem from its sensitivity to the number of products involved in AD cases. However, the tariff effect becomes insignificant, which indicates that the earlier finding on this variable may not be robust for India. And the general retaliation effect also becomes insignificant, which means the deterrence effect on India from other countries may also not be robust. Again we are finding evidence of less systematic drivers of AD use in the case of India in comparison to China.

Table 6: Results for Comparative Analysis with Product-level Data

Variables		China		India	
		Products Involved in AD Cases		Products Involved in AD Cases	
Macroeconomic Variables	*GDP*	-1.026***	-0.950***	-0.136***	-0.137***
		(-2.74)	(-2.60)	(-3.61)	(-3.67)
	TAR	-0.580***	-0.574***	-0.030	-0.030
		(-4.01)	(-4.13)	(-1.11)	(-1.10)
	STR	0.830	0.755	-0.302**	-0.320**
		(1.38)	(1.28)	(-2.23)	(-2.37)
	DEP	-0.148	-0.148	-0.010	-0.088
		(-1.51)	(-1.55)	(-1.37)	(-1.22)
	FGDP	0.082**	0.079**	-0.018	-0.017
		(2.06)	(2.18)	(-1.03)	(-0.95)
	EX	0.029***	0.028***	-0.001	-0.001
		(3.05)	(3.08)	(-0.57)	(-0.45)
	IMP	0.502***	0.550***	0.441***	0.513***
		(3.69)	(5.79)	(3.09)	(3.79)
Strategic Variables	*RET*	0.027*	0.023	-0.030	-0.030
		(1.66)	(1.41)	(-1.44)	(-1.42)
	CLUB	-0.018**	-0.015**	-0.005	-0.004
		(-1.98)	(-2.03)	(-0.83)	(-0.59)
	DEFL	0.032	0.030	0.0287***	0.0312***
		(1.41)	(1.47)	(3.12)	(3.47)
	ECHO	0.100***	0.094***	0.017**	0.018**
		(4.48)	(4.58)	(2.02)	(2.14)
Other Variables	*FTA*	-0.808***	-0.771***	-0.112**	-0.111**
		(-3.18)	(-3.07)	(-1.96)	(-1.96)
	REC	-3.120*	-2.847*	-0.829***	-0.860***
		(-1.81)	(-1.69)	(-2.58)	(-2.71)
	TIME	0.780**	0.731**	0.243***	0.236***
		(2.20)	(2.10)	(2.99)	(2.92)
Regression Method		Negative Binomial	Negative Binomial	Negative Binomial	Negative Binomial
Country Fixed Effect		Yes	No	Yes	No
Observations		375	375	1039	1052
Log Likelihood		-265.96	-342.03	-868.58	-1081.14

Notes: ***, **, * denote significance at 1%, 5% and 10%, respectively.

For further robustness tests, we estimate a zero-inflated count model with both AD cases and products involved in AD cases as the dependent variable. Before running the regressions, we test the appropriateness of the estimation methods for both China and India. The estimation results are reported in Table 7. Again we find that the signs of all variables and the significance of most

variables are unchanged, with the exceptions that trade dependence becomes significant for both countries and that foreign GDP growth becomes insignificant for China.

Table 7: Results for Zero-inflated Estimates for China and India of Determinants of AD Filings

Variables		China		India	
		AD Cases	Products	AD Cases	Products
Macroeconomic Variables	*GDP*	-0.996***	-1.163***	-0.103***	-0.206***
		(-3.11)	(-3.83)	(-2.57)	(-4.23)
	TAR	-0.369***	-0.454***	-0.054*	-0.074**
		(-2.96)	(-4.24)	(-1.85)	(-2.01)
	STR	0.950*	0.763	-0.317**	-0.009
		(1.86)	(1.54)	(-2.19)	(-0.05)
	DEP	-0.141*	-0.177**	-0.185**	-0.445***
		(-1.72)	(-2.44)	(-2.32)	(-4.27)
	FGDP	0.021	0.029	-0.005	-0.023
		(0.67)	(0.97)	(-0.27)	(-1.03)
	EX	0.021***	0.005	0.000	-0.003
		(2.59)	(0.65)	(0.11)	(-0.83)
	IMP	0.609***	0.372***	0.678***	0.768***
		(9.04)	(5.84)	(5.02)	(4.04)
Strategic Variables	*RET*	0.030**	0.025*	-0.0425*	-0.043
		(2.01)	(1.93)	(-1.83)	(-1.45)
	CLUB	0.010**	-0.001	0.004	0.011
		(2.15)	(-0.40)	(0.45)	(0.94)
	DEFL	0.017	0.006	0.043***	0.065***
		(0.89)	(0.39)	(3.12)	(2.87)
	ECHO	0.066***	0.083***	0.040***	0.061***
		(3.89)	(6.17)	(2.96)	(2.71)
Other Variables	*FTA*	-0.691***	-0.723***	-0.137**	-0.044
		(-3.14)	(-3.42)	(-2.15)	(-0.55)
	REC	-3.726**	-3.846***	-0.623*	-1.021**
		(-2.52)	(-2.91)	(-1.67)	(-2.12)
	TIME	0.837***	0.971***	0.289***	0.523***
		(2.70)	(3.30)	(3.21)	(4.61)
Regression Method		ZIP	ZIP	ZINB	ZINB
Observations		375	375	1039	1052
Log Likelihood		-251.98	-419.84	-845.37	-1104.274

Notes: ***, **, * denote significance at 1%, 5% and 10%, respectively.

5. Conclusions

This paper explores the differences in the pattern of AD use and the drivers of AD use and country targeting by China and India. Using panel data for periods of recent and comparable AD use we estimate models of the determinants of AD use for the two countries, which capture macroeconomic, strategic and other influences on the policy actions for these two developing countries. We find evidence of systematic influences on China's AD filings, ones generally in line with prior expectations. In contrast to the findings for to China, there is less evidence of systematic drivers of AD use by India, both in terms of macroeconomic and strategic factors.

We also find that China's AD filings are more constrained by economic growth, tariff protection, FTA participation and the global economic recession than is the case for India. This may well explain why China initiates fewer AD filings than India. Meanwhile, AD use by China is also revealed by the estimated models to be more significantly influenced by the world economy than India is. This is likely to be due to China being more deeply integrated in to the global economy than India. We find that trade dependence, foreign GDP growth and the 2008 economic recession had significant impact on China's AD filing behavior. Differences also exist between the two countries in terms of the retaliatory and contagion patterns of their AD filings. Interestingly, India's retaliatory pattern is more similar to that of the developed countries By contrast in terms of AD targets, China's AD filings target developed countries more than developing countries. This is in particular so after the recession. For India we find less systematic targeting of developed over developing countries. Being less integrated in to and less dependent on the global economy, India appears to have a less systematic approach to the strategic use and targeting of AD actions than is the case for China.

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Appendices

Appendix1: Tests for over-dispersion

Data for China:

According to the summary statistics, the variance of AD is approximately 2 times larger than the mean, displaying signs of over-dispersion. To test over-dispersion, we run a Poisson and negative binomial regression respectively, and then test their goodness-of-fit. The results are reported as follow:

Table A1: Goodness-of-fit test for Poisson regression

Deviance goodness-of-fit	= 264.069
Prob > chi2(360)	= 1.000
Pearson goodness-of-fit	= 346.977
Prob > chi2(360)	= 0.680

Table A2: Goodness-of-fit test for negative binomial regression

	Coef.	Std.Err
alpha	0.089	0.106

Likelihood-ratio test for alpha=0: chibar2(01) = 0.92 Prob>=chibar2 = 0.169

The first test statistic indicates that the Poisson model is not inappropriate (P>0.05). The likelihood ratio test for the second analysis is a test of the over-dispersion parameter alpha, and the result indicates that alpha is not significantly different from zero, consistent with the first test. Therefore, the negative binomial distribution is equivalent to a Poisson distribution in this case.

Data for India:

According to the summary statistics, the variance of AD is nearly 3 times larger than the mean, displaying signs of over-dispersion. We run the tests for over-dispersion as in the previous case. The results are as follow:

Table A3: Goodness-of-fit test for Poisson regression

Deviance goodness-of-fit	= 1183.285
Prob > chi2(360)	= 0.001
Pearson goodness-of-fit	= 1608.664
Prob > chi2(360)	= 0.000

Table A4: Goodness-of-fit test for negative binomial regression

	Coef.	Std.Err
alpha	1.192	0.178

Likelihood-ratio test for alpha=0: chibar2(01) = 162.67 Prob>=chibar2 = 0.000

For the first test, a significant level (P<0.05) indicates that the Poisson model is inappropriate. Alpha is significantly different from zero in the second test, which confirms that the Poisson distribution is not appropriate.

Appendix 2: Tests for zero-inflation

Since the AD cases in our research may contain excess zero-count data, we introduce the zero-inflated model, as well as the Vuong (1989) test to compare the inflated model with the standard count model. According to the tests for over-dispersion, we run a zero-inflated Poisson (ZIP) model for China and a zero-inflated negative binomial (ZINB) model for India respectively. For China, the Vuong test of the ZIP model versus the standard Poisson model indicates that the ZIP model is more appropriate (P>z = 0.07). As for India, the Vuong test of ZINB model versus standard negative binomial model indicates that the ZINB model is more appropriate (P>z = 0.03).

Appendix 3: Robustness check for comparative analysis of AD filings across target countries

Table A5: Results of Robustness Test for Developed and Developing Target Countries

Variables		China		India	
		AD Cases		AD Cases	
		Developing Countries	Developed Countries	Developing Countries	Developed Countries
Macroeconomic Variables	*GDP*	-1.910**	-0.647	-0.146***	-0.059
		(-2.49)	(-1.62)	(-3.83)	(-1.17)
	TAR	-0.761***	-0.506***	-0.035	-0.057
		(-3.03)	(-2.99)	(-1.24)	(-1.46)
	STR	2.570**	0.400	-0.195	-0.565***
		(2.11)	(0.60)	(-1.38)	(-3.12)
	DEP	-0.459***	-0.059	-0.105	-0.205*
		(-2.57)	(-0.54)	(-1.38)	(-1.89)
	FGDP	0.042	0.040	-0.011	0.031
		(0.84)	(0.76)	(-0.60)	(0.87)
	EX	0.034***	0.033*	-0.002	-0.000
		(2.68)	(1.89)	(-0.50)	(-0.03)
	IMP	0.588***	0.495***	0.140	0.626***
		(3.47)	(4.79)	(0.26)	(2.90)
Strategic	*RET*	0.062**	0.006	-0.038*	-0.024

Variables		(2.20)	(0.26)	(-1.78)	(-0.77)
	CLUB	-0.015	0.005	-0.002	-0.004
		(-1.40)	(0.65)	(-0.17)	(-0.53)
	DEFL	0.004	0.044*	0.014*	0.037
		(0.12)	(1.73)	(1.84)	(1.57)
	ECHO	0.134***	0.060**	0.005	0.046*
		(3.77)	(2.28)	(0.75)	(1.86)
	FTA	-1.514***	-0.387	-0.118*	-0.130
		(-2.93)	(-1.30)	(-1.95)	(-1.50)
Other	*REC*	-9.092***	-1.742	-0.706**	-0.719
Variables		(-2.62)	(-0.97)	(-2.27)	(-1.46)
	TIME	1.900***	0.345	0.236***	0.306**
		(2.67)	(0.85)	(2.87)	(2.45)
Regression Method		Poisson	Poisson	Negative Binomial	Negative Binomial
Country Fixed Effect		No	No	No	No
Observations		150	225	508	544
Log Likelihood		-60.33	-158.39	-403.85	-360.28

Notes: ***, **, * denote significance at 1%, 5% and 10%, respectively.

Notes

1. According to the results of Hausman test, both fixed and random effect models give consistent estimates when we use the panel count model. But when we use standard panel regressions, estimates with random effect are biased. Therefore, we choose the fixed effect model as the baseline model.

2. Existing estimation techniques do not provide a method to combine panel data with zero-inflation data. Therefore, we have to use both a panel count model and a zero-inflated count model. In view of the bilateral characteristics of AD filings, we take the panel count model as the baseline model and the zero-inflated count model as a robustness check.

3. In accordance with the test results for the pooled data, we run a panel negative binomial regression with and without country fixed effect for the test of statistical difference.