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# An Empirical Analysis of the role of Institutional Quality in the Relationship between Foreign Development Assistance and Environmental Degradation in Developing Countries

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**Abstract**

This study examines the issue of environmental quality in 69 developing countries from the perspective of the Foreign Development Assistance (FDA) and the role of institutional quality over the period of 2000-2018, using the Generalized Method of Moment (GMM) and Least Square Dummy Variable Corrected (LSDVC). The results show that FDA have a positive but insignificant impact on the environment in the GMM approach, while it is significant in the LSDVC estimator. This indicates that the FDA does significantly increase the levels of environmental degradation in developing countries. In other words, it can be concluded that the FDA may significantly determine the levels of environmental degradation in developing countries. Furthermore, the results revealed that the interaction between FDA and institutional quality is negative and significant. This implies that FDA may reduce the levels of environmental degradation in developing countries if the governments effectively channel the funds received from foreign donors into several development agenda especially in the presence of good institutions, since FDA are other means of filling the financial gap that exists in developing countries. Therefore, we recommend that policymakers concentrate on improving the quality of institutions since it significantly determines the environmental impact of FDA.

## Introduction

Global pollution levels are increasing as global economic activity intensifies, and the ensuing cross-border pollution has become a major point of contention in current international talks and policy disputes among various countries. Acid rain, water pollution, and global warming are all examples of this type of transboundary contamination. When negative international

externalities are bidirectional, i.e., when all countries contribute to cross-border pollution, there is a significant incentive for policy coordination to mitigate environmental damage. However, in the case of unidirectional cross-border pollution, in which some countries emit pollution and others do not, the polluting countries have little or no incentive to take unilateral efforts to mitigate environmental damage (see for example, Chichilnisky & Heal, 1994).

However, there is increasing acknowledgment that the externalities associated with pollution are not country-specific and that concerted worldwide action is required to address the issue. Worldwide institutions work to liberalize the international movement of commodities and production elements, but there is limit effort to promote cross-border pollution cooperation. While developed countries generally work cooperatively to solve problems, developing countries do not always cooperate because they are primarily concerned with income-increasing or growth-promoting policies and require assistance from developed countries to pursue environmental policies as well (Hirazawa & Yakita, 2005; Panayotou, 2000). Hence, the reliance on foreign aid to meet the cost of environmental abatement and the requisite technological requirement to limit emissions.

As a result, anecdotal evidence of foreign assistance to underdeveloped countries abounds. For example, the US donated nearly $30.5 million to poor nations in 1994 alone to safeguard the environment and prevent global warming. At the International Conference on Financing for Development, the United States indicated that it would increase its official developing assistance (ODA), which is now around $10 billion, by up to 50% by 2006. The EU and numerous other donors quickly followed suit, bringing development issues to the top of the agendas of recent G-8 Summit meetings (Oladi & Beladi, 2015). On the other hand, the European Union (EU) contributed 16.5 million euros in 2006 to various environmental protection programmes in developing countries. Additionally, the EU donated approximately €200 million in environmental assistance to African, Caribbean, and Pacific (ACP) countries in 2009. Additionally, Vietnam received a total of $144 million for water sanitation, climate change, and marine conservation projects from Australia, Denmark, and the Netherlands (Cini & Borragán, 2019; Oladi & Beladi, 2015; El-Agraa, 2011). Thus, whether the pollution released by developing countries is local or global in scope, foreign environmental aid is critical for pollution mitigation. Foreign aid alone, however, is insufficient. It will need to be linked with a national policy on emission reductions.

However, when polluted countries are small emerging economies, the situation becomes much more complicated due to their inability to finance clean-up initiatives due to severe economic restrictions. Developed countries and international organizations might utilize "carrot" policies such as international transfers (foreign aid) to entice developing economies to adopt environmental protection measures. For instance, the Danish Environmental Protection Agency gives environmental assistance to Central and Eastern Europe in order to aid in the conservation of natural resources and the reduction of transboundary pollution generated by these countries. The Inter-American Development Bank (IDB), the Overseas Economic Cooperation Fund (OECF) of Japan, the European Commission, and the Global Environment Facility (GEF) all offer significant support to developing economies for pollution abatement operations.

The Millennium Declaration is a United Nations effort aimed at raising the living standards of millions of people worldwide. It contains eight objectives that symbolize human rights that everyone should be able to enjoy, including the following: ensure environmental sustainability; and establish a global development cooperation. To accomplish these goals,

much will depend on the feasibility of establishing a global partnership for development [goal (viii)], an objective that implies that international aid should not be reduced below current levels. Additionally, as Addison and Tarp (2014) included therein that the ongoing debate over the macroeconomic impacts of using aid for development indicates the need for additional research.

Concerning the goal of ensuring environmental sustainability [goal (vii)], the evidence indicates that deforestation continues at an alarming rate, biodiversity loss continues at an alarming rate, with increasing risks of dramatic shifts in ecosystems, safe water supply remains a challenge in many parts of the world, and sanitation improvements disproportionately benefit the poor. Nowadays, it is vital to ensure that economic growth and development are environmentally sustainable. Containing environmental and natural resource degradation is a significant problem for developing countries. The Clean Development Mechanism (CDM) defined in the Kyoto Protocol to provide funding for emission reduction projects, the United Nations Framework Convention on Climate Change's (UNFCCC) Reducing Emissions from Deforestation and Forest Degradation (REDD) mechanism, and the Global Environment Facility (GEF) that provides funding and/or financial instruments for projects related to biodiversity, climate change, and land degradation, among others. In the case of developing countries, these instruments typically take the form of soft loans, grants, credits, venture capital, equity, and simple assistance, which are supplied at more favourable terms to borrowers than market-rate loans (Akihisa, 2008). Foreign aid to developing nations can play a critical role in not only driving prosperity but also maintaining, if not improving, environmental quality (Muchapondwa & Stage, 2015; Omer, 2008; Lélé & Nabi, 1991).

Additionally, institutions are critical for a variety of development initiatives in underdeveloped countries, including environmental conservation and foreign finance. According to Chhibber and Laajaj (2008), countries with strong institutions grow faster and are more capable of addressing environmental challenges. The low quality of institutions prevalent in the majority of developing countries is associated with environmental degradation caused by inefficient allocation of resources and misuse of foreign assistance. Institutional factors such as inadequate governance can have a detrimental effect on environmental quality if left unchecked. Institutional characteristics such as sound laws, rules, and policies are thought to influence environmental quality. Environmental pollution can be significantly decreased with well-defined and well-implemented rules, regulations, policies, and programmes. As a result, increased institutional quality is likely to translate into increased environmental quality.

The quality of institutions largely determines donors' involvement in developing countries' policies and facilitates "selectivity," or the process of selecting recipient countries that qualify for foreign assistance based on their political stability and sound economic and social institutions and policies, with the goal of maximizing aid efficiency. One example of this type of involvement and selective assistance is the US Millennium Development Account, which will be distributed only to developing countries that demonstrate a strong commitment to good governance, public health and education, and sound economic policies that foster enterprise and entrepreneurship. On the other hand, selectivity may encourage excessive intervention in the policies of developing countries (Nanda, 2006; Hout, 2004; Wane, 2004; Sunaga, 2004). Hence, the opposition by numerous developing countries.

Hence, emerging new concepts regarding development assistance require examination, particularly in terms of institutional quality. The donor community has increasingly realized

that several poor countries, have remained impoverished despite donor efforts. These countries face governance challenges, as evidenced by insufficient economic and social structures, a scarcity of human resources, and, in many cases, a lack of justice paired with pervasive corruption. Amongst the worst-case scenarios are so-called "failing states," which hardly function at the state level. It looks unlikely to expect such countries to rely completely on self-help initiatives, with donor countries funneling aid funds that these countries are incapable of administering or applying effectively to their development needs. As a result, donors have been more receptive to examining developing countries' governance when deciding on aid programmes (Alsaleh, et al., 2021; Jaffee et al., 2011; Tierney et al., 2011; Fritz & Menocal, 2007; Sunaga, 2004).

As demonstrated by a growing body of literature, institutions account for a diverse variety of social institutions such as property rights, contract enforcement, investor protection, and the political system, all of which interact to influence economic activities and foster economically healthy environment (see Acemoglu Johnson, & Robinson, 2001; Rodrik et al., 2004). This relationship once again emphasizes the need to improve the quality of institutions in developing countries so as to benefit from the resources received from donor countries, especially those primarily targeted towards cleaning the environment. In this study, the soaring environmental problems in developing countries were investigated on the basis of foreign development assistance. Hence, this study examined the impact of foreign development assistance on the environment, considering the role of institutions in 69 developing countries. The asymptotic efficient generalized method of moment (GMM) and the bias-corrected least squares dummy variable (LSDVC) were applied to achieve this objective.

**Literature**

The literature on economic and environmental policies is broad and dates all the way back to Crocker's works on environmental and resource economics, see Crocker (1999) and Baumol's (1971). However, this review focuses exclusively on areas of environmental policy that are pertinent to this study. To begin, multiple authors examined a variety of pollution control policies (Chao & Yu, 2000; Hatzipanayotou et al., 2002, Ishikawa and Kiyono, 2006, among others). The second strand of literature, which is relevant to our inquiry, is concerned with pollution abatement activities and includes (Hadjiyiannis et al., 2009; Beladi et al., 2013). This study belongs to the third strand of literature on foreign aid directed towards environmental pollution abatement. Chao and Yu (2000), for example, examined the environmental consequences of foreign aid. Schweinberger and Woodland (2008) examine the effectiveness of foreign aid in eradicating pollution and creating employment.

Recently, several further research studied the macroeconomic effects of foreign aid while taking environmental quality into account. For example, Barañano and San Martín (2015) formulated a dynamic equilibrium model in which domestic and international resources can be used to co-finance public expenditures in infrastructure and pollution abatement. They analyzed four possibilities for assistance allocation: aid that is not related to infrastructure, aid that is wholly tied to abatement, and aid that is equally tied to both expenditures. The findings indicate that international aid efficacy is contingent on the interaction of multiple elements in the recipient country: the elasticity of substitution in production, the IES in consumption, and environmental valuation. Additionally, they discovered that when the extent to which agents are impacted by environmental concerns is considered, regardless of the likelihood of factor substitution, transfers related to

infrastructure and pollution abatement may be the most welfare-enhancing alternative. Additionally, foreign transfers must take into account the recipient countries' unique fiscal policies. They concluded that, in the majority of cases, aid that is not linked to pollution abatement programmes results in the lowest welfare gains, as these transfers improve environmental quality but have no effect on growth (Barañano & San Martín, 2015).

There is a presumption in the literature that tied foreign aid can be utilized effectively to reduce transnational pollution. In contrast, Schweinberger and Woodland (2008) cast doubt on the effectiveness of tied foreign aid in reducing pollution by examining the interaction between public and private pollution abatement provisions in the recipient country. They gained numerous policy-relevant findings in this setting. Taking changes in employment into consideration and differentiating between short- and long-run consequences. They established that tied foreign aid crowds out private pollution mitigation provision in the short run. While tied foreign aid increases employment and is thus beneficial to the recipient, it is detrimental to the donor country because it also increases pollution. Additionally, the study emphasizes the importance of the government's role, as their findings significantly improve when the government offers pollution abatement.

Additionally, the benefits of foreign aid donor countries and recipient countries given different forms of conditionalities ranging from economy structure, institutional arrangement and style of governance etc. have resulted in several cases of awareness and competition for aid (see for example, Lahiri et al., 2002). This is a strategy employed by different potential recipient countries to attract and/or divert from each other. Tsakiris et al. (2006) investigated the effects of competition for aid and found that it reduces cross-border pollution for the donor when recipients use the percentage of aid that goes to pollution abatement to get rid of aid from each other, which is what the donor wants. However, when recipients use the emission tax to take aid away from each other, it causes more pollution across borders, which is bad for everyone.

Despite the significance of environmental challenges, there is a scanty economic growth literature that incorporates environmental quality and foreign aid. To our knowledge, a sizable portion of the literature on the relationship between growth and the environment ignores the possible implications of foreign aid. The majority of research focuses on issues of optimal fiscal policy (e.g., Nguyen-Van & Pham, 2013; Barman & Gupta, 2010; Economides & Philippopoulos, 2008), with little attention paid to the relationship between environmental policies, economic growth, and foreign aid. However, Chao et al. (2012) is an exception, as they study the long-run economic and welfare consequences of assistance allocation in the recipient economy.

Furthermore, the inconsistencies in the literature could be a result of several factors, such as the level of development of the countries (see Ogaki et al., 1996), the political institutions and governance, awareness and competition for aid (see Jaffee et al., 2011; Tierney et al., 2011; Fritz & Menocal, 2007) and the empirical methodologies employed. This study therefore seeks to bridge this gap and add to the existing literature by employing a panel dataset of 69 developing countries for the period 2000–2018 to investigate the relationship between FDA and the environment using the GMM and LSDVC estimators. In addition, the role of institutional quality in the relationship between FDA and the environment would be considered.

**Empirical Model**

The empirical literature on aid-growth and/or aid-environment relationships has suffered from the lack of a comprehensive and generally acceptable theoretical framework that would identify the mechanism and empirical specification of the aid–environmental relationship. The current theoretical models exploring this relationship are mainly based on the early work of Chenery and Carter (1973) and suffer from several limitations because of several unrealistic assumptions in the model. However, this study strictly examined the impact of foreign aid on the environment while considering the role of institutional quality.

This model is specified following the idea and evidence indicates that environmental degradation continues at an alarming rate, causing biodiversity loss, with increasing risks of dramatic shifts in ecosystems, safe water supply remains a challenge in many parts of the world, and sanitation improvements disproportionately benefit the poor. This problem is more complicated, due to the inability of most of the emerging economies and developing countries to finance clean-up initiatives due to severe economic restrictions. This prompted the establishing a global partnership for development to create an international aid to tackle environmental degradation. This is in line with Griffin (1991) who maintains that foreign aid can be beneficial in a variety of ways, including disaster relief and mitigation of environmental pollution.

In this study, we extend the analysis of Chao et al. (2012) in three ways. First, we consider the impact of foreign aid on the environment of the recipient countries, which will reflect how likely countries are to channel resources from donor countries to pollution abatement. Second, since empirical estimates and the impact of aid on the environment vary depending on the level of income and institutions of recipient countries, an interaction term is introduced to capture the role of institutional quality in the aid-environment relationship. Finally, we also estimate the mode by using separate measures of institutional quality to examine their impact on the environment. Hence, we proposed a model that includes foreign aid as an explanatory variable in the environmental model.

$$EVD_{it} = \alpha + \theta X_{it} + \mathcal{E}_{it} \quad (1)$$

Where *EVD* is environmental degradation, and *X* represents foreign aid. However, following several previous empirical studies, this study extends the model by incorporating control variables such as trade openness and urbanization in the model.

$$EVD_{it} = \beta_0 + \beta_1 FDA_{it} + \beta_2 Z_{it} + \beta_3 Trade_{it} + \beta_4 URB_{it} + \mathcal{E}_{it} \quad (2)$$

Where *EVD* represents environmental degradation, *FDA* represents foreign development assistance, *Z* represents institutional quality, *Trade* represents trade openness, *URB* denotes urbanization, $\mathcal{E}$ is error term, while the subscripts *i* and *t* denote individual countries and time, respectively.

In addition, various studies have stressed the role of institutional quality on effectiveness of foreign aid. The quality of institutions mostly determines donors' involvement in developing countries' policies as well as to promote "selectivity," or the process of selecting recipient countries that qualify for foreign assistance due to their political stability and sound economic and social institutions and policies, with the goal of maximizing aid efficiency (Nanda, 2006; Hout, 2004; Wane, 2004; Sunaga, 2004). Similarly, Molenaers et al. (2015) insist that the quality of institutions affect the establishment, use, follow-up and effectiveness of foreign aid. Hence, we modify the model as thus:

$$EVD_{it} = \beta_0 + \beta_1 FDA_{it} + \beta_2 Z_{it} + \beta_3 FDAZ_{it} + \beta_4 Trade_{it} + \beta_3 URB_{it} + \mathcal{E}_{it} \quad (3)$$

Where *FDAZ* represent the interaction between foreign aid and institutions.

The system GMM and the LSDVC estimators were employed to examine the relationship between FDA and environmental degradation for 69 developing countries across 19 years. These estimators are efficient and suitable estimator for this study given the nature of the data (see Abdulwakil et al., 2020; Ibrahim & Law, 2015). The estimation procedure included a baseline model consisting of all the explanatory variable that are included in the study. Secondly, the interaction between FDA and institutions (FDAZ) was included in the model and to obtain separate results that shows the role of institutions in the FDA-environment relationship.

**The Data**

The study evaluates the relationship between foreign aid and environmental degradation in developing countries. The sample size for this study covers 69 developing countries during the period 2000-2018 (see appendix for the list of countries). These countries were selected in line with the IMF classification of countries by their level of development and data availability for the period of 2000 to 2018. Environmental degradation in this study is measure by $CO_2$ emissions obtained from the International Energy Agency (IEA). The lack of adequate data on other environmental indicators (such as greenhouse gas emissions (GHG), particulate matter, Sulphur dioxide, nitrogen dioxide and methane) especially in developing countries is the reason for selecting $CO_2$ emissions as the measure of environmental degradation.

Data on FDA, trade openness and urbanization were obtained from the World Development Indictors (WDI). Foreign aid in this study refers to net official development assistance and foreign aid received by recipient countries from donor countries. Foreign aid is a source of funding for environmental preservation in the recipient country. Most recipient countries are assumed to not have the required financial strength to meet development obligations and the cost of environmental abatement simultaneously, hence the need to be assisted by wealthier countries. Empirically, previous studies have considered the contribution of foreign aid to environmental sustainability (see, for example, Barañano & San Martín, 2015; Schweinberger & Woodland, 2008; Chao & Yu, 2000; Lahiri et al. 2002). Schweinberger and Woodland (2008) and Naito (2003) examined the effectiveness of foreign aid in mitigating pollution. These studies find that foreign aid plays a significant role in controlling or reducing global pollution.

Trade openness is measured as a ratio of trade (X+M) to GDP [(X+M)/GDP]. Theory suggests that there is a positive relationship between trade and emissions. However, Frankel and Rose (2005) incorporated this idea into their models and found an inverse relationship between the variables. Therefore, the addition of trade openness to the environmental model has theoretical and empirical underpinnings, which makes it appropriate for this study. Similarly, urbanization is measured by the percentage of the total population that resides in urban areas. When there is an increase in rural-urban drift, more emissions are experienced in urban areas where there are numerous economic activities. In the case of developing countries, there is a high rate of urbanization, which results in high population density and, consequently, a high level of demand for energy and hence increased emissions. This variable was also adopted by (Bah et al., 2020; Akinyemi et al., 2018).

The measure of institutional quality would be a single index representing all six measures of institutional quality (control of corruption, voice and accountability, regulatory quality, government effectiveness, political stability and rule of law). This composite index is used to prevent the collinearity problem that may exist between the measures of institutional quality. Data on institutional quality were obtained from WGI.

**Results and Discussion**

This section presents results of the impact of FDA on the environment for 69 developing countries for the 2000 – 2018. The period is averaged to produce a five (5) period. This was done to eliminate the possibility of the proliferation instruments which is common problem in the GMM approach. This employed the system GMM to achieve the objective of the study. Furthermore, the LSDVC estimator was applied to provide a robustness check and confirm the reliability of the results from system GMM. The estimation procedure begins with a baseline model that does not include the interaction between institutions and the FDA (Table 1). Then it proceeds to the model with interaction (see Table 2). This was done to establish a linear relationship between the variables without the addition of interaction term in the model. The estimated results show that FDA has a positive but insignificant coefficient. This implies that FDA does not significantly increase the levels of environmental degradation in developing countries. On the other hand, trade openness and urbanization have positive and significant coefficients. It suggests that trade openness has positive and significant effect on environmental degradation. While the result of urbanization implies that concentration of people in the urban areas often lead to increasing degradation of the environment. However, institutional quality appears as a catalyst to reduce environmental degradation in developing countries as it has a significant negative coefficient.

Precisely, the results suggest that a percentage increase in the openness to trade will lead to a 0.16% increase in environmental degradation in developing countries. While in the case of urbanization, a 1% increase will lead to 0.1% increase in environmental degradation. On the contrary, a percentage increase in the quality of institutions will reduce the level of environmental degradation by about 0.24% in these countries. These findings are consistent previous empirical studies related to foreign aid and the environment (see Barañano & San Martín, 2015; Schweinberger & Woodland, 2008). It is important to state that the model passed all the necessary diagnostic tests to ascertain the reliability of the results. Specifically, the model is free from the problems of second-order autocorrelation and simultaneity bias since the results do not reject the null hypotheses of the AR (2) test and the Hansen J-test, respectively.

On the other hand, the results from the LSDVC estimator, although applying all the three standard estimators namely: Arellano & Bond, Blundell & Bond, and Anderson & Hsiao, but it is noteworthy that the discussion is centered on the Arellano & Bond estimator. The estimated results presented in Table 1 show that FDA has a positive and significant coefficient. This implies that FDA significantly increase the levels of environmental degradation in developing countries. Similarly, Urbanization has a positive and significant coefficient, implying that concentration of people in the urban areas often lead to increasing degradation of the environment. While trade openness is although positive but has an insignificant coefficient. It suggests that trade openness has not significantly affected environmental degradation. On the other hand, institutional quality appears to be instrumental in the reduction of environmental degradation in developing countries as it has a significant negative coefficient. Precisely, the results suggest that a percentage increase in FDA and urbanization will increase environmental degradation by 0.015% and 0.317%, respectively. On the contrary, a percentage increase in the quality of institutions will reduce the level of environmental degradation by 0.164% in these countries.

Table 1
*Summary Results on the impact of FDA on Environmental Degradation using Difference GMM and System GMM (2000-2018)*

| | Difference GMM | System GMM | Arellano & Bond | Blundell & Bond | Anderson & Hsiao |
|---|---|---|---|---|---|
| L.emissions | 0.565*** | 0.871*** | 0.818*** | 0.939*** | 0.833*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| FDA | 0.029 | 0.026 | 0.015*** | 0.020*** | 0.015*** |
| | (0.353) | (0.293) | (0.000) | (0.000) | (0.000) |
| Institutions | -0.179** | -0.239** | -0.164*** | -0.152*** | -0.169*** |
| | (0.040) | (0.035) | (0.000) | (0.003) | (0.000) |
| Trade openness | 0.153* | 0.161* | 0.121 | 0.135* | 0.126* |
| | (0.055) | (0.095) | (0.213) | (0.094) | (0.081) |
| Urbanization | 1.173** | 0.102** | 0.317** | -0.079 | 0.258* |
| | (0.034) | (0.026) | (0.025) | (0.792) | (0.054) |
| Constant | | 0.187 | | | |
| | | (0.895) | | | |
| Number of observations | 267 | 267 | 267 | 267 | 267 |
| Number of time period (*T*) | 5 | 5 | 5 | 5 | 5 |
| Number of countries (*N*) | 69 | 69 | 69 | 69 | 69 |
| Number of instruments | 13 | 14 | - | - | - |
| Sargan test (*p*-value) | 4.60(0.467) | 22.82(0.004) | - | - | - |
| Hansen *j*-test (p-value) | 4.83(0.437) | 10.68(0.221) | - | - | - |
| AR(1) | -1.62(0.104) | -1.86(0.063) | - | - | - |
| AR(2) | 0.01(0.989) | -0.13(0.893) | - | - | - |

Notes: *p*-values are in parentheses; *, **, and *** represent significance at 10%, 5% and 1% levels of significance.

Table 2 shows the results on the role of institutional quality of the relationship between foreign development assistance and environmental degradation in developing countries, by including the interaction between institutional quality and FDA. As with the results in Table 1, the necessary diagnostic tests were carried out to ascertain the reliability of our results. Hence, the estimated variables based on the models with interaction of FDA and institutional quality are interpreted and discussed as follows: the results in Table 2 indicate that trade openness and urbanization are consistently positive and significant despite the inclusion of the interaction between FDA and institutional quality, while institutional quality is negative. However, this discussion concentrates on the interaction between FDA and institutional quality. The results revealed that the interaction between FDA and institutional quality is positive and significant. This finding is worrisome as it implies that foreign aid may further cause environmental degradation given the level of institutional quality.

On the contrary, the results of the LSDVC estimators suggest that the interaction between FDA and institutional quality is negative and significant. This implies that the relationship between FDA and environmental degradation in developing countries is dependent on the level of institutional quality. This suggests that the quality of institutions matters for developing countries to effectively channel foreign assistance into cleaning the

environment, instead of channeling the resources into other developmental activities – otherwise, the levels of pollutions may increase as FDA received by these countries increase. This is evident from the results of the linear relationship between the variables in Table 1 and Table 2. Interestingly, FDA and urbanization are consistently positive and significant despite the inclusion of the interaction between FDA and institutional quality, while institutional quality is negative.

Table 2
*Summary Results on the Role of Institutional Quality on FDA - Environmental Degradation (2000-2018)*

| | Difference GMM | System GMM | Arellano & Bond | Blundell & Bond | Anderson & Hsiao |
|---|---|---|---|---|---|
| L.emissions | 0.532*** | 0.865*** | 0.805*** | 0.933*** | 0.815*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| FDA | 0.051 | 0.031 | 0.032*** | 0.036*** | 0.032*** |
| | (0.228) | (0.429) | (0.000) | (0.000) | (0.000) |
| Institutions | -0.104** | -0.221** | -0.128*** | -0.119** | -0.132*** |
| | (0.040) | (0.019) | (0.002) | (0.021) | (0.001) |
| FDAZ | -0.008** | -0.010*** | -0.013*** | -0.010*** | -0.015*** |
| | (0.029) | (0.005) | (0.000) | (0.000) | (0.000) |
| Trade Openness | 0.173** | 0.169** | 0.130 | 0.144** | 0.135* |
| | (0.048) | (0.012) | (0.183) | (0.025) | (0.057) |
| Urbanization | 1.325** | 0.076** | 0.373** | -0.047 | 0.334* |
| | (0.022) | (0.025) | (0.021) | (0.836) | (0.091) |
| Constant | | 0.038 | | | |
| | | (0.985) | | | |
| Number of observations | 267 | 267 | 267 | 267 | 267 |
| Number of time period (*T*) | 5 | 5 | 5 | 5 | 5 |
| Number of countries (*N*) | 69 | 69 | 69 | 69 | 69 |
| Number of Instruments | 13 | 14 | | | |
| Sargan test (*p*-value) | 3.19(0.527) | 23.06(0.002) | - | - | - |
| Hansen test (p-value) | 4.72(0.318) | 10.74(0.150) | - | - | - |
| AR(1) | -1.54(0.124) | -1.82(0.069) | - | - | - |
| AR(2) | 0.25(0.805) | -0.06(0.952) | - | - | - |

Notes: FDAZ represents the interaction between FDA and institutional quality, *p*-values are in parentheses; *, **, and *** represent significance at 10%, 5% and 1% levels of significance.

Furthermore, for additional robustness check, the study estimated an additional model to show the impact of each institutional quality measure (control of corruption; government effectiveness; regulatory quality; rule of law; voice and accountability; political stability) on environmental degradation. It is worthy to note that, the variables of interest in the interpretation of the results in Table 3 are the measures of institutional quality. The results show that control of corruption, government effectiveness, regulatory quality, voice and accountability and political stability are negatively and significantly related to environmental

degradation. However, rule of law appeared not be a significant determinant of environmental degradation. These findings are in line with the assertion of earlier studies such as (Nanda, 2006; Hout, 2004; Sunaga, 2004).

**Discussion of Findings**

This study examined the impact of foreign development assistance on the environment in developing countries during the period 2000–2018. The results obtained from the system GMM indicate that environmental pollution is not significantly influenced by FDA inflow in these countries. This implies that the countries have not devoted the FDA received to cleaning up environmental pollution resulting from various development activities. On the other hand, the results obtained from the LSDVC suggest that the inflow of FDA can significantly increase the levels of pollution in developing countries. This finding is, however, not surprising as previous studies have also mentioned that the effectiveness of FDA in reducing environmental pollution may depend on the interaction of other key factors in recipient countries. These factors include (but are not limited to) the rate of substitution in production, environmental valuation and protection policies, property rights, public spending policies, and the quality of institutions (see Oladi & Beladi, 2015; Molenaers et al., 2015; Naito, 2003).

Furthermore, the results revealed that the FDA may reduce environmental degradation when it interacts with institutional quality. This implies that the level of institutional quality may influence the decision of these countries, to channel the funds from foreign assistance into cleaning up environmental pollution, rather than channelling the funds into other developmental activities given the developing countries have various development needs. However, the volume, set-up, follow-up, and effectiveness of FDA can be influenced by the political economy and the institutional structure of the recipient country. In this regard, good governance can help to differentiate between what FDA "can do" and what it "should do". Additionally, institutional quality can be both a catalyst to reduce environmental degradation and a tool to stimulate foreign aid (Jaffee et al., 2011; Barañano and San Martín, 2015).

On the other hand, trade openness has a positive and significant effect on environmental degradation. This finding is consistent with previous empirical studies such as Tran and Do (2021), Tiba and Belaid (2020), and Ling et al. (2020). According to Ling et al. (2020), trade openness will have an indirect positive relationship with emissions in the short-run, while this relationship will be positive and direct in the long run since trade openness can result in the production of pollution-intensive products in one region (say, developing countries) and importing other products from developed countries as a result of technological advancement and the demand for environmental regulation in developed countries.

Empirically, urbanisation has been cited as a major reason for the continuous environmental pollution in developing countries, as people migrate from rural areas to urban areas in search of sustenance (Bah et al., 2020; Capps et al., 2016; Destek & Ozsoy, 2015; Shahbaz et al., 2014; Uttara et al., 2012). In line with these studies, our findings indicate that urbanization has led to the concentration of people in urban areas over the years, which has resulted in increasing degradation of the environment through the pressures on industrialization housing, transportation, health care, and the demand and consumption of energy. An attempt to meet these needs has further resulted in massive construction projects and built-up infrastructure that also attract tourism and other activities that further increase local air pollution.

**Conclusion and Recommendation**

This study investigated the impact of FDA on environment degradation in 69 developing countries for the period 2000–2018. The study applied the GMM approach and the LSDVC estimator which also serves as robustness check. These methods are suitable for panel data with finite or relatively small time series and large cross sections. Furthermore, both methods are efficient estimator can produce robust estimates even in the presence of endogeneity problem. The results show that FDA have a positive but insignificant impact on the environment in the GMM approach, while it is significant in the LSDVC estimator. This indicates that the FDA does significantly increase the levels of environmental degradation in developing countries. In other words, it can be concluded that the FDA may significantly determine the levels of environmental degradation in developing countries. Furthermore, the results revealed that the interaction between FDA and institutional quality is negative and significant. This implies that FDA may reduce the levels of environmental degradation in developing countries if the governments effectively channel the funds received from foreign donors into several development agenda especially in the presence of good institutions, since FDA are other means of filling the financial gap that exists in developing countries.

On the other hand, the results revealed that trade openness and urbanization have positive and significant effects on environmental degradation. These findings imply that the concentration of people in urban areas often leads to increasing degradation of the environment. Additionally, trade openness can increase the level of environmental degradation through increased imports and exports of pollution-intensive products and structural change in the form of an increased share of manufacturing output. However, institutional quality appears to be a catalyst to reduce environmental degradation in developing countries. Therefore, institutional quality is important in the fight against environmental degradation in developing countries.

These findings have policy implications and thus this study recommends that developing countries should strive to improve the quality of institutions. since the level of institutional quality appear to influence the level of environmental degradation and most importantly, good and effective governance may help appropriate allocate the funds received through FDA into investment in R&D and more effective and cleaner production, government spending on environmental pollution abatement, and investment in energy efficient technologies. This is equally important as the level of good governance in a recipient country can also determine the rate, set-up, follow-up, and effectiveness of FDA. This is because institutional quality will not only determine the effectiveness of FDA but will also help to attract more FDA especially in the presence of conditionalities and selective from the donor countries.

Different liberalization policies should reflect environmental protection. This will ensure that these countries continue to seek to mitigate environmental damage while simultaneously supporting economic development. This may be achieved by implementing ecologically responsible industrial methods, utilizing green energy sources such as bioenergy and thermal energy, and implementing energy-efficient equipment to minimize emissions and hence pollution. Trade in dirty goods, on the other hand, is influenced by a variety of other factors, including capital abundance and industry factor intensities. Although it is impossible to restrict urbanization, policies should be in place to ensure that urbanization proceeds on the right path, causing the minimum impact on the environment.

**Reference**

Abdulwakil, M. M., Abdul-Rahim, A. S., & Alsaleh, M. (2020). Bioenergy efficiency change and its determinants in EU-28 region: evidence using least square dummy variable corrected estimation. *Biomass and Bioenergy*, *137*, 105569.

Acemoglu, D., Johnson, S., & Robinson, J. A. (2001). The colonial origins of comparative development: An empirical investigation. *American economic review*, *91*(5), 1369-1401.

Addison, T., & Tarp, F. (2015). Aid policy and the macroeconomic management of aid. *World Development*, *69*, 1-5.

Akinyemi, O., Alege, P. O., & Ajayi, O. (2018). Energy pricing policy and environmental quality in Nigeria: A dynamic computable general equilibrium approach. *International Journal of Energy Economics and Policy, 7*(1), 268-276.

Alsaleh, M., Abdul-Rahim, A. S., & Abdulwakil, M. M. (2021). The importance of worldwide governance indicators for transitions toward sustainable bioenergy industry. *Journal of environmental management*, *294*, 112960.

Bah, M. M., Abdulwakil, M. M., & Azam, M. (2020). Income heterogeneity and the Environmental Kuznets Curve hypothesis in Sub-Saharan African countries. *Geo Journal, 85*(3), 617-628.

Barañano, I., & San Martín, M. (2015). The impact of foreign aid linked to infrastructure and pollution abatement. *Review of International Economics*, *23*(4), 667-686.

Barman, T. R., & Gupta, M. R. (2010). Public expenditure, environment, and economic growth. *Journal of Public Economic Theory*, *12*(6), 1109-1134.

Baumol, W. J. (1971). Environmental protection at minimum cost. *The American Journal of Economics and Sociology*, *30*(4), 337-343.

Beladi, H., Liu, L., & Oladi, R. (2013). On pollution permits and abatement. *Economics Letters*, *119*(3), 302-305.

Capps, K. A., Bentsen, C. N., & Ramírez, A. (2016). Poverty, urbanization, and environmental degradation: urban streams in the developing world. *Freshwater Science, 35*(1), 429-435.

Chao, C. C., and E. S. H. Yu (2000), 'Foreign aid, the Environment, and Welfare'*, Journal of Development Economics,* 59, 553–564.

Chenery, H. B., & Carter, N. G. (1973). Foreign assistance and development performance, 1960-1970. *The American Economic Review, 63*(2), 459-468.

Chichilnisky, G., & Heal, G. (1994). Who should abate carbon emissions? An international viewpoint. *Economics Letters*, *44*(4), 443-449.

Chhibber, A., & Laajaj, R. (2008). Disasters, climate change and economic development in sub-Saharan Africa: lessons and directions. *Journal of African Economies*, *17*(suppl_2), ii7-ii49.

Chao, C. C., Hu, S. W., Lai, C. C., & Tai, M. Y. (2012). Foreign aid, government spending, and the environment. *Review of Development Economics*, *16*(1), 62-71.

Cini, M., Borragán, N. P. S., & Biscoe, A. (2019). *Brexit*. Oxford University Press.

Crocker, T. D. (1999). 2 A Short history of environmental and resource economics. *Handbook of environmental and resource economics*, 32(2) 32-46.

Destek, M. A., & Ozsoy, F. N. (2015). Relationships between economic growth, energy consumption, globalization, urbanization and environmental degradation in Turkey. *International Journal of Energy and Statistics, 3*(04), 1550017.

Economides, G., Kalyvitis, S., & Philippopoulos, A. (2008). Does foreign aid distort incentives and hurt growth? Theory and evidence from 75 aid-recipient countries. *Public Choice*, *134*(3), 463-488.

El-Agraa, A. M. (2011). On the Japanese retirement lump sum: loyalty no longer welcomed. *Journal of the Asia Pacific economy*, *16*(3), 489-498.

Frankel, J. A., & Rose, A. K. (2005). Is trade good or bad for the environment? Sorting out the causality. *Review of economics and statistics, 87*(1), 85-91.

Fritz, V., & Menocal, A. R. (2007). Developmental states in the new millennium: Concepts and challenges for a new aid agenda. *Development Policy Review, 25*(5), 531-552.

Griffin, K. (1991). Foreign aid after the Cold War. *Development and change*, *22*(4), 645-685.

Hadjiyiannis, C., Hatzipanayotou, P., & Michael, M. S. (2009). Public pollution abatement, regional capital mobility, and tax competition. *Southern Economic Journal*, *75*(3), 703-719.

Hatzipanayotou, P., S. Lahiri and M. Michael (2002), 'Can Cross-Border Pollution Reduce Pollution? *Canadian Journal of Economics*, 35, 805–818.

Hirazawa, M., & Yakita, A. (2005). A note on environmental awareness and cross-border pollution. *Environmental and Resource Economics*, *30*(4), 369-376.

Hout, W. (2004). Political regimes and development assistance: The political economy of aid selectivity. *Critical Asian Studies*, *36*(4), 591-613.

Ibrahim M. H. & Law S. H. (2015). Institutional Quality and CO2 Emission–Trade Relations: Evidence from Sub-Saharan Africa. South African Journal of Economics 84:323–340.

Ishikawa, J., & Kiyono, K. (2006). Greenhouse-gas emission controls in an open economy. *International Economic Review*, *47*(2), 431-450.

Jaffee, S., Henson, S., & Diaz Rios, L. (2011). Making the grade: Smallholder farmers, emerging standards, and development assistance programs in Africa-A research program synthesis.

Lahiri, S., Raimondos-Møller, P., Wong, K.-y., and Woodland, A. D. (2002): ''Optimal Foreign Aid and Tariffs.'' Journal of Development Economics *67*: 79–99.

Lele, U., & Nabi, I. (1991). The role of aid and capital flows in economic development. *American*

*Journal of Agricultural Economics*, *73*(3), 947-950.

Ling, T. Y., Ab-Rahim, R., & Mohd-Kamal, K. A. (2020). Trade openness and environmental degradation in asean-5 countries. *International Journal of Academic Research in Business and Social Sciences, 10*(2).

Molenaers, N., Dellepiane, S., & Faust, J. (2015). Political conditionality and foreign aid. *World Development*, *75*, 2-12.

Muchapondwa, E., & Stage, J. (2015). Whereto with institutions and governance challenges in African wildlife conservation? *Environmental research letters*, *10*(9), 095013.

Naito, T. (2003), 'Pareto-improving Untied Aid with Environmental Externalities', *Journal of Economics 80* (2), 161–169

Nanda, V. P. (2006). The "good governance" concept revisited. *The ANNALS of the American academy of political and social science, 603*(1), 269-283.

Nguyen T. V. H., & Cao, T. H. V (2013). The Impact of Institutional Quality on Foreign Direct Investment (FDI) Inflows to Vietnam

OECD. (2003) Foreign Direct Investment for Development maximum benefits, minimum cost

Oladi, R., & Beladi, H. (2015). On foreign aid, pollution and abatement. *Environment and Development Economics, 20*(6), 797-812.

Omer, A. M. (2008). Energy, environment and sustainable development. *Renewable and sustainable energy reviews*, *12*(9), 2265-2300.

Panayotou, T., Peterson, A., & Sachs, J. D. (2000). Is the environmental Kuznets curve driven by structural change? What extended time series may imply for developing countries.

Rodrik, D. (2007). One Economics, Many Recipes: Globalization, Institutions and Economic Growth, Princeton University Press, Princeton, NJ, USA

Schweinberger, A. G., & Woodland, A. D. (2008). The short and long run effects of tied foreign aid on pollution abatement, pollution and employment: a pilot model. *Journal of Environmental Economics and Management*, *55*(3), 310-325.

Shahbaz, M., Sbia, R., Hamdi, H., & Ozturk, I. (2014). Economic growth, electricity consumption, urbanization and environmental degradation relationship in United Arab Emirates. *Ecological Indicators, 45*, 622-631

Sunaga, K. (2004). The reshaping of Japan's official development assistance (ODA) charter. *FASID (Foundation for Advanced Studies on International Development) Discussion Paper on Development Assistant,* (3), 4.

Tiba, S., & Belaid, F. (2020). The pollution concern in the era of globalization: Do the contribution of foreign direct investment and trade openness matter? Energy Economics, 92, 104966.

Tierney, M. J., Nielson, D. L., Hawkins, D. G., Roberts, J. T., Findley, M. G., Powers, R. M., & Hicks, R. L. (2011). More dollars than sense: Refining our knowledge of development finance using Aid Data. World Development, 39(11), 1891-1906.

Uttara, S., Bhuvandas, N., & Aggarwal, V. (2012). Impacts of urbanization on environment. International Journal of Research in Engineering and Applied Sciences, 2(2), 1637-1645.

## Appendix

Table 3

*Summary Results on the Impact of Institutional Quality on Environmental Degradation*

| | Emissions | Emissions | emissions | Emissions | emissions | Emissions |
|---|---|---|---|---|---|---|
| L.emissions | 0.968*** | 0.967*** | 0.968*** | 0.965*** | 0.967*** | 0.965*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| FDA | 0.002 | 0.002 | 0.001 | 0.002 | 0.000 | 0.001 |
| | (0.792) | (0.771) | (0.850) | (0.784) | (0.999) | (0.901) |
| Control of Corruption | -0.044*** | | | | | |
| | (0.000) | | | | | |
| Govt. Effectiveness | | -0.033*** | | | | |
| | | (0.000) | | | | |
| Regulatory Quality | | | -0.031*** | | | |
| | | | (0.000) | | | |
| Rule of Law | | | | 0.046 | | |
| | | | | (0.131) | | |
| Voice and Accountability | | | | | -0.032*** | |
| | | | | | (0.000) | |
| Political Stability | | | | | | -0.063*** |
| | | | | | | (0.000) |
| Trade Openness | 0.058** | 0.062** | 0.060** | 0.065*** | 0.061** | 0.065** |
| | (0.021) | (0.016) | (0.023) | (0.009) | (0.020) | (0.016) |
| Urbanization | 0.028 | 0.026 | 0.027 | 0.025 | 0.036 | 0.029 |
| | (0.689) | (0.699) | (0.655) | (0.716) | (0.593) | (0.647) |
| Observations | 1205 | 1205 | 1205 | 1205 | 1205 | 1205 |
| Countries | 69 | 69 | 69 | 69 | 69 | 69 |

Note: This model was estimated using LSDVC initiated by the Arellano and Bond estimator, *p*-values are in parentheses; *, **, and *** represent significance at 10%, 5% and 1% levels of significance

Table 4

*List of Countries in the Sample*

| | | |
|---|---|---|
| Chile | Iraq | India |
| Mauritius | Jamaica | Kenya |
| Panama | Jordan | Kyrgyz Republic |
| Uruguay | Kazakhstan | Moldova |
| Algeria | Lebanon | Mongolia |
| Armenia | Malaysia | Morocco |
| Azerbaijan | Mexico | Nigeria |
| Argentina | Namibia | Pakistan |
| Albania | Paraguay | Philippines |
| Botswana | Peru | Senegal |
| Bosnia and Herzegovina | South Africa | Tanzania |
| Brazil | Thailand | Tunisia |
| Bulgaria | Turkey | Ukraine |
| Belarus | Angola | Uzbekistan |
| China | Bangladesh | Vietnam |
| Colombia | Bolivia | Zambia |

| | | |
|---|---|---|
| Costa Rica | Cameroon | Zimbabwe |
| Dominican Republic | Cambodia | D.R. Congo |
| Ecuador | Congo, Rep. | Benin |
| Gabon | Cote d'Ivoire | Mozambique |
| Georgia | El Salvador | Niger |
| Guatemala | Ghana | Sudan |
| Iran, Islamic Rep. | Honduras | Togo |