IS POVERTY A KEY FACTOR FOR AID ALLOCATION IN BASIN AREAS? A STUDY ON SIX LOW- AND MIDDLE-INCOME BASIN AREAS

A POBREZA É UM FATOR RELEVANTE PARA ALOCAR AJUDA EXTERNA EM ZONAS DE BACIA? UM ESTUDO EM SEIS ZONAS DE BACIA DE RENDAS BAIXA E MÉDIA

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Abstract: This paper aims to answer if poverty rates functions as a key factor for the total amount of aid allocated to the countries of the Amazon Basin, the Bay of Bengal, the Caspian Sea, the Congo Basin, the Niger Basin, and the Nile Basin. Both governmental discourse and the allegations by international organisations engaged in aid allocation value poverty as a critical factor for aid giving. Therefore, the data was analysed with the use of a multiple linear regression model with log transformations on variables, such as GDP and the total value of aid, to evaluate the degree to which poverty rates influence aid allocation. Exploratory data analysis and the results of the model have shown that the effects of the poverty rate on the amount of aid allocated to the countries are mostly negative yet minimal.

Key-words: Poverty rate. International aid. Economic development. Basin regions.

Resumo: Este artigo busca responder se as taxas de pobreza funcionam como um fator relevante para alocar verba de ajuda externa para os países da Bacia Amazônica, da Baía de Bengala, do Mar Cáspio, da Bacia do Congo, da Bacia do Niger e da Bacia do Nilo. Discursos governamentais e alegações de organizações internacionais envolvidas em alocação de ajuda externa mencionam a pobreza como um dos principais fatores para seu fornecimento, apesar de a literatura sugerir o contrário. Assim, dados de pobreza, ajuda e similares foram analisados, por meio de um modelo de regressão logarítmica linear múltipla para avaliar o grau com o qual as taxas de pobreza influenciam a alocação de ajuda externa. A análise exploratória dos dados e os resultados do modelo sugerem que os efeitos das taxas de pobreza no valor total de ajuda externa para os países em zonas de bacia são majoritariamente negativos, ainda que mínimos.

Palavras-chave: Pobreza. Ajuda externa. Desenvolvimento econômico. Zonas de bacia.

Introduction

There is no doubt that foreign aid is one of the most familiar tools for facilitating relations among countries. As time goes by, foreign aid has taken many forms within the scope of international cooperation. Aid can be bilateral, multilateral, or condition-based. It can also be used for a variety of

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purposes. Therefore, it is not surprising that many studies in Political Science and International Relations have focused on international aid.

The motivations behind foreign aid are not always self-evident. Neither is its relationship to development and poverty. Moreover, the relationship between the last two is blurred too, both within the Academia and in policy-making. Hence, aid is a challenging topic to be studied. The literature suggests that there is a common belief that donors decide to give aid because they aim to promote global development and to reduce poverty in developing countries. It is also true, however, that this action of more prosperous countries and international organisations does not present itself without interest.

Another topic that picks up scholarly attention in International Relations is the study of common environmental grounds, which are mainly derived from Elinor Östrom's (1990) propositions. There is a growing number of scholars debating the degree to which these common grounds—like the basin areas herein presented—have any effect on how world politics affect the nations that share this common space and vice versa.

With this in mind, the research question proposed here is the following: what impact does the poverty rate have on the total amount of aid allocated to low- and middle-income countries in relevant basin areas? To pursue the data and then proceed to the analysis, the first hypothesis set was that poverty rates had a marginal yet negative effect on the allocation of aid to these countries. The literature findings support the hypothesis.

Hence, the null hypothesis was divided into two branches. The first one is that poverty rates have no effect at all on aid allocation and the second one is that its effects on aid allocation are positive, based on the ever-lasting claim made by governments and international organisations that one of the main reasons aid is given is to alleviate poverty.

This is a non-extensive study on the weight of poverty rates on the total amount of aid disbursed by international organisations and developed nations, to the countries in the basin areas, without considering many of the parameters that are usually set for a case-by-case study. In other words, inquiries on conditionality, bilateral and multilateral agreements, and the amount of aid needed by a given country are excluded from the analysis. To fulfil this main goal of analysing how poverty rates affect aid in relevant basin areas, this paper debates international aid, poverty, and development

theoretically, setting the groundwork for the analysis with the support of a multiple linear regression model with log transformations.

1. International aid, poverty, and development: a not-so-self-evident relation

In the discussions in Political Science and International Relations literature, it is often implied that international aid—frequently called foreign aid—aims to promote economic development and reduce poverty. It is no novelty, however, that there is more to international assistance than just this rather broad objective.

International aid is placed within the context of international cooperation. Interpretations on the genesis of international cooperation set up different starting points for understanding foreign aid. They usually span from Mario Dehove's (1998) interpretation that since the very foundation of the Westphalian state, the basis for the development of this form of cooperation was laid, to post-war theorists claiming that the unfolding of international cooperation came to light with the creation and establishment of the Bretton Woods organisations.

There between, Craig Murphy (2014) argues that European concertation before World War I, supported by international public unions, was international cooperation's first milestone, while Maria da Conceição Tavares and Luiz Gonzaga de Mello Belluzzo (2004) see the formation of the *Pax Britannica* as its onset (Santana, 2017). Whichever is the case, according to Carol Lancaster (2007), international aid—as known today—was a puzzling topic before the end of World War II, in which the main transactions were addressed mostly to humanitarian programs.

Morgenthau (1962) demonstrated that aid-giving has many objectives, and the reasons behind it are broad. Along with Morgenthau's beliefs, there is a core group of theorists in the area who believe that international aid aims primarily—but, of course, not exclusively—at economic development and poverty tackling. Poverty and economic development, however different, are intertwined, and their mutual relations and their relations with international aid are far from being self-evident (Lancaster, 2007). Therefore, some scrutiny on their relationship is needed before proceeding to the theory that underlies them.

Regarding aid an economic development, in his 1962 paper to the American Political Science Review, *A Political Theory of Foreign Aid*, Morgenthau presented the various shapes international aid could take. He did not only describe the different forms of international aid, but also analysed them

within the context of development policy. According to him, aid for humanitarian purposes, aid for subsistence, bribery, aid for prestige, and aid for development are the different forms international aid takes.

Lancaster (2007) adds that aid has been used to promote democracy and support economic transitions, like those of the former Soviet nations, especially in the countries that had to build their capitalist systems from scratch.

In Morgenthau's (1962) interpretation, though, international aid for development not only became institutionalised, but was also expected to happen by both donor and recipient governments, as well as by international organisations. Its institutionalisation made transfers viable and rationalised, and it highlighted the notion that rich countries must take responsibility for helping the poor ones. It also actuated so-called middle-income countries, like Brazil, Thailand, and Turkey, and low-income countries, like China, Azerbaijan, and India to engage in a dual give-and-take role in international aid logistics (Lancaster, 2007). Put differently, middle- and low-income nations usually receive aid from more affluent countries while developing aid-giving programmes for other developing countries.

If Lancaster (2007) is correct in saying that only after the 1950s did international aid start to be widespread and institutionalised, then Truman's Point Four Programme was its kick-off. In short, Truman's Point Four Programme proposed technical assistance to developing countries. It set the United States as the model nation of development in a Cold War context, when both the Soviet Union and the United States were racing for international influence and technological advancement.

According to Rist (2002), Truman's Point Four made the US scientific knowledge and industrial progress available to underdeveloped regions so that they could improve their economic development. The official reason given to justify Truman's project of giving aid to underdeveloped nations was that "more than half the people of the world [were] living in conditions approaching misery. Their food [was] inadequate. They [were] victims of disease. Their economic life [was] primitive and stagnant. Their poverty [was] a handicap and a threat both to them and to more prosperous areas" (Truman, 1949).[2]

Point Four Programme also evoked other developed nations to promote development, as it did to private capital and large enterprises. Providing aid to poorer countries was a way to ensure that not

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[2] All the verbs in brackets are in the simple present tense in the original passage.

only the threat of communism would be dispelled, but that the US cultural system and economic practices would be exported to the rest of the world (Rist, 2002).

Morgenthau (1962) argues that, due to a rather traditional belief in the Academia, technical knowledge and the formation of capital are interpreted as the main tools for the economic development of poorer nations—and, at the same time, to the reduction of poverty. Although Morgenthau wrote his argument back in the 1960s and the main theoretical approaches to poverty and development have changed over the decades, Lancaster (2007) shows that many studies of International Relations either take the relationship between the promotion of technical knowledge and the growth of Gross Domestic Product (GDP), or their relation with development to be self-evident.

In other words, the central belief within the political arena is that poorer countries cannot achieve development because they lack expertise and money (Hanlon, Barrientos, and Hulme, 2010). It consequently neglects many challenges faced by these countries, such as difficulties in accessing resources and social and political burdens, among other shortages (Hanlon, Barrientos, and Hulme, 2010).

This thinking found its way into the Academia with the Industrial Revolution and was expanded after Truman's Point Four Programme. Despite being long-living and self-supportive, it seems not to be able to provide a solution to inequality and poverty, regardless of overall GDP growth around the world (Rist, 2002).

Writing critics about the Theory of Development, Cardoso and Costa Pinto (2016) argue that regardless of the theoretical bone supporting the different approaches to under-development and poverty, their main goal is to promote capitalist accumulation and translate it into economic development. In this sense, the higher the accumulation of capital by a given nation, the higher its development. If poverty and development are intertwined, it is then not surprising that many of the studies on international aid take GDP measurements as their main variables.

The way poverty has been addressed has also changed over the course of history. At the same time, the way it interacts with development has changed *vis-à-vis*. It is therefore essential to look at how aid is theoretically influenced by poverty.

Hence, it should be noted the relationship between aid and poverty. Poverty and development seem not to be separate. For many authors, poverty and development are concepts that are intertwined, and the reduction of poverty is thus tightly associated with the growth of development indexes (Hall

and Midgley, 2005). If development and poverty are intertwined and the most institutionalised form of aid is the one that aims at development, then international aid also aims at reducing poverty (Lancaster, 2007).

When trying to turn poverty into numbers, the most classical approach used by national states and international organisations is the poverty line. Poverty lines are used to promote policies for poverty reduction and to estimate the population that fails to cross that line upward.

Salama and Valier (1996) argue that it is rather difficult to address the limits of a poverty line accurately. Its principles, however, are simple and easy to put into categorisation. According to them, the basic basket of goods—an agreed-upon minimal set of goods needed for the reproduction of a person and his home—is the main backbone of poverty lines.

Similarly, Hall and Midgley (2005) add that the basic basket of goods guides the income limit that will be set as the cut-off point for the poverty line. Many times, they argue, the quantification of the minimal consumption needs of a person is made by calculating the number of mean calories needed for human survival and transforming it into the goods that are consumed in a given society. Once all products are calculated, their sum reflects the poverty line. A more precise basic basket of goods will have the caloric needs of a person added to the mean expenses for other human needs, such as housing, transportation, and clothing. This sum represents Engels' Coefficient.

Poverty lines are used worldwide. However, they are targeted at critics mainly because they might be scarce and non-realistic. They also generate some degree of complacency, which may erroneously foster the belief that GDP growth (especially in *per capita* terms) and income rising are enough to tackle poverty (Hall and Midgley, 2005).

Yet problematic, international organisations, like the United Nations and the World Bank, continue to use poverty rates to address, evaluate, and implement policies and programmes for poverty reduction. The World Bank first used poverty lines in 1970. The well-known "one dollar a day poverty line" reflects the percentage of the global population, or of a given area, that lives with less than USD 2,15 a day[3] and therefore is considered to be living in absolute poverty.

Side by side with poverty lines, GDP and GDP *per capita* are also up for discussion. Many economists and researchers argue that both indicators are relevant for the comprehension of national

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[3] This value was originally USD 1,25 a day, but due to the global rising cost of living, the World Bank's poverty line had to be adjusted to reflect these changes. With a new price set, the USD 2,15 real value corresponds to the same real value as the previous USD 1,25 and USD 1,90 poverty lines.

and individual economic well-being, respectively, and are used in comparative studies between countries as well as in time-series studies in many subjects (Harvie et al., 2009).

Many other indicators have been created throughout the years. The Human Development Index (HDI), for instance, adds basic education and access to a fair health system to the measures of poverty, while the Gini index calculates inequality (Hall and Midgley, 2005).

In a 1991 report entitled *Development*, the World Bank advocated that economic growth is needed to promote improvement in the quality of people's lives. Development, however, fostered without policies that target the least-off in an economic set, will generate more inequality and create barriers for poor people to join economic activity effectively.

The above-mentioned report represented a shift in poverty thinking as it presented that economic development, by itself, is not enough to reduce poverty. In short, the report reads that decreasing poverty incidence became one of the tools to achieve development instead of being a consequence of it. "A rising tide sinks leaking boats", say Hanlon, Barrientos and Hulme (2010, p. 21).

Poverty, therefore, is seen as a handicap for development and must be addressed alongside the pursuit of economic growth. As poverty and development became more intertwined, Kraychete (2012) argues that the United Nations' high level fora gave more power to international organisations to reinforce the implementation of management methodologies similar to those of private corporations to tackle problems of income distribution and poverty fighting.

While the belief that "growth is good for the poor" became legitimate and dominant (Dollar and Kraay, 2002; Dercon, 2003), many authors suggest that despite growth processes, the poor in many underdeveloped countries remained in the same situation as before or had their situations worsened (Dercon, 2003; Salama and Valier, 1994; Hall and Midgley, 2005; Hanlon, Barrientos, and Hulme, 2010). In fact, by revisiting Adelman and Morris' studies, Hall and Midgley (2005, p. 85) argue "[…] that economic development was not only accompanied by high social gap but also caus[ed] an absolute decline of poor group income [and …] that poor people will be better if there was no economic growth at all".

In summary, despite the several methods to measure poverty, it was always attached to economic development. Whether as a consequence of growth—that is, as a nation develops, it gets the resources to tackle poverty, and as a nation falls short of economic resources, poverty will be affected by increasing rates—or as one of the means to achieve it.

2. Is there a reason for aid allocation?

There are critics and praises for international aid. Critics will argue that aid is ineffective and, therefore, needs to be reduced. Supporters of aid, in turn, not only advocate that aid works but try to find ways to improve its effectiveness (Lancaster, 2007; Hanlon, Barrientos, and Hulme, 2010). Effective or not, aid has become widespread and institutionalised to the point that by changing its aid policies, a country may affect its political perception both locally and internationally.

Summarising aid from diverse International Relations theories, Lancaster (2007) says that realists interpret aid as a hard-headed strategic tool, in which power, security, and survival are embedded as the primary goals of aid-providing nations in an anarchic system. Using the theory of dependence, marxists see aid as a tool by which the central powers in the international order maintain their position and the *status quo* of the international division of labour.

Leaving aside the driving engine of marxist studies—capitalism— Lancaster sees marxist and realist theories as similar: in both, aid-giving is perceived as a tool used by influential countries to maintain or exercise their control and power over their sphere of influence. Liberalists, on the other hand, characterise aid as the mirror device that reflects the tendency of states to cooperate in addressing problems of interdependence and globalisation.

Finally, constructivist approaches look at rich countries taking responsibility for global poverty and being morally obliged to intervene on humanitarian issues. Hence, "support for aid was a response to world poverty, which arose mainly from ethical and humane concern and, secondarily, from the belief that long-term peace and prosperity were possible only in a generous and just international order where all could prosper" (Lumsdaine, 1993, p. 3). Hence, poverty is, in this constructivist view, theoretically linked to aid-giving.

International cooperation's success "depends in good measure not so much upon its soundness in strictly economic terms as upon intellectual, moral, and political preconditions, which are not susceptible to economic manipulation, if they are susceptible to manipulation from the outside at all" (Morgenthau, 1962, p. 307). In other words, Morgenthau was saying that conditions already present in recipient nations that donor nations cannot manipulate are the main vectors that will determine if international cooperation will be successful or a total failure.

Riddell (2007), in turn, argues that what dooms foreign aid not to reach its full potential is exactly the high control of the donors over the donations. Put differently, recipient nations have little control over what to do with the money disbursed to them through international aid. The recipient nations' lack of freedom creates a paradox in which donors blame recipient nations for the inefficient use of resources, while the latter are always expecting more aid and labelling the first as stingy. This lack of freedom present in Riddell's (2007) work recalls the concept of appropriation and the effectiveness and efficiency of international aid.

According to Kraychete (2012, p. 225), international cooperation changed alongside the development agenda. Already in 1996, the pursuit of effectiveness and efficiency was "appointed as the way to recover the prestige of international cooperation for development", but it was only after the turn of the 21st century that this approach became institutionalised under the International Conference on Financing for Development in Monterrey, Mexico.

After that, many United Nations high-level fora were devoted to development and international aid. Some of the most important ones are the 2003 Rome Declaration on harmonisation, the 2005 Paris Declaration on Aid Effectiveness, the 2008 Accra Agenda for Action, and the 2011 Busan Partnership for Effective Development Cooperation. All of the documents aimed to converge practices for the harmonisation of policies in search of the success of international aid. As aforementioned, the guidelines originated in the fora gave international organisations more power over national governments receiving aid and exported to the recipient's public bureaucracy a corroborative management culture.

Despite its allocation for a variety of purposes, it seems that there is great disparity between what governments and international organisations say and what they actually do to decide the destiny of aid (Carothers and De Gramont, 2013). The official discourse is that aid promotes development and tackles poverty. Since official development aid has become so institutionalised, the provision of aid is not questioned.

It may be easy to claim that the main reason governments and international organisations give aid is because they want "to save lives in emergencies and to contribute to development, growth, and poverty eradication in poor countries. However, this provides a very incomplete picture, particularly of why governments provide aid" (Riddell, 2007, p. 91).

Rich countries have taken responsibility for aiding underdeveloped nations (Lancaster, 2007; Riddell, 2007; Hanlon, Barrientos, and Hulme, 2010). However, the reason they allocate a budget to aid giving is somewhat blurry. Riddell (2007) says that there is no official system for the allocation of aid. In addition, the amount provided by a donor does not necessarily reflect the needs of the recipient countries, and the decision seems to be based solely on domestic terms. That is, each country and international organisation decides how much to give to a specific country without considering the policies of other countries and organisations.

The study of why aid is given has its complexities. Riddell (2007) argues that the theoretical distinctions between aid for development and other types of support are usually blurred together. In addition, in statistical analysis, the amount of aid disbursed is often put in contrast with ideal allocations based on some poverty criteria, traditionally determined by *per capita* income levels; aid-effectiveness and overall levels of poverty are often variables put into models and running statistics.

A surprising fact, however, is that "the distribution of official aid to countries at different levels of development reveals a considerable mismatch between aid provided and overall levels of poverty, as measured by average *per capita* income" (Riddell, 2007, p. 102).

The most significant findings of international aid research are the following: the largest amount of aid *does not* go to the poorest countries, large poor countries receive relatively less aid *per capita* if compared with other equally poor nations, and, finally, aid allocation should be based on more poverty criteria for it to be significant to poverty reduction (Riddell 2010). In summary, aid is primarily allocated for political, commercial, or other purposes that do aim at development but that do not necessarily have a positive impact on poverty reduction (Lancaster, 2007; Riddell, 2007).

Both Lancaster (2007) and Riddell (2007) argue that ideology and the pursuit of economic advantages are essential in the decision of aid allocation. The donor's national interests and geopolitics are also important to evaluate why a given country or organisation has allocated a certain sum to another country. The argument behind it is that if aid is allocated in a given place for the wrong reasons, then the evaluation of its effectiveness will translate into a vain pursuit.

The justifications provided by mainstream international organisations are also under scrutiny by scholars. According to Thomas Carothers and Diane de Gramont (2013), the action of international organisations in international aid arena has been tied to the fostering of good governance, such as the promotion of public access information by the governments of recipient countries, the setting of

participatory budgeting, citizen monitoring of public service provision, public interest advocacy campaigns for policy reform, capacity building for activists and journalists on governance issues, and right awareness and civic education efforts. Becoming more political and working closely with civil society sectors, international organisations foster the spread of democracy and its tools, as also aforesaid in Kraychete's (2012) studies.

Altogether, GDP values—total or *per capita*—poverty rates, average income, and other economically relevant variables are taken into account when international aid is analysed as a whole, without any focus on a particular case. When focus is given, variables that will associate national interests and geopolitics, as well as the need for aid in a specific country or set of countries, are also used to more accurately address the interpretations of the data collected.

3. The data

To analyse poverty and the total amount of aid received by the countries in the basin areas within the context of International Relations quantitatively proved to be no easy task. The data collection[4] and their analysis required extensive search and adaptation. The final data set comprised data on twenty variables and on forty-two countries from six different politically relevant basin areas around the world.

Numerically, there were eight countries for the Amazon Basin, the Congo Basin, and the Caspian Sea drainage area; seven countries for the Nile Basin, six for the Niger Basin, and five countries for the Bay of Bengal.

The Amazon Basin countries are straightforward and did not need any special adaptation. Bolivia, Brazil, Colombia, Ecuador, Peru, Venezuela, Suriname, and Guyana are the countries that comprise the list. On the African continent, there are three different regions: the Congo Basin area lists both the Republic and the Democratic Republic of Congo as well as Tanzania, Zambia, Angola, the Central African Republic, Cameroon, and Gabon. The Nile Basin, in turn, comprises Egypt, Uganda, Ethiopia, Rwanda, Sudan, Burundi, and Kenya. Due to a lack of data, South Sudan was excluded from the final analysis in the Nile Basin region. Finally, the Niger basin includes, for this study, Guinea, Benin, Niger, Sierra Leone, Mali, and Nigeria.

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[4] The aid and population data were retrieved from the Quality of Government (QoG) 2019 Time Series Standard data-set. (QOG Institute, s.d.) Most data relating to poverty were retrieved from the World Bank's PovcalNet platform (The World Bank, s.d.).

The five Bay of Bengal countries included in this study are Bangladesh, India, Indonesia, Myanmar, and Sri Lanka. A special note must be given to the Caspian Sea drainage area: the countries in the basin are Azerbaijan, Iran, Kazakhstan, and Turkmenistan. Russia is also on the shore of the Caspian Sea. Additionally, the Quality of the Government dataset does not include incoming aid data for Russia and other considered high-income countries. Therefore, Russia is not included in the Caspian Sea region set. The Caspian drainage area plays a significant role in regional geopolitics for its abundance of crude oil and gas and once-shared infrastructure. Therefore, Armenia, Georgia, Turkey (United Nations Economic Commission for Europe 2007), and Uzbekistan were also included in the region's set.

The aid data analysed aggregates two types of aid data: the "sum of commitments received from donors, not including International Organisations" (crsc) and the "sum of commitments received from International Organisations" (crsio). The total amount of aid mentioned in this study, therefore, refers to the sum of *crsc* and *crsio*.

The basis year for data analysis is 2012 for poverty data and 2013 for aid data. The one-year span between poverty data and aid data allows a more accurate observation of the effect of poverty (and the other relevant variables) on aid allocation than if both data were collected for the same year. Moreover, if most countries and international organisations allocate their budget to international cooperation annually (Lancaster, 2007; Carothers and De Gramont, 2013), the approach in this paper is correct in allowing this time gap.

Despite setting a basis date, the data needed to achieve the analysis were scarce. The basis years are the ones that have the most cases: 16 in total. All other cases were filtered from the original datasets to the closest date to the basis years downwards. That is, if both poverty and aid data were available for the 2011–2012 pair, then this data would be used. Eight countries fell in this yearly span. Put together, these periods account for more than half of the cases studied. The pattern of filtering data continued until all data were retrieved. The earliest examples are those of Turkmenistan and Guyana, for which the most recent data available were those of the 1998–1999-year pair.

By using the RStudio software, the interpretation of the data has come from a variety of exploratory data analysis techniques and from the creation of a multiple linear regression model, whose equation was the following: *Logged total aid* $= \alpha + \beta_1$ *poverty rate* $+ \beta_2$ *logged GDP size* $+ \beta_3$ *GDP*

growth + ß$_4$ *average income* + ß$_5$ *logged population* + ß$_6$ *basin region* + ε. The model fits according to the Graphic 1 below.

Graphic 1: Model fit
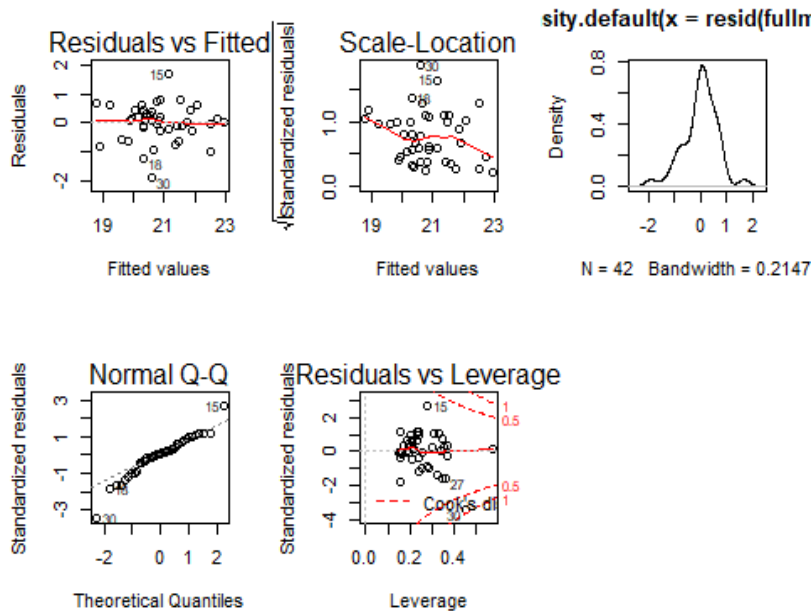
Source: Author's own design with the use of RStudio.

The first graph of the model fit shows the residuals versus fitted relationship. The homoscedasticity assumption is confirmed in the model as the residual values are reasonably distributed around zero and with similar amplitude. The normal Q-Q graph shows that most of the data are not far from the diagonal red line, except for the values in both extremes. The scale location graph shows the standardised residuals within the fitted values of the model. The residuals versus leverage graph presents Cook's distance, which does show most data fit well in the model.

One case, that of Iran, is close to being an outlier that affects the model. Other model configurations were tried, but none were successful in avoiding the influence of this specific case on the results of the model. To confirm the normality of the distribution, the Shapiro test was applied, and with a p-value result of 0.1609, it is possible to say that the model also fits the assumption of a normal distribution. The same can be said for the density of the residuals, as can be seen in the residual density plot.

4. An interesting outcome, or more like we knew it before?

Aid has been given for a mix of purposes, from bribery to development, but promoting growth and reducing poverty are said to be the most common reasons aid is allocated to other nations. As simple as it may seem, one could interpret that if poverty and development are the two main engines that move aid allocation, then poorer countries with low GDP rates and high poverty rates are the ones that will receive most of the aid. Theory has shown, however, that this relationship is far from simple and is blurred within many political interests.

During the exploratory data analysis, a quick look at the distribution of international aid within the regions for the data herein presented might surprise an uninformed reader. As Graphic 2 (below) suggests, if the outlier countries in the Nile and Amazon regions and the Caspian Sea drainage area are excluded, the Bay of Bengal appears as the region that received the most aid.

However, after calculating the amount of aid *per capita*, it gets a rather intriguing conclusion: with some exceptions, the distribution of aid seemed to range between 50 and 100 US dollars per person for most countries. Still, the average aid per head of the Bay of Bengal fell below the 25 US dollar mark. Riddell (2007) had already pointed out that poor countries with large populations are doomed to receive lower average aid in *per capita* terms. The Bay of Bengal is home to three of the most populated countries in the world: India, Indonesia, and Bangladesh.

Poverty rates proved to be higher in all three regions of the African continent. Two Caspian Sea countries, however, namely, Turkmenistan and Uzbekistan, presented poverty rates of more than 40%. The same is true for Myanmar, in the Bay of Bengal, which showed a poverty rate of 42.15%.

With only this information in hand, it is possible to start inferring if poverty rates have an influence on the amount of money disbursed by international aid to the recipients herein presented. Excluding outliers, the amount of money from foreign aid going into the Nile Basin is higher than that of the other African regions and of the Caspian Sea and Amazon Basin. *Per capita* measurement levels the amount of aid available for each person in the countries.

Graphic 2: Distribution of total aid and aid *per capita* within regions in USD
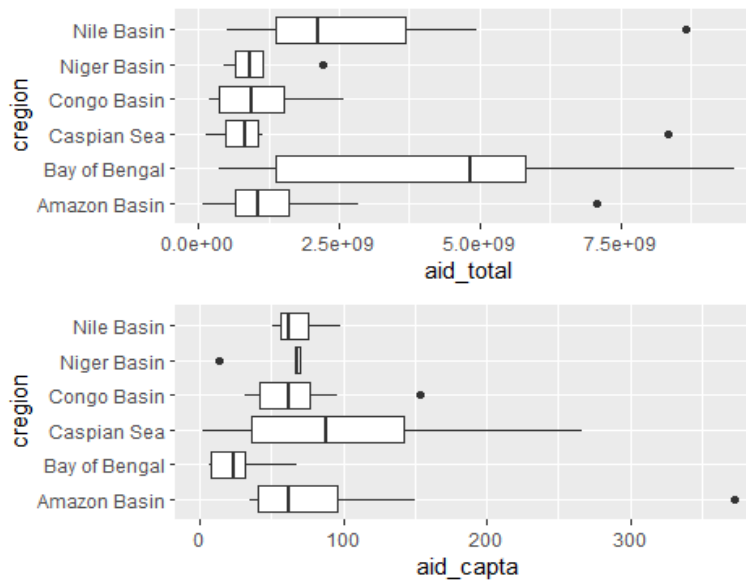
Source: Author's own design with the use of RStudio.

Average income and the logged size of total aid showed very little correlation. Despite average income being addressed by theory as one of the relevant variables for aid allocation, for the relevant basin areas, it presented no significant influence over the aid data.

Since theory argues that it is an important variable to control the outcomes of modelling statistical analysis on aid allocation, it was kept in the full model presented in this paper as a controlling effect of poverty rates on the total amount of aid disbursed by both international organisations and donor countries.

Notwithstanding, average income was strongly correlated with GDP *per capita* using Pearson's correlation equation. Since it is recommended that strongly correlated variables not be put in the same model to avoid co-variation, one of them had to be left aside.

Both average income and GDP *per capita* showed very little correlation with the total amount of aid given to recipient countries, but GDP per head was slightly more correlated to total GDP size, and therefore, it was left out of the final model.

As for the size of GDP, it had a strong correlation with the total amount of international aid received by the countries in the relevant regions. As Graphic 3 shows, when the total amount of aid is compared with the GDP of the countries, the pattern becomes that the stronger the economy of a country, the more international aid it will receive.

When the values are logged, this relationship gets sharper. If we add the correlation line to the graph and assign the regions to where the data presented belong to, a positive correlation can be clearly seen with one Caspian Sea country falling off the curve.

Graphic 3: Relationship line between GDP size and total aid, both logged
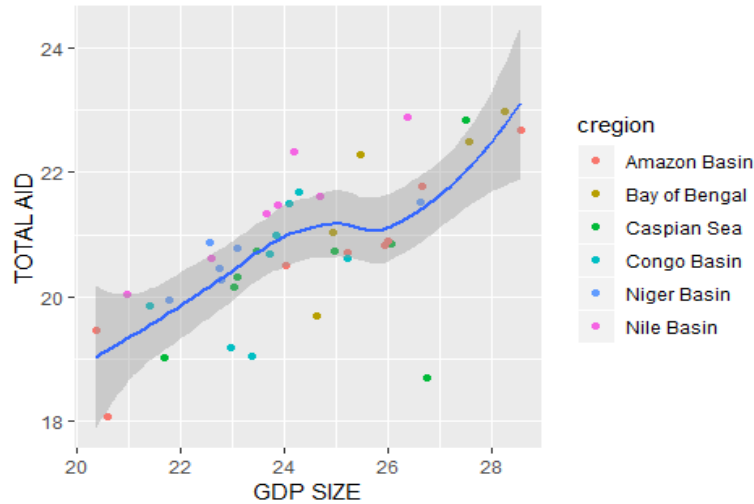
Source: Author's own design with the use of RStudio.

If the analysis is reduced to within the regions, the relationship between GDP size and the total amount of aid disbursed to a country continues to be evident in all regions, yet less clear for the Congo and Niger basins. In the first, the data seem to have a downward trend, with the three countries with the lowest GDP receiving less aid as their GDP size is higher. Then, there is an upward trend, followed by the last member of the basin fitting almost in the middle of the data span. In the Niger Basin, a trend upward is more evident than in the Congo Basin.

Still, the data suggest that countries with similar GDP sizes have also received similar amounts of aid, and the explanation for one receiving more or less than the others may come from different sources.

As such, India, Egypt, Türkiye, Brazil, and Indonesia, which are among the highest GDP numbers in the dataset, are the countries that received the most aid in total, while Suriname, Turkmenistan, Congo, Gabon, the smallest GDPs in the dataset, and outlier Iran are among the countries with the lowest amount of aid allocated to them, as Graphic 4 suggests.

As mentioned, Iran, the second largest GDP size in the Caspian Sea drainage area and the first directly on the shore, falls off the upward line correlating GDP size and the total amount of aid

allocated to the countries of the Caspian Sea. Kazakhstan, Azerbaijan, and Georgia have received similar logged values of aid, despite having considerably different GDP sizes.

Although they do not push the line downward, it seems like other variables might explain better their allocation of aid. Hence, a more comprehensive study on them is required. For the other three regions, the positive correlation between aid and GDP size is self-evident; Suriname, in the Amazon basin, is the only country that is off the upward trend.

Graphic 4: Relationship between GDP size and aid allocated to countries in specific regions
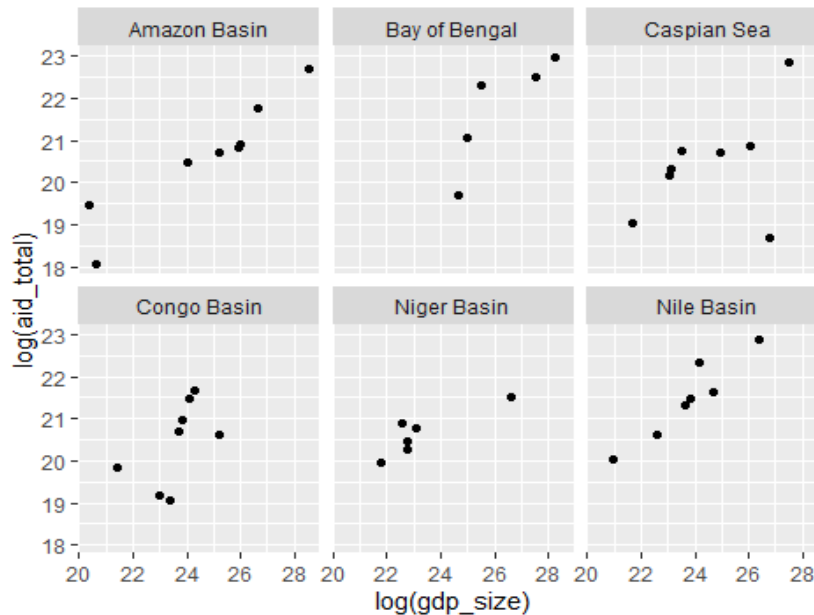
Source: Author's own design with the use of RStudio.

GDP growth in the year before aid allocation also seems to play an important role in deciding how much money from donors' budgets will be given to a particular country. Although the correlation is not as clear as the one with GDP total size and the bulk of the data is concentrated at a point where the correlation seems to be blurry, only one country with GDP growth below the 2% mark received a higher amount of total aid. This was Brazil, whose large total incoming aid may be explained by the aforementioned large GDP size as well as its large population.

Of all the countries in the dataset, Brazil has the highest GDP. Meanwhile, if Bay of Bengal's Myanmar is left aside, all countries with GDP growth greater than 6% also received more aid in total, according to Graphic 5 below.

Graphic 5: Relationship between total aid and GDP growth

Source: Author's own design with the use of RStudio.

Finally, there are poverty rates. Despite the arguments that poverty in countries with a large population may affect aid allocation negatively, the goal of international aid's most institutionalised and popular form is to foster development and poverty reduction.

As aforementioned, despite theoretical controversies, governments' public claims advocate for poverty tackling, and, hence, poverty rates should have a positive effect on the amount of aid disbursed to the countries.

Meanwhile, largely populated countries would weaken the effect globally, but not enough to turn it into a negative. Nonetheless, the data shows that poverty seems to have a slightly negative impact on aid allocation, as can be seen in Graphic 6.

**Graphic 6**: Relationship line between poverty rate and total aid

Source: Author's own design with the use of RStudio.

The Caspian Sea and the Amazon Basin presented the lowest overall poverty rates. While, in the first region, the influence of poverty rate on the allocation of aid is somewhat inconclusive, there are two countries with high poverty rates that received less aid than the correlation line, even if Uzbekistan figures inside the confidence interval.

As for the Amazon Basin, there is a strong negative correlation between poverty rates and the total amount of aid. In other words, the data suggest that, for the region, the higher the poverty rate, the lower the total amount of aid allocated to those countries. The Nile Basin has also shown this negative trend, while the Congo Basin inverts this trend positively. When the regions are analysed individually, Graphic 6 suggests the following:

- The Amazon Basin and the Nile Basin follow the literature trend. In other words, in these basin regions, poorer countries generally receive less aid than those with better poverty numbers:

- In the Bay of Bengal region, however, the trend seems to be the opposite. Apart from Myanmar, which figures as an outlier, the poorer the country in the Asian basin is, the more aid it receives.

- The Congo Basin also seems to follow such a pattern, despite the data not being as evident.

- In the Niger basin, where poverty rate data ranged most between 50 and 60%, the countries received considerably different values of aid, which does not allow for generalisations.

- A similar situation was presented by the countries in the Caspian Sea set: the amount of aid differed greatly for countries with similar poverty rates.

- Finally, the set presents two countries with high poverty numbers that scored differently on the total amount of aid, presenting no regular pattern when in comparison with the other members of the same basin region.

Graphic 7: Relationship between poverty rates and aid allocated to countries in specific regions
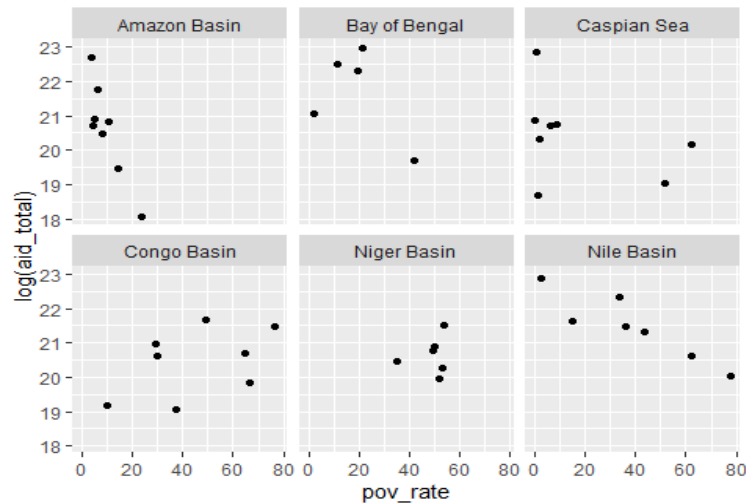
Source: Author's own design with the use of RStudio.

Most of the analysis suggested that GDP size was more important to the size of aid disbursed to a country than poverty rates. It is also important to note, however, that if a correlation line is drawn between GDP size and aid *per capita* instead of the total amount of aid, this relation becomes rather negative (for the graph, see Graphic 7).

Graphic 8: Relation between GDP size and aid *per capita*
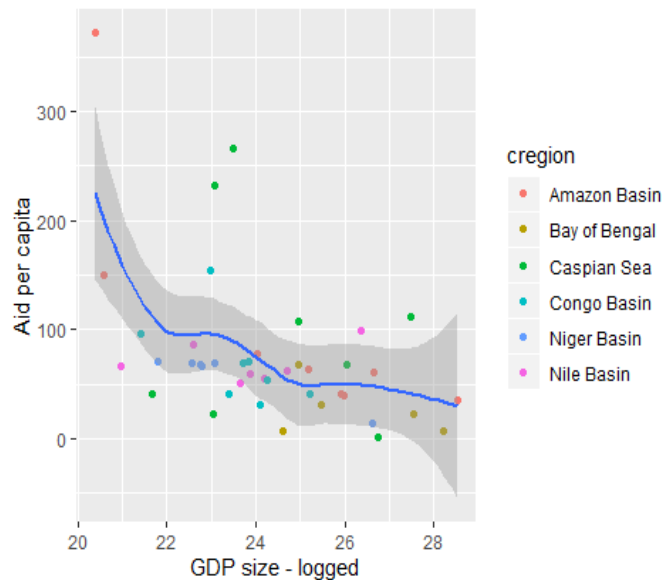
Source: Author's own design with the use of RStudio.

Based on this exploratory analysis, a multiple linear regression model was run. In the model, both the total amount of aid and the GDP size were logged to improve the model. GDP size proved to be

statistically significant, with the data showing a positive influence over total aid. Poverty rates in total, while not as statistically significant, presented a slightly negative impact on total aid.

The model, which explains the influence of poverty rate on the amount of aid allocated to the countries in the diverse basin regions, was controlled by GDP size, GDP growth, average income, size of the population, and geographical position.

The results of the multiple regression applied showed that the model explains 69% of the statistics if the multiple R-squared value is taken into account. GDP size appears to be statistically significant and is expected to increase the value of aid allocation as it also increases. Poverty rates, in turn, having their effects controlled by the other variables, while not being as statistically significant as the size of a country's economy, present a slightly negative impact on the total amount of aid received by recipient countries.

Despite presenting a negative influence on aid, poverty rate results may not be considered surprising. It should not be considered conclusive either. The theory behind poverty and development may well clarify why poverty rates have had such a negative impact. Since the poverty rates of a given year are dependable on the numbers of poverty rates of the previous years, if they do not reduce, that is, if poverty numbers do not lower, then donor countries and organisations might interpret it as if the aid received by this given country was not used effectively.

In other words, high rates of poverty, despite denouncing the need for more aid, will have a negative effect, although marginal, on total aid. Another study with different variables and approaches is needed to investigate this hypothesis.

For the data herein presented, the most accurate variable to explain aid giving is GDP size, while high poverty rates tend to reduce aid. Nonetheless, neither GDP nor poverty rates are good variables to predict the values of aid (Graphic 8).

Graphic 9: Predictors
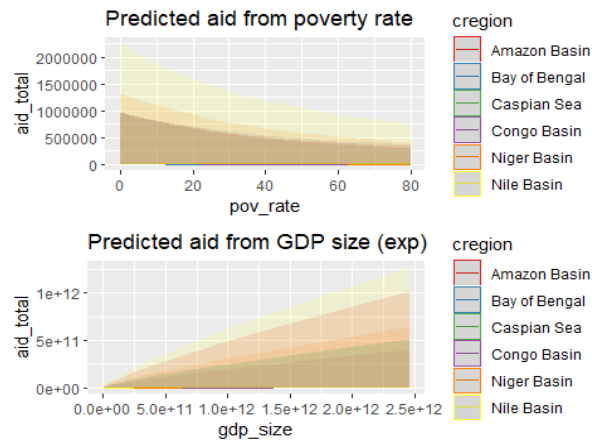
Source: Author's own design with the use of RStudio.

The predicted values of both variables do, respectively, show their positive and negative effect on the amount of aid received by the countries both globally and within each of the regions studied. However, the confidence intervals in both predictors are too broad, although they also show the same trend.

Concluding thoughts

It comes as no surprise that GDP size plays a significant role in the amount of aid given to countries across the globe and, therefore, to the basin countries presented in this study. It was expected, according to the theory, that the effect of poverty rates on the amount of aid disbursed to the countries would be slightly negative, even if tackling poverty is claimed to be one of the top priorities of international aid.

In addition, interesting findings and conclusions can be drawn from the statistical analysis herein presented. Firstly, although the relationship is negative, it is marginal, and within the confidence interval, poverty rates may have slightly positive effects in certain circumstances. That was, for instance, the case for the Congo Basin region.

Secondly, since the relationship between GDP size and aid per *capita* favoured the most impoverished countries—especially those with less population—,a study that deepens the inquiry on the relevance of being an economically weak country to the allocation of aid, calculated in terms of the total population or in terms of the poor population of selected countries, may find a more accurate trend on the distribution of aid.

Moreover, the regions do seem to have patterns of their own. Hence, an in-depth case study for each region seems to be necessary to deepen the understanding of how they interact with the donors' decision of giving less or more aid to a specific country.

Notwithstanding, the conclusion here is that, in summary, poverty rates have little influence on the allocation of the total amount of aid to the countries in the Amazon Basin, the Bay of Bengal, the Caspian Sea, the Congo Basin, the Niger Basin, and the Nile Basin. This influence, however, tilts toward being mostly marginally negative.

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