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Impacts of Aid for Trade on Agricultural Development and Trade

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Keywords
Aid for Trade, agricultural development, agricultural exports, agricultural GDP, agricultural ODA

Abstract
Aid for Trade (AfT) has emerged as a significant mechanism for development of the lesser-developed countries by helping them to participate in the global value chain. Given the importance of agriculture in most of the recipient countries, it is necessary to analyse the impacts of AfT on economic growth and trade, focusing only on the agricultural sector. This research aims to evaluate whether AfT has significant relations with agricultural development and trade. It also examined whether there is heterogeneity in a response to AfT across the recipient countries with different national characteristics. Our results show that AfT in agriculture has increased both agricultural GDP and exports of the recipient countries. This study also found the most effective form of AfT in agriculture which differs depending on the characteristics of each country.

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1. Introduction

Under the intensifying trade liberalization movement, the lesser-developed countries have become more isolated in the global trading system (Huchet-Bourdon et al., 2009). In terms of exports, their competitiveness is falling further behind in the global market (Huchet-Bourdon et al., 2009), while facing costs like loss of tariff income and increase of import competition (Cali et al., 2010). The World Trade Organization (WTO) recognized the problems that the lesser-developed countries have structure- and supply-related constraints to participate in international trade (Busse et al., 2011). As a response to this problem, the WTO launched the Aid for Trade (AfT) initiative at the ministerial conference held in Hong Kong in December 2005. The objective of AfT was to assist the lesser-developed countries to build the supply-side capacity and trade-related infrastructure that they need to assist them to implement and benefit from WTO Agreements and more broadly to expand their trade (WTO, 2005).

AfT is a way of Official Development Assistance (ODA) supporting trade-related areas to bring the lesser-developed countries into the world trading system. According to the WTO task force on AfT, it is mentioned that AfT is about assisting the lesser-developed countries to increase exports of goods and services to integrate into the multilateral trading system and to benefit from liberalized trade and increase market access (WTO, 2005).

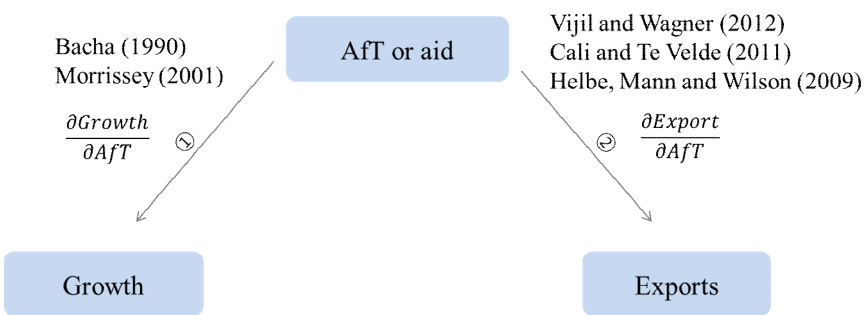
It has been more than a decade since AfT was initiated and a number of studies were conducted to evaluate effectiveness of AfT. Empirical studies have proven that aid causes growth of the recipient countries (Morrissey, 2001; Clemens et al., 2011). In addition, some studies indicate that AfT has positive impact on exports (Cali et al., 2010; Bearce, 2013). In contrast, several studies argued that aid has been ineffective in promoting economic development (Easterly, 2007; Williamson, 2010) and even some factors of AfT are insignificant when it comes to exports (Vijil and Wagner, 2012). These opposed results might be derived from two reasons: (1) The range of studies is too broad which covers the general trade market

and the whole economic growth, and (2) impact of AfT may vary depending on countries, characteristics, sub-categories of AfT etc. Many recipient countries heavily depend on agriculture thus agriculture has been the driving force of their economies (Braun and Kennedy, 1994). So it would bring implications if the scope of study is narrowed down to the agricultural sector. More specifically, the effect of AfT related to agriculture on agricultural development and exports is important to examine contribution of AfT to recipients' economic growth and alleviate poverty. Therefore, this study aims to examine impact of agricultural AfT on agricultural development and exports by undertaking a subgroup analysis of recipient countries with different national characteristics. In addition, our results suggest the most effective form of AfT which differs from country to country depending on the characteristics of each country.

2. Theoretical Framework

There are a vast number of empirical studies on impact of AfT as well as aid and most of the literatures generally have drawn results by estimating changes in economic growth and trade. These research results show that the relationship of AfT or aid with growth and exports is represented as a triangular structure (Figure 1).

Figure 1. The relationship of AfT or aid with growth and exports



2.1. The relationship between AfT and growth

As seen in the Figure 1-①, aid promotes economic growth by increasing productive investment contributing to domestic savings (Bacha, 1990; Morrissey, 2001). Moreover, aid has a positive impact on growth under good fiscal, monetary and trade policies (Burnside and Dollar, 2000). On the other hand, there are some studies which show these relationships are insignificant. Some researches on aid and growth note that aid has negative impact on economic growth by worsening democracy, bureaucratic quality, the rule of law and corruption (Djankov et al., 2006 and Knack, 2001).

2.2. The relationship between AfT and exports

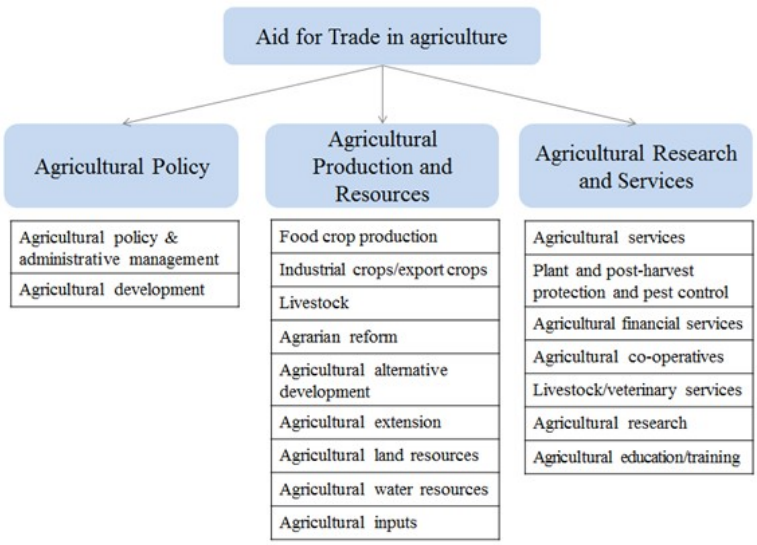
It is proven that AfT has helped the lesser-developed countries trade more efficiently, by increasing aid in infrastructure channel, reducing trade costs, facilitating reforms of trade policy and regulation (Vijil and Wagner, 2012; Cali and Te Velde, 2011; Helbe et al., 2009), represented in Figure 1-②. However some studies assert that AfT or aid does not increase exports. For instance, aid can cause increase of domestic prices by increased demand, reducing price competitiveness of local goods in international markets (Suwa-Eisenmann and Verdier, 2007). Morrissey (1993) also argued that there is reverse effect of aid on trade due to donor's self-interests.

2.3. Aid for Trade in agriculture

Most of the researches distinguish AfT into five categories (Martinez-Zarzoso et al., 2014; Vijil et al., 2012): (1) technical assistance for trade policy and regulations; (2) trade-related infrastructure; (3) productive capacity building; (4) trade-related adjustment; (5) other trade-related needs. However, since we have focused on agriculture, we distinguish the 18

detailed sectors of AfT in agriculture into 3 categories by the purpose code and characteristics: (1) agricultural policy; (2) agricultural production and resources; (3) agricultural research and services (Figure 2).

Figure 2. Aid for Trade in Agriculture by Sub-Category

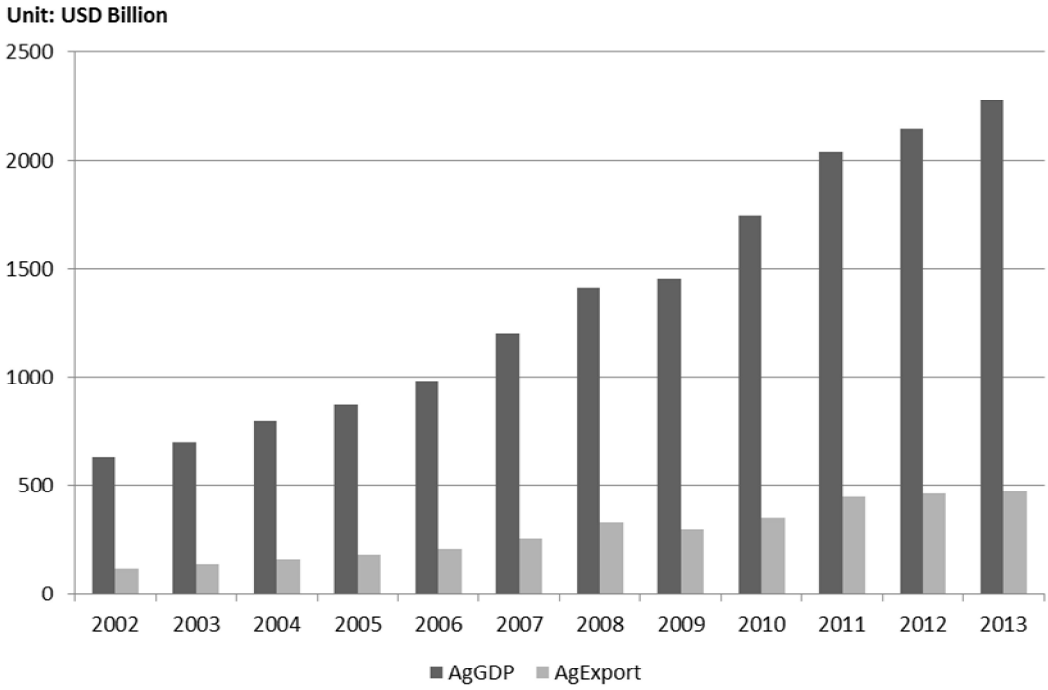


Source: OECD (2015).

Figure 3 presents the development of agriculture with increased agricultural GDP and exports of the recipient countries.[1] According to this graph, agricultural GDP constantly increased during that period. In the same period, the amount of agricultural export performance shows remarkable growth, despite the decrease recorded at the time of 2009. Compared to 2002, the total export amount more than quadrupled in 2013. Overall, AfT in agriculture as well as agricultural GDP and exports show the similar tendency which means the amount of AfT in agriculture, agricultural GDP and exports has increased in total value. Therefore, this study notes that AfT in agriculture might have influenced the agricultural development and exports.

1 71 countries are selected by existence of data from 2002 to 2013 and the list of countries is attached in Appendix Table 1.

Figure 3. Agricultural GDP and Export Trends of Recipient Countries



Source: World Bank (2015), UN COMTRADE (2015).

3. Empirical Framework and Data

Most of the variables specified in our models are based on the variables adopted in previous studies (Rajan and Subramanian, 2008; Morrissey, 2001; Nelson and Silva, 2008; Cali and te Velde, 2010). Moreover, this study used the autocorrelation test suggested by Cumby and Huizinga (1992) and the test result indicates that there might be autocorrected residuals. According to the suggestion by Granger and Newbold (1974), we included a lagged dependent variable in the equation. The use of the lagged dependent variable as an independent variable and the long disparity between the dependent variable and the AfT variable make it possible to

avoid endogenous problems. With all these relations, an equation for estimating the impacts of AfT on agricultural GDP is defined as (1).

$$AGGDP_{it} = \beta_0 + \sum_{p=0}^{P} \delta_i AfT_{it-p} + \beta_1 AGGDP_{it-1} + u_i + \varepsilon_{it} \quad (1)$$

AGGDPit indicates agricultural GDP of country *i* during the period *t*. AfT_{it-p} is the main variable of this research which is AfT in agriculture invested in country *i* during the period *t-p*. u_i means the country fixed-effect and ϵ_{it} is an error term. An equation for estimating the impacts of AfT on agricultural exports is defined as (2).

$$AGEX_{it} = \gamma_0 + \sum_{k=0}^{K} \theta_i AfT_{it-k} + \gamma_1 AGEX_{it-1} + \alpha_i + \varepsilon_{it} \quad (2)$$

$AGEX_{it}$ is agricultural exports of country *i* during the period *t*. AfT_{it-k} is AfT in agriculture invested in country *i* during the period *t-k*. Since there is time lag between AfT implementation and its effectiveness, we used Akaike Information Criterion (AIC), Schwarz Criterion (SC), Hannan Quinn (HQ) Criterion to select the optimal lag length. This study also used 9 year lagged AfT variables (*p*=9) for equation (1) and 4 year lagged AfT variables (*k*=4) for equation (2). It has been found that the period in which the AfT in the agricultural sector affects agricultural growth takes a considerably long time. In general, it is known to take many years to return the investment in the agricultural sector than the non-agricultural sector. However, since our study focuses on underdeveloped countries, the return to investment in agriculture takes longer than the average time to be effective. This is in line with the finding of Mogues et al. (2012), which points out the productivity increase effect by public investment in underdeveloped countries will continue even after 20 years and 30 years.

On the contrary, the effect of AfT in the agricultural sector on the increase of exports was shown in a relatively short time. This can be explained by the fact that even if production volume does not increase significantly, convergence of domestic supplies into exports may

raise agricultural exports, within a relatively short period of time. Since AfT in agriculture might have different effects according to the characteristics of aid, this study has divided AfT in agriculture into 3 categories and they were introduced in the previous chapter. Using the split AfT variables, estimations were conducted more in detail and they are represented as equations (3) and (4). AP_{it} is AfT related to agricultural policies of country *i* during the period *t*. APR_{it} indicates AfT related to agricultural production and resources of country *i* during the period *t*. Lastly, ARS_{it} is AfT related to agricultural research and services of country *i* during the period *t*. We also used Akaike Information Criterion (AIC), Schwarz Criterion (SC), Hannan Quinn (HQ) Criterion to select the optimal lag length of each variable.

$$AGGDP_{it} = \lambda_0 + \gamma_1 \mathrm{AP}_{it-1} + \gamma_2 \mathrm{APR}_{it-1} + \gamma_3 \mathrm{ARS}_{it-9} + \gamma_4 AGGDP_{it-1} + \qquad +\kappa_i + \varepsilon_{it} \quad (3)$$

$$AGEX_{it} = \eta_0 + \eta_1 \Delta\mathrm{AP}_{it-3} + \eta_2 \Delta\mathrm{APR}_{it-1} + \eta_3 \mathrm{ARS}_{it-4} + \eta_4 AGEX_{it-1} + \qquad +\mu_i + \varepsilon_{it} \quad (4)$$

Table 1 provides summary statistics for the variables. The period of the panel dataset used in this empirical framework includes from 2002 to 2013 and it covers 71 countries. The number of countries is decided by limited data availability of the panel. AfT data before 2002 were unavailable and the most recent data were those of 2013.

Table 1. Summary of variables statistics

Variables	Unit	Mean	Std. Dev.	Min	Max
Aid for Trade in agriculture, Total	USD million	37.747	50.222	0.000	410.083
Agricultural Policy		12.597	18.416	0.000	170.186
Agricultural Production and Resources		16.439	28.803	0.000	327.731
Agricultural Research and Services		8.061	16.474	0.000	217.029
Agricultural Exports	USD billion	4.013	9.236	0.000	84.665
Agricultural GDP, Total		19.070	68.268	0.038	892.891
Freedom(1: Low 7: High)	Number	3.761	1.433	1.000	6.500
Control of Corruption(100%: good)	Percentage	37.391	20.169	1.435	91.707
Government Effectiveness(100%: good)		40.597	18.859	1.435	87.805
Political Stability(100%: good)		33.246	20.378	0.472	92.823

(Continued)

Variables	Unit	Mean	Std. Dev.	Min	Max
Regulatory Quality(100%: good)		41.962	17.268	0.980	93.301
Rule of Law(100%: good)		36.873	18.068	0.474	89.474
Voice and Accountability(100%: good)		38.729	18.479	4.739	89.423

Data for AfT are taken from the OECD Creditor Reporting System (CRS). The system provides commitments and disbursements of official development assistance (ODA) by detailed and broad sector. Data for agricultural exports are taken from the United Nations COMTRADE (PC-TAS) database. Data on agricultural GDP are obtained from the World Bank's World Development Indicators (WDI). Data on freedom are derived from the website of Freedom House and these data indicate each country's freedom status. As the number gets smaller, the citizens of a certain country are away from freedom. Data on Control of Corruption (CC), which measures the level of public power whether it can control corruption within the countries, come from the World Bank's Worldwide Governance Indicators (WGI). For CC, the number indicates the percentage of controlling corruption of a certain country. Data on Government Effectiveness (GE), which implies quality of public service, the civil service as well as the degree of its independence from political pressures, the quality of policy formulation and implementation, the credibility of the government's commitment to such policies, are also taken from WGI in percentage. Data on Political Stability and Absence of Violence and Terrorism (PV), which show the likelihood of political instability and politically-motivated violence and terrorism, are provided from WGI in percentage. Data on Regulatory Quality (RQ), the ability of the government to formulate and implement sound policies and regulations permitting and promoting private sector development, come from WGI and they are also presented in percentage. Data on Rule of Law (RL), a measurement of the rule of society and data on Voice and Accountability (VA), which imply whether a country's citizens can participate in selecting their government with freedom of expression, are also extracted from WGI in percentage. All these data from WGI represent each country's characteristics on government environment.

4. Result

To control country-specific effects, fixed-effects models are used for estimation and the result shows that there are positive impacts of the AfT on agricultural GDP and exports. There are previous researches which underline a positive relationship between AfT and growth (Bacha, 1990; Burnside and Dollar, 2000; Morrissey, 2001) while some studies draw negative effects of AfT on growth (Djankov et al., 2006; Knack, 2001). Our result indicates that AfT in agriculture has increased agricultural GDP of recipient countries. This finding implies that AfT with the specific purposes has impacts on agricultural development although there are controversial issues in literatures related to the effects of AfT on growth in broader scope. An increase in agricultural exports also has positively influenced agricultural growth (Table 2). Most of the lagged dependent variables were significant.

Table 2. Impacts of AfT on agricultural GDP and exports

Independent Variables	Dependent Variables			
	$AGGDP_{it}$	$AGEX_{it}$	$AGGDP_{it}$	$AGGDP_{it}$
	1)	2)	3)	4)
AfT_{it-4}		7.084**		
		(2.791)		
AfT_{it-9}	58.749***			
	(15.946)			
AP_{it-1}			20.270	
			(13.652)	
AP_{it-3}				-5.252
				(6.619)
APR_{it-1}			20.447	5.165
			(19.068)	(3.542)
ARS_{it-4}				30.651***
				(6.671)
ARS_{it-9}			325.343***	
			(68.764)	
$AGGDP_{it-1}$	0.745***		0.740***	
	(0.019)		(0.018)	
$AGEX_{it-1}$		0.864***		0.849***
		(0.020)		(0.020)
Observations	213	568	213	568
Countries	71	71	71	71
R^2	0.995	0.977	0.994	0.977

Notes: * significant at 10% level; ** significant at 5% level; *** significant at 1% level; standard errors.

In columns (1) and (2), the result shows that AfT in agriculture draws positive effects on agricultural GDP and exports. The finding is in line with Vijil and Wagner (2012), Cali and Te Velde (2011) and Helbe et al. (2009). AfT was analysed to have a significant impact on the increase in agricultural GDP after a long period of time. The relationship between AfT and agricultural exports is highly dependent on the fundamental purpose of AfT to facilitate trade in recipient countries. Nevertheless, it has been analyzed that the result of AfT investment in the agricultural sector takes about 4 years until substantial agricultural exports increase.

According to the characteristics of AfT in agriculture, the coefficient values are drawn differently. In column (3), AfT on research and services including agricultural education/training, research and services, plant and post-harvest protection and pest control, agricultural financial services, agricultural co-operatives, livestock/veterinary services is statistically significant to agricultural GDP. This AfT investment showed a substantial increase in agricultural GDP after nine years. On the other hand, AfT related to agricultural policies and management and AfT related to agricultural production and resources which contains food crop production, industrial crops/export crops, livestock, agrarian reform, agricultural alternative development, agricultural extension, agricultural land resources, water resources and inputs are statistically insignificant. For agricultural exports, the coefficients of AfT on research and services in column (4) show significance while AfT related to agricultural policies and management and AfT related to agricultural production and resources are not significant. These results imply that AfT invested in agricultural production and resources is not effective although the amount used under the purpose of agricultural production and resources is high. This study has an implication that AfT used for agricultural research and services will lead to increase of the recipient countries' agricultural GDP and exports.

The heterogeneity in AfT effects with respect to political environments in recipient countries might exist. To verify this assumption, sub-sample analyses were conducted. Because of the multi-collinearity problem between indices, instead of including indices in equations, recipient countries are divided into sub-groups using mean values of indices through k-means clustering. Dividing the sample into two groups is found as the optimal k-means cluster solution and the proportional reduction of error coefficient as suggested by Makles (2012).

Table 3 and table 4 present estimates of the effect of AfT in agriculture on agricultural GDP and exports across these different sub-groups. The results demonstrate that AfT related to agricultural research and services is effective in the recipient countries with low level of freedom leading to increase of agricultural GDP (Table 3). For the recipient countries with high level of freedom, AfT had no effect on agricultural GDP growth. In both high and low-level corruption

control groups, AfT related to agricultural research and services helped to grow agricultural GDP. AfT in agricultural policy is only effective in the recipient countries with high level of corruption control. All types of AfT are significant in the recipients with high level of government effectiveness while any AfT is insignificant in the recipients with low level of government effectiveness. In order for AfT to have a positive impact on agricultural GDP growth, the effectiveness of the government was found to be very important. Regarding political stability and absence of violence/terrorism and regulatory quality, AfT in agricultural research and services is only significant in lower group. Meanwhile, for rule of law and voice and accountability, higher group indicates that AfT in research and services is effective for agricultural development. This analysis implies that the effects of AfT on the increase of agricultural GDP can be different depending on the difference of the governance environment of the country.

The estimation on agricultural exports shows that more diversified types of AfT were found to be effective in agricultural exports (Table 4). AfT in research and services has been shown to be most effective in increasing agricultural exports, except for high freedom group countries, low government effectiveness countries, and low voice and accountability countries. The recipients with low level of corruption control, low level of political stability and absence of violence/terrorism, low level of regulatory quality, low level of rule of law as well as high level of voice and accountability are influenced by AfT related to agricultural production and resources leading to agricultural exports. AfT related to agricultural policies shows positive impacts only on recipient countries with high level of regulatory quality.

Through sub-sample analyses, we found that the effective form of AfT differs depending on the characteristics of the country. And in most cases, AfT in research and services has a positive impact on agricultural GDP and agricultural trade. This study found that there are heterogeneity in the relationship between agricultural AfT and agricultural GDP and also in the relationship between agricultural AfT and agricultural exports, depending on the characteristics of recipient countries and types of AfT. However, we did not study why such a difference occurred, which is a limitation of this study. Future research will provide more rigorous verification.

Table 3. Effect of AfT in agriculture on agricultural GDP in sub-groups

	Freedom		Control of Corruption		Government Effectiveness		Political Stability and Absence of Violence/Terrorism	
Group	H	L	H	L	H	L	H	L
AP_{it-1}	4.693	-0.255	17.072 *	16.906	63.002 **	2.825	10.846	23.587
	(17.513)	(6.799)	(10.176)	(15.847)	(28.060)	(7.412)	(7.650)	(17.514)
APR_{it-1}	-2.763	-5.894	-9.215	37.364	54.927 *	-16.792	-2.126	20.342
	(23.538)	(9.714)	(11.223)	(25.443)	(32.169)	(13.034)	(10.815)	(24.295)
ARS_{it-9}	26.720	82.087 *	200.174 **	364.302 ***	586.354 ***	59.352	68.340	397.150 ***
	(80.935)	(42.847)	(84.849)	(71.719)	(123.757)	(40.261)	(55.594)	(74.724)
$AGGDP_{it-1}$	0.783 ***	-0.035	-0.143 ***	0.754 ***	0.745 ***	0.606 ***	-0.205 ***	0.757 ***
	(0.016)	(0.035)	(0.048)	(0.018)	(0.023)	(0.073)	(0.044)	(0.018)
constant	12512.31 ***	23804.29 ***	16656.87 ***	9842.248 ***	13297.62 ***	4333.234 ***	12196.68 ***	11330.56 ***
	(782.193)	(934.136)	(714.919)	(904.620)	(1466.922)	(655.138)	(516.100)	(896.713)
R^2	0.998	0.957	0.943	0.994	0.991	0.994	0.974	0.995
N	84	129	84	129	96	117	87	126
	Regulatory Quality		Rule of Law		Voice and Accountability			
Group	H	L	H	L	H	L		
AP_{it-1}	16.244	1.600	11.923	15.276	-1.527	6.638		
	(23.475)	(10.406)	(26.522)	(10.776)	(6.510)	(18.336)		
APR_{it-1}	29.845	12.232	18.553	-3.489	-6.571	-0.876		
	(28.998)	(16.801)	(30.076)	(18.851)	(9.428)	(24.238)		
ARS_{it-9}	-231.928	144.678 ***	558.551 ***	64.602	79.477 *	24.473		
	(230.486)	(48.479)	(113.620)	(51.948)	(41.764)	(82.245)		
$AGGDP_{it-1}$	0.767 ***	0.165 ***	0.750 ***	0.407 ***	-0.038	0.783 ***		
	(0.019)	(0.057)	(0.022)	(0.076)	(.035)	(0.016)		
constant	11423.18 ***	19201.91 ***	11368.01 ***	8567.885 ***	23450.52 ***	12653.71 ***		
	(855.826)	(1546.03)	(1207.90)	(1072.769)	(889.595)	(792.363)		
R^2	0.997	0.987	0.993	0.994	0.966	0.998		
N	105	108	111	102	129	84		

Notes: * significant at 10% level; ** significant at 5% level; *** significant at 1% level; standard errors.

Table 4. Effect of AfT in agriculture on agricultural exports in sub-groups

	Freedom		Control of Corruption		Government Effectiveness		Political Stability and Absence of Violence/Terrorism	
Group	H	L	H	L	H	L	H	L
AP_{it-3}	-9.651	-0.979	-7.597	-5.704	-7.358	1.051	-12.017	-9.017
	(3.791)	(9.437)	(14.100)	(7.291)	(14.412)	(2.820)	(14.302)	(6.549)
APR_{it-1}	1.865	12.148	-5.817	7.640 *	10.102	1.840	-2.232	5.786 *
	(3.791)	(7.417)	(8.425)	(4.119)	(9.154)	(1.461)	(11.365)	(3.325)
ARS_{it-4}	3.507	33.277 ***	93.558 ***	17.811 **	37.058 ***	5.742	100.410 ***	12.672 **
	(16.395)	(7.960)	(15.513)	(7.369)	(6.08)	(4.540)	(19.690)	(6.181)
$AGEX_{it-1}$	0.841 ***	0.843 ***	0.854 ***	0.840 ***	0.847 ***	0.712 ***	0.820 ***	0.908 ***
	(0.035)	(0.026)	(0.027)	(0.031)	(0.030)	(0.044)	(0.030)	(.028)
constant	931.665 ***	1053.844 ***	1199.899 ***	836.651 ***	1965.284 ***	366.622 ***	1129.963 ***	791.859 ***
	(198.562)	(218.45)	(216.655)	(184.106)	(350.617)	(60.838)	(251.150)	(159.085)
R^2	0.975	0.975	0.982	0.970	0.973	0.888	0.977	0.978
N	224	344	224	344	256	312	232	336
	Regulatory Quality		Rule of Law		Voice and Accountability			
Group	H	L	H	L	H	L		
AP_{it-3}	-25.551 **	3.045	-0.938	3.024	-1.653	-10.176		
	(12.313)	(7.879)	(12.193)	(7.287)	(9.278)	(8.913)		
APR_{it-1}	-7.847	11.659 ***	1.461	6.777 *	12.569 *	1.723		
	(7.161)	(4.296)	(7.064)	(3.993)	(7.593)	(3.743)		
ARS_{it-4}	105.456 ***	23.296 ***	29.676 ***	26.554 **	33.043 ***	3.352		
	(15.793)	(7.581)	(8.272)	(13.219)	(7.946)	(16.680)		
$AGEX_{it-1}$	0.864 ***	0.769 ***	0.889 ***	0.687 ***	0.844 ***	0.841 ***		
	(0.024)	(0.039)	(0.026)	(.038)	(.026)	(.035)		
constant	1346.092 ***	629.714 ***	1219.078 ***	811.028 ***	1047.833 ***	937.306 ***		
	(210.274)	(185.028)	(264.547)	(158.509)	(219.271)	(197.848)		
R^2	0.984	0.954	0.981	0.954	0.975	0.975		
N	280	288	296	272	344	224		

Notes: * significant at 10% level; ** significant at 5% level; *** significant at 1% level; standard errors.

5. Conclusion

As time has gone by, the globalization of the market has deepened and the lesser-developed countries have lagged behind in the global market. This issue has been regarded as one of the reasons that the lesser-developed countries have difficulty in economic development, escaping the poverty trap. To reduce such problems, AfT has appeared to help them participate in the world trade system and a growing number of studies have put efforts to examine the effectiveness of AfT. However, studies on AfT and growth, AfT and trade have not shown consistent results. We concluded that the reason for this was because the studies did not reflect the industrial characteristics of the recipient country and their range was too wide. Apart from most of the studies on AfT, this study focused on AfT in agriculture and its impact on agricultural development and exports. Since there is a limitation in getting resources of AfT amount, agricultural GDP, exports as well as the governance index altogether, the number of sample countries has been shrunk.

This study finds that AfT in agriculture increases agricultural GDP and exports leading to agricultural development. However, the effects vary depending on the purpose of AfT in agriculture. AfT used for research and services is presented as more effective than AfT invested in agricultural policy or agricultural production and resources to agricultural GDP and exports of the recipients. This finding may be partly explained by the industrial structure of recipient countries that is highly dependent on agriculture.

The subgroup analysis results show that AfT in agriculture increases agricultural development and exports especially in recipients with a relatively weak governance system. On the other hand, AfT works more effectively in those recipient countries which can control corruption within their countries, with stable political environment and absence of violence/terrorism. Some factors such as government effectiveness and rule of law are found that they do not affect agricultural exports. Therefore, this study suggests that the characteristics

of recipient countries should be considered when deciding the purpose and type of AfT in agriculture to raise effectiveness.

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Appendix

Appendix Table 1. List of recipient countries

Africa	Asia	America	Europe	Oceania
DZA	AFG	AIA	ALB	COK
AGO	ARM	ATG	BLR	FJI
BEN	AZE	ARG	BIH	KIR
BWA	BGD	BRB	HRV	MHL
BFA	BTN	BLZ	MKD	FSM
BDI	KHM	BOL	Kosovo	NRU
CPV	CHN	BRA	MDA	NIU
CMR	PRK	CHL	MNE	PLW
CAF	GEO	COL	SRB	PNG
TCD	IND	CRI	SVN	WSM
COM	IDN	CUB	States Ex-Yugoslavia	SLB
COG	IRN	DMA	UKR	TKL
CIV	IRQ	DOM		TUV
COD	JOR	ECU		VUT
DJI	KAZ	SLV		WLF
ETH	KGZ	GRD		
EGY	LAO	GTM		
GNQ	LBN	GUY		
ERI	MYS	HTI		
GAB	MDV	HND		
GMB	MNG	MEX		
GHA	MMR	MSR		
GIN	NPL	NIC		
GNB	OMN	PAN		
JAM	PAK	PRY		
KEN	PHL	PER		
LSO	SAU	KNA		
LBR	LKA	LCA		
LBY	SYR	VCT		
MDG	TJK	SUR		
MWI	THA	TTO		
MLI	TLS	TCA		
MRT	TUR	URY		
MUS	TKM	VEN		

Africa	Asia	America	Europe	Oceania
MYT	UZB			
MAR	VNM			
MOZ	West Bank and Gaza Strip			
NAM	YEM			
NER				
NGA				
RWA				
SHN				
STP				
SEN				
SYC				
SLE				
SOM				
ZAF				
SSD				
SDN				
SWZ				
TZA				
TGO				
TON				
TUN				
UGA				
ZMB				
ZWE				

Note: Country codes refer to ISO Alpha-3. Some country names appeared with full names since no ISO codes are provided.