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# Patterns of Official Development Assistance in Tajikistan: effects on growth and poverty reduction

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## Abstract

The aim of this paper is to assess the effect of official development assistance on economic growth and poverty reduction in Tajikistan, as well as to examine the recent role of South-South Cooperation. We used a panel data set on economic growth and poverty estimates in Tajikistan, and found that a 1% increase of official development assistance provoked a 1.6% rise in per capita GDP and a 0.48% decrease in poverty levels in Tajikistan. Despite the increased relevance of South-South Cooperation in Tajikistan, the current bilateral cooperation pattern does not allow us to think South-South aid will create employment and growth opportunities.

**Keywords:** Tajikistan; official development assistance; economic growth; poverty measure.

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## Introduction

It is nearly fifty years since foreign official development assistance became one of the main factors of economic growth among developing countries. A 1970 resolution approved by the United Nations General Assembly (1970, paragraph 43) specified that rich countries should aim to donate 0.7% of gross national product (GNP) to poor countries in the form of official development assistance (ODA). Although ODA did not reach an average 0.7% of GNP, the United Nations (2015) suggested several positive effects, for developing countries between 1990 and 2015. ODA has reduced global extreme poverty in 56.6%, increased children enrolment in primary education from 83% to 91%, improved health conditions regarding, for instance, HIV/AIDS, improved environmental sustainability, as well as reduced child mortality from 90 to 43 deaths per 1000 during this period.

The volume of ODA has increased drastically over the recent decades: the total value of aid disbursed to developing countries has multiplied 3.6 times, *i.e.* from US\$ 33,7 billion in 1960 to US\$ 157,6 billion in 2017 (World Bank Org 2017).

However, empirical evidence regarding the role of foreign aid in the growth process among developing countries shows mixed results, as will be shown later. Hence, new empirical case studies are still needed to clarify this issue. This controversy coincides with the upsurge of some emerging countries such as China, Russia or Turkey as donors, especially regarding their area of influence, or among countries rich in raw materials.

Although developed countries belonging to the Organization for Economic Cooperation and Development's (OECD) Development Assistance Committee (DAC) continue to be the main source of international aid, the share of non-DAC contributors has been rising, especially from middle-income developing countries, such as China, through the so-called South-South Cooperation channel. Until the collapse of the USSR, international cooperation between China and Central Asian countries was insignificant and, once Central Asian countries became independent, China improved its contacts and actively set its bilateral relations with these countries, including Tajikistan (Kessenova 2009).

South-South Cooperation plays an important role in international development cooperation. Its main principles are non-interference in internal affairs, equality among developing partners and respect for their independence, national sovereignty, cultural diversity, identity and local content (Padilla 2010). There are some reasons why Chinese development assistance has proved more effective than OECD/DAC aid. For instance, there is a lack of conditionality for Chinese development assistance, whereas DAC donors demand reforms among recipient countries in return for aid (Chinese Ministry of Foreign Affairs 2003). Bossuyt (2015) claims that, with the exception of Kyrgyzstan and Tajikistan, receptiveness to EU's aid is low, mostly because it involves political conditionality and interference in domestic affairs. However, a number of experts asserted that some recipient countries are concerned with the mixed effect of Chinese development assistance. For instance, local companies are endangered because Chinese firms bring labour with them, therefore, few jobs are created and no technology transfer takes place (Chin and Frolic 2007). In this regard, the Chinese labour policy leads to a paradox in the case of the Tajik economy, because Tajik workers migrate to Russia while Chinese workers occupy jobs in construction projects and land farming in Tajikistan.

Whereas a large number of studies have examined the effects of aid among African countries, there is no literature discussing aid's effects on Tajikistan. Tajikistan has been selected as the best case study because it has received a considerable amount of development assistance from China (as a Central Asian country neighbouring China). The total amount of China's development assistance to Tajikistan reached around US\$ 1.8 billion from 2005 to 2017 (Agency on Statistics under the President of the Republic of Tajikistan 2019). The amount of China's development assistance to foreign countries is increasing remarkably. However, the Chinese government does not publish reports providing consolidated information on foreign aid. Chinese officials are

generally unwilling to reveal either the geographical or sectoral distribution of disbursements (Chin and Frolic 2007).

Tajikistan's case is the best example for the interpretation of South-South Cooperation, as a former Soviet Republic that can theoretically benefit from both Russian and Chinese aid. Therefore, in this paper we analyse the main features of the ODA flows recently received in Tajikistan, in order not only to draw conclusions about the nature of Tajik aid, but also to suggest policy recommendations for EU as well as OECD countries regarding ODA effectiveness.

The main objective of this research is to analyse aid effects on growth and poverty reduction using a time series methodology (employing annual data from 1998 to 2016 for the Tajik economy). It is too soon to examine whether South-South Cooperation will be more effective for economic growth and poverty reduction; however, it is still essential to evaluate the recent role played by ODA from OECD/DAC countries.

We attempt to assess the effect of ODA on economic growth and poverty reduction in Tajikistan with the purpose of testing the following hypotheses:

H1: The volume of foreign aid is associated with a higher standard of living (higher per capita GDP).

H2: Foreign aid has been able to reduce poverty levels among recipient countries.

H3: In case South-South Cooperation upsurge has already become a reality, it will improve the standard of living of the population of aid-receiving countries.

The remainder of the paper proceeds as follows: Section 2 provides a brief literature survey. Section 3 discusses the basic features of ODA in Tajikistan, whereas Section 4 presents the specification of the applied model. Section 5 discusses the econometric estimation and the expected signs of the utilised variables. Sections 6, 7 and 8 present empirical results regarding the effect of ODA on per capita GDP levels and poverty reduction. The final section concludes the paper and suggests some policy implications.

## Literature review about ODA effects on growth and poverty reduction

The empirical literature has failed to produce conclusive evidence regarding the relationship between foreign aid and economic growth or poverty reduction among developing countries.

In a pioneering paper, Chenery and Strout (1966, 463-466), using a Two-Gap model (Investment-Saving and Import-Export), stated that investment is the main factor of economic growth, the one which increases output and per capita income. In addition, they noted that 'the required investment depends on domestic savings, but if domestic savings are lower than the required investment then foreign assistance could fill that gap'.

In an attempt to prove this theory empirically, Papanek (1973), using a cross-country analysis of 34 countries in the 1950s and 51 countries in the 1960s, conducted the first study to disaggregate foreign capital flows into foreign aid, foreign investment and other flows. They found that foreign aid had the greatest effect on growth in comparison with foreign direct investment, other foreign capital inflows and domestic savings.

Many years later, and once foreign aid had been generalised among developing countries, Hansen and Tarp (2000, 4), in a cross-country regression analysis of 72 countries that estimated the relationship between aid and economic growth, revealed that 40 of those 72 countries showed a positive correlation of aid and growth, whereas 32 countries did not.

Among aid supporters, Morrissey (2001, 41-42) concluded that the upward trend of global ODA does contribute to developing countries' economic growth. He expressed that "aid increases investment in physical and human capital, increases the capacity to import capital goods or technology, does not have indirect effects that reduce investments or savings rates, and aid is associated with technology transfers that increase the productivity of capital and promote endogenous technical change." Gomanee et al. (2003), using a sample of 25 Sub-Saharan African countries over the period between 1970 and 1997, suggest that aid has a direct effect on economic growth. They emphasise that, on average, each percentage point increase in the aid/GNP ratio leads to an increase in the growth rate from 0.5 to 1 percentage point.

Karras (2006), using panel data of 71 aid-receiving countries over the period from 1960 to 1997, proposed a positive effect of foreign aid on economic growth without considering the impact of policies. He concluded that a permanent increase in foreign aid by \$20 per person provokes a permanent increase in the growth of real GDP per capita by 0.16%. More recently, Adams and Atsu (2014) utilised Ghana's annual data over the period between 1970 and 2011 to demonstrate that aid had a positive short-term correlation with that country's economic growth.

Recent claims regarding the complete uselessness of ODA have been neglected by some authors. It must be reminded that, despite controversy, ODA has had very positive effects on developing countries (Radelet 2017).

However, a number of experts claim that ODA does not provide receiving countries with a stable platform to grow sustainably. For instance, Mosley et al. (1987), applying various estimation techniques for 63 countries covering the period 1970–1980, claimed that there is no relationship between aid and economic growth.

Cassen (1994, 15-16) report that empirical studies on the correlation between aid and economic growth are ambiguous: "research on the macroeconomic effects of aid deals with relatively large groups of developing countries. Its results are ambiguous. The relationship between aid and growth is rather weak: it can be either positive or negative, depending on the country groupings and the time period chosen [...]."

Moreover, part of the literature has pointed out some conditions that must be fulfilled in order to guarantee the above-mentioned positive effect of aid on growth. Governance quality is one

of the conditions that has emerged as the key to sustainable human development in recent years. Overall, the central importance of good policies and institutions in maximising the effectiveness of aid has been strongly confirmed in many studies.

Quite early, Dowling and Hiemenz (1983), using a panel data for Asian countries over the period from 1970 to 1978, found strong evidence that foreign aid flows are positively associated with higher growth rates in recipient countries. Moreover, these authors stated that good institutions and open trade have a positive correlation with GDP growth through the allocation and mobilisation of foreign resources.

Burnside and Dollar (2000), using a neoclassical growth model in which the interaction of aid and a policy index variable was analysed, examined 56 countries over six time periods spanning from 1970 to 1993. They discovered that the interaction of aid and institutional quality exerts a robust positive effect on growth. Furthermore, they stated that ‘a corrupt, incompetent government is not going to use aid wisely and outside donors are not going to be able to force it to change its habits’ (Burnside and Dollar 2000, 2). However, Easterly et al. (2004) assessed the Burnside and Dollar (2000) model by using alternative definitions of aid, finding that the aid-interaction term is statistically insignificant. They used the same model specification, econometric techniques, and data applied by Burnside and Dollar (2000), extending data over four additional years; however, the interactive term remained statistically insignificant.

According to the World Bank (Dollar 1998), there is a demonstrated relationship between aid effectiveness and good governance. The main conclusion of the World Bank’s report was that aid allocation should be channelled to recipient countries selected according to their policy environment. On a similar note, Princeton Survey Research Associates (2003) conducted a survey commissioned by the World Bank, which showed that 84% of opinion makers concluded that, because of corruption, foreign assistance to developing countries is mostly wasted in Sub-Saharan Africa.

Quite recently, Cooley and Heathershaw (2018, 3) inform us that “governments in Central Asia are very much connected with the outside world, and that greater connectivity actually exacerbates the region’s problems with weak governance and corruption. Since becoming independent states, governments in Central Asia have been quite adept at navigating the liberal political and economic order beyond their borders to promote their self-enrichment and self-preservation.” In other words, as expressed by Darden (2008), corruption has become a source of stability for authoritarian regimes in many post-Soviet states.

Overall, the central importance of good policies and institutions in maximising the effectiveness of aid has been strongly confirmed in the existing literature. However, some empirical papers deny the positive impact of ODA on the macroeconomic performance of recipient countries.

Several decades ago, Mosley (1980) made an important contribution to the literature by incorporating lagged aid variables into his model, which helped him conclude that there is no statistically significant correlation between aid and economic growth. According to Mosley et al. (1987, 139), “there appears to be no statistically significant correlation in any post-war period,

either positive or negative, between inflows of development aid and the growth rate of GNP amongst developing countries when other causal influences on growth are taken into account.” Recently, Mallik (2008), using co-integration analysis, found that aid has no significant effect on growth in the short run, whereas there is a significant negative relationship between aid and growth in the long run in 5 of the 6 poorest African countries.

The World Bank (Dollar 1998), assessing the articles by Burnside and Dollar (2000) and Collier and Dollar (2002), asserted that the correlation between aid and poverty reduction would only be seen under the two following conditions: (a) a large share of the population living in poverty and (b) good fiscal policies. In a similar vein, Easterly (2003) suggested that aid reduces poverty when the quality of the institutions is good enough to efficiently allocate aid funds in receiving countries.

Regarding attempts to measure ODA effectiveness in reducing poverty, Addison et al. (2005), using a panel data for 23 African aid recipient countries from 1960 to 2002, concluded that aid promotes growth and reduces poverty. Recently, Ravallion (2016, 519) argued that “foreign aid is a phenomenal investment and it does not simply save lives but it also lays the groundwork for lasting, long-term economic progress.” On the other side of the debate, anti-foreign aid opinions are equally strong. On this view, foreign aid tends to reduce poverty in recipient countries only when governance quality is also improved. For instance, Arvin and Barillas (2002) tested the causal relationship among aid, democracy, and poverty using data from 118 countries over the period from 1971 to 2002. They concluded that, conditional on the state of democracy, there is no significant causal relationship between aid and poverty. Ijaiya and Ijaiya (2004) analysing 39 Sub-Saharan African countries over the period from 1990 to 2004, found that a low level of institutional quality does not allow foreign aid to reduce poverty levels significantly in Sub-Saharan Africa.

From the above-listed review of empirical studies, it is quite clear that aid may not always be successful in promoting economic growth and poverty reduction. A good institutional environment has been considered an important determinant in the development process, since better government institutions are linked with both economic growth and poverty reduction among recipient countries.

## Patterns of Aid Inflows into the Tajik economy: the role of emerging countries as ODA donors

Although Tajikistan has achieved relative political stability, and macroeconomic indicators of the country have improved since the end of the Tajik Civil War in 1997, poverty levels, external debt, and the size of the shadow economy are a continuous and serious concern. Sometimes Tajikistan has been regarded as the poorest Central Asian nation, whose particular struggle against severe poverty has already been described by the literature (Falkingham 2000). In spite of the



poor level of institutional quality in Tajikistan, donor countries provide aid to Tajikistan through embassies, agencies for cooperation and development, banks, and other government agencies in multilateral and bilateral channels. The main providers of multilateral aid are still the OECD countries; with regard to the bilateral aid channel, China in particular plays the most relevant role. While Western donor activities used the terms “development aid” and “development assistances,” the Chinese government does not have an official definition of what constitutes development aid, and the Chinese prefer the terms “South-South Cooperation” and “strategic partnership,” featuring the political equality and mutual trust, economic win-win cooperation and cultural exchanges (*The declaration of Beijing summit of the forum for China-Africa cooperation* 2006).

Regarding China’s role in international cooperation, many projects of different nature have recently been launched, but mainly among African countries, which still seem to be the main interest of Chinese authorities’ donations (Huang et al. 2018).

Gulrajani (2016) argues that bilateral channels are more politicised, whereas multilateral channels are better suppliers of global public goods. However, the scenario is quite different in Tajikistan in this regard. Multilateral aid delivery to Tajikistan has mainly been channelled to budget support, technical assistance (project approach) and support to civil society and non-state actors (Agency on Statistics under the President of the Republic of Tajikistan 2016). These funds are targeted to sectoral programmes, mostly focusing on poverty alleviation, health, and pensions. The European Union External Action Report (European Union 2016) stated that multilateral aid policy gives priority in Tajikistan to promoting human rights, democracy, the rule of law, access to justice for the civil society, protection of the environment and the fight against HIV/AIDS.

According to ASPRT’s report (Agency on Statistics under the President of the Republic of Tajikistan 2016), the total annual volume of multilateral aid to Tajikistan continually increased since 2002, until it reached its peak in 2010 at US\$ 157.30 million. Bilateral aid reached its peak in 2015, at US\$ 448.96 million. A 6.8% reduction of the annual volume of bilateral foreign aid took place between 2009 and 2013, predominantly due to the global financial and economic crisis in 2008, and the ongoing financial crisis started from 2015 among CIS countries.

**Figure 1. Volume of aid provided by OECD (multilateral) and China (bilateral) to Tajikistan during 2002–2016**

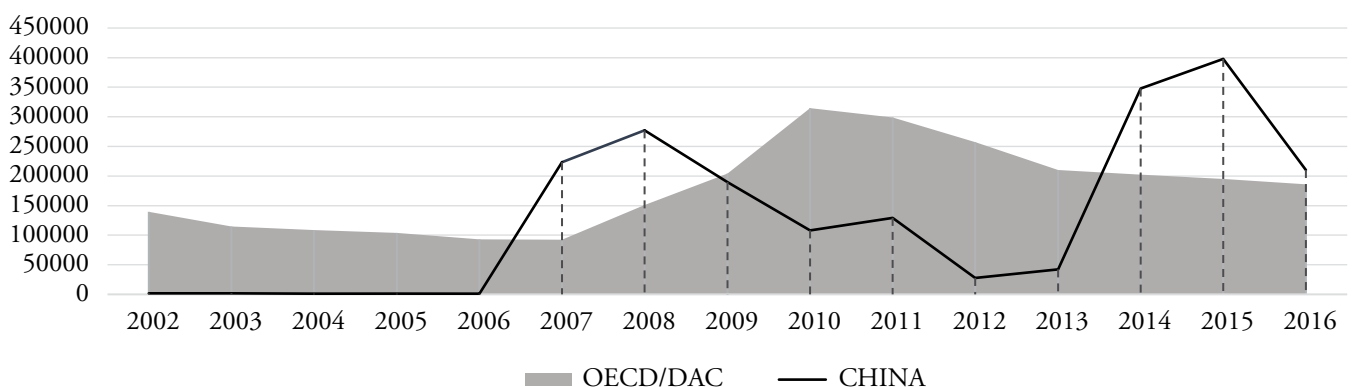
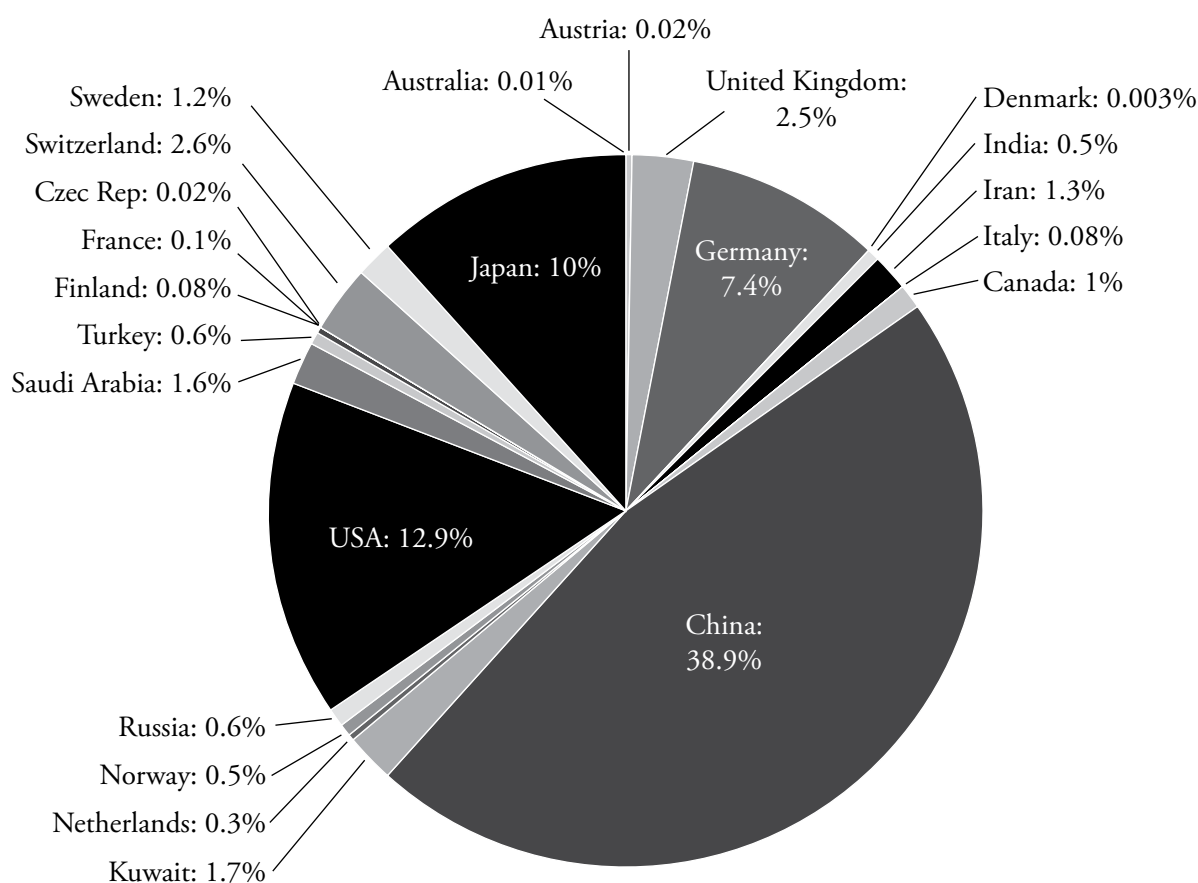


Figure 1 indicates that the total amount of assistance from donor countries through multilateral cooperation from 2002 to 2016 reached US\$ 1.335.112 million (Agency on Statistics under the President of the Republic of Tajikistan 2019). The reduction of ODA volume by OECD has led to China becoming the main provider of development assistance to Tajikistan. Aid flowing from China sharply increased from 2007 to 2015. The total development assistance provided by China amounted to US\$ 1.959.761 million in the last ten years. Figure 2 shows that about 40% of the bilateral aid came from China. However, we have to consider that China does not take part in multilateral organizations' aid, with the exception of the Shanghai Cooperation Organization, which focused on Chinese-Russian-Central Asian ties. Nevertheless, such assistance has not provided a relevant amount of resources to Asian countries.

**Figure 2. The volume of bilateral aid by donor countries to Tajikistan in 2016**



During the 2002–2016 period, total aid, either through multilateral or bilateral channels, amounted to US\$ 3.294.783 million (Agency on Statistics under the President of the Republic of Tajikistan 2016), of which only US\$ 119.62 million stemmed from countries with a Muslim majority. Russia donated US\$ 67.8 million during 2002–2016. Thus, we set Figure 3 once again, to test our third hypothesis, regarding the contribution of emerging countries and South-South Cooperation to Tajikistan from 2002 to 2016.



**Figure 3. The total bilateral aid provided by Russia, Muslim countries, and China to Tajikistan during 2002–2016 (in %)**

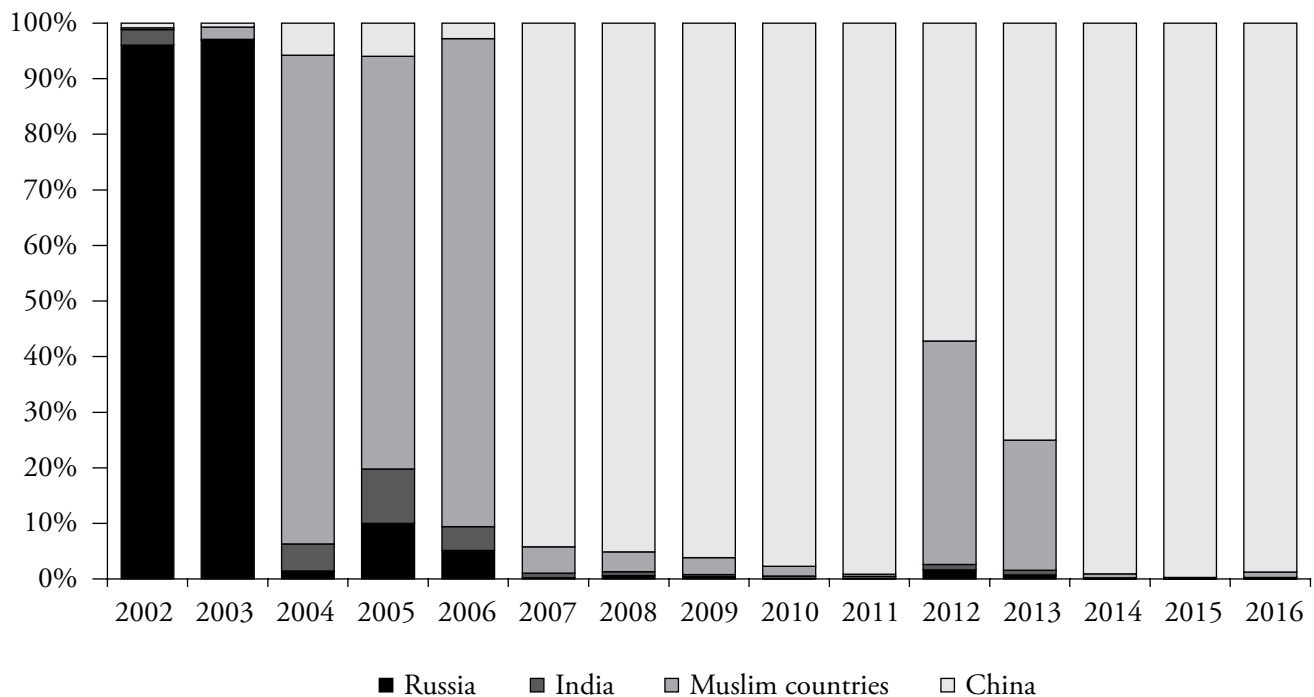


Figure 3 shows that China has become an important provider of aid to Tajikistan, starting in 2007. Total aid provided by Muslim majority countries and Russia amounted to only 7.1% of total aid provided by China during the 2002–2016 period. During the 2007–2011 period, the volume of aid provided by Muslim majority countries decreased, mostly due to the global financial and economic crisis in 2007. The share of Muslim majority countries was remarkable between 2002 and 2006, *i.e.* until the beginning of the Arab Spring in the Middle East and North African regions.

Regarding the channel through which Chinese aid has been conceded, most if it has been delivered in the form of loans: the amount borrowed by Tajikistan from China for different government investments reaches around \$1.5 billion, a figure around one half of total public debt (Ibrahimova 2019). Only recently, as part of China’s Belt and Road initiative, China has granted \$360 million to upgrade the highway from Kulob to Bokhtar. This amount could be considered a “freebie,” although one must keep in mind that Chinese gifts conceal certain conditions, such as mining concessions, tax exemption for Chinese firms, or even, as in the case of Tajikistan, donation of agricultural land (Vinson 2012; Hofman 2019). According to Hofman (2015) “the Tajik establishment has turned towards China, rather than Iran, Russia, or Europe.” These loans or grants conceded by Chinese authorities, according to many authors, are not allowing genuine development for Tajikistan, but could on the contrary provoke a higher dependency on imports from China (45% of Tajik imports come from China), once the Belt and Road initiative is completed (Karrar and Mostowlansky 2020). As mentioned before, there is a collusion between Chinese firms’ and Tajik elite’s interests (Cooley and Heathershaw 2018), which is an obstacle to

Tajikistan's development due to commercial dependency, higher public debt and resource extraction by elites. In consequence, the win-win outcome of the so-called South-South Cooperation can certainly be questioned.

Although Figure 6 highlights the noticeable share of aid from Muslim majority countries and Russia during the 2003–2006 period, total aid provided by these countries within that period amounts to 38.4% of that provided by China in 2007. Total aid provided by Muslim-majority countries and Russia amounted to US\$ 85.7 million from 2002 to 2006, whereas the Chinese share totalled \$223.31 million in 2007 alone. During 2012 and 2013, total aid provided by Muslim-majority countries totalled \$193.79 million and \$131.49 million respectively, whereas in the same period the Chinese share totalled \$276.24 million and \$421.58 million.

The average volume of aid provided by China in the last ten years was US\$ 130,6 million, while Muslim-majority countries and Russia's share amounted to US\$ 67.6 million and US\$ 91.4 million, respectively. Furthermore, Russia has not provided aid to Tajikistan in 2011, 2014, and 2016.

Despite the fact that financial South-South Cooperation to Tajikistan is channelled mainly through loans and less through grants, South-South Cooperation already plays a crucial role in the field of international development assistance to Tajikistan far beyond what OECD and emerging countries can offer. The role of DAC countries is remarkable after China, while Muslim-majority countries' share is smaller; Russia plays barely any role in this regard.

However, although the money invested in Tajikistan is creating infrastructures and accumulating capital in some sectors, such as mining or energy generation, South–South cooperation is surely providing more benefits for lending countries and elites than providing better job opportunities for the Tajik population. As a result, the “win-win” or “mutual gains” narrative corresponding to South-South Cooperation should be nuanced. Therefore, we would reject the hypothesis 3 presented in the introduction.

## Data and methodological procedure

This section discusses the specifications of a model aimed at examining the relationship, first, between foreign aid and per capita GDP growth and, second, between aid and poverty reduction. Following the basic neoclassical growth model by Solow (1956), our specification can be written as follows:

$$Y_t = A_t K_t^\alpha (HC_t L_t)^\beta \dots \quad (1)$$

where  $Y$  is gross domestic product ( $GDP$ ) in real terms;  $L$  and  $K$  denote, respectively, labour (employment) and physical capital inputs,  $A$  is a measure of technology and exogenous knowledge;  $\alpha$  is the share of capital;  $\beta$  is the share of labour (participation ratio), while  $t$  represents time.

We linearise (1), taking logs and differencing, obtaining the following expression that describes the determinants of the growth rate of real *GDP*:

$$\ln Y_t = \alpha \ln(K_t) + \beta \ln(L_t) + \ln(H_t) + \ln(A_t) \dots (2)$$

Considering the goal of researching the effect of aid on economic growth, aggregate capital can be divided into domestic and foreign capital, in the form of aid. In addition to this, there are variables that conventionally appear in economic growth models, such as institutional quality (level of corruption), openness to trade, average years of schooling. The ODA inflow in ratio to GDP and the Gini coefficient have also been included (Barro and Lee 1994). Applying these changes to equation 2, the final model will be rewritten as follows:

$$\ln GDP_{pc_t} = \beta_0 + \beta_1 \ln(ODA_t) + \beta_2 \ln(Edu_t) + \beta_3 \ln(GE_t) + \beta_4 \ln(CPIAc_t) + \beta_5 \ln(LF_t) + \beta_6 \ln(OPNc_t) + \beta_7 \ln(GINI_t) + \varepsilon_t (3)$$

As shown by the first hypothesis presented, we expect that  $\beta_1$  (*aid inflow*) is positive. Furthermore, we expect a positive effect of  $\beta_2$  (*average years of schooling*) and  $\beta_5$  (*labour force*), since a higher human capital accumulation and a higher level of education lead to a higher growth potential. We also expect a negative value for  $\beta_4$  (level of corruption). Barro and Sala-i-Martin (1995) also argue that government consumption is a proxy of political corruption and other undesirable government aspects. It is also widely argued that the openness ( $\beta_6$ ) effect on growth is theoretically ambiguous. Edwards (1992) states that openness to trade might have a positive impact on economic growth primarily by facilitating technological spillovers, which, in turn, would increase productivity, international competitiveness, and export revenues. On the contrary, Vlastou (2010) claimed that openness might have a negative impact on growth, particularly in the case of low-income developing countries.

The parameter  $\beta_7$  (income inequality measured by the Gini coefficient) is the elasticity of GDP with respect to income inequality, and  $\varepsilon$  – a disturbance term which is assumed to be normally distributed. The  $\beta$  coefficients of the explanatory variables, excluding the dummy variable, reflect the elasticity of the real GDP with respect to each of these variables.

According to Foster et al. (1984), poverty can be calculated based on three measures: headcount poverty, poverty gap (or poverty depth) and square poverty gap (or poverty severity). The most widely used measure is the headcount index, which simply calculates the proportion of the population that is registered as poor, often denoted by  $P_0$  and described by the following formula,

$$P_0 = \frac{N_p}{N} (4)$$

where  $N_p$  is the number of poor people and  $N$  is the total population. The expression can be rewritten as follows:

$$P_0 = \frac{1}{N} \sum_{i=1}^N I(y_i < z) \quad (5)$$

Here, “I (·) is an indicator function that takes a value of 1 if the expression in brackets is true, and 0 otherwise. So, if expenditure ( $y_i$ ) is lower than the poverty line ( $z$ ), then I (·) equals 1 and the household would be counted as poor” (Haughton and Khandker 2009, 68-69, Chapter 4).

A moderately popular measure of poverty is the poverty gap index, which calculates the extent to which individuals’ income falls below the poverty line (cost of living in a country) as a percentage of the poverty line. The poverty gap index may be written as follows.

$$P_1 = \frac{1}{N} \sum_{i=1}^N \frac{G_i}{z} \quad (6)$$

where  $N$  is the size of sample,  $G_i$  is a poverty gap and  $z$  is a poverty line. The measure does not reflect changes in inequality amongst the poor, whilst the next measure of poverty, *i.e.* squared poverty gap (or poverty severity) takes into account inequality amongst the poor, which formally might be written as:

$$P_\alpha = \frac{1}{N} \sum_{i=1}^N \left( \frac{G_i}{z} \right)^\alpha, \quad (\alpha \geq 0) \quad (7)$$

where  $N$  is the number of people in the economy,  $\alpha$  is a measure of the sensitivity of the index to poverty,  $z$  is a poverty line and  $G$  is poverty gap for individual  $i$ . With  $\alpha = 0$ ,  $P_0$  is simply the headcount poverty index. With  $\alpha = 1$ , the index is the poverty gap index  $P_1$ , and when  $\alpha$  is set equal to 2,  $P_2$  is the poverty severity index (Foster et al. 1984).

In an effort to examine the relationship between ODA and poverty reduction, we follow the primary linear model form suggested by Ravallion (1997). The relationship can be written as follows:

$$\ln Pov_{it} = \alpha_1 + \beta_1 \ln(g_{it}) + \beta_2 \ln(y_{it}) + \beta_3 \ln(X_{it}) + \varepsilon_{it}$$

$$\varepsilon_{it}, \quad (i = 1, \dots, N; t = 1, \dots, T) \quad (8)$$

where ‘c’ and ‘t’ denote country and time, respectively;  $Pov_{it}$  is the logarithm of poverty (headcount) index in country  $i$  at time  $t$ ; and  $\alpha_1$  is a fixed effect reflecting qualitative differences among countries.  $\beta_1$  is the elasticity of poverty with respect to income inequality measured by the Gini coefficient,  $g$ ;  $\beta_2$  is the elasticity of poverty with respect to real per capita GDP given by  $y$ . Moreover,  $X$  is a set of policies and institutional variables that affect poverty. As Mosley et al. (1987) suggested, the indirect effects of aid on poverty could be channelled through appropriate policies and institutions.

Equation (8) will be modified to reflect the peculiarity of our study, choosing variables following a pattern similar to Equation (3).

Applying these changes to equation 8, the final model can be rewritten as follows:

$$\ln Pov_{it} = \beta_0 + \beta_1 \ln(ODA_{it}) + \beta_2 \ln(CPIA_{it}) + \beta_3 \ln(Edu_{it}) + \beta_4 \ln(GE_{it}) + \beta_5 \ln(OPNC_{it}) + \beta_6 \ln(GINI_{it}) + \varepsilon_{it} \quad (9)$$

Based on economic theory, the expectation is that the ODA effect on poverty level is negative. However, a number of studies (*e.g.* Burnside and Dollar 2000) claim that the effect on poverty could be an ambiguous conditional on institutional quality among recipient countries. Thus, the model must be extended, including an interactive regressor (*i.e.* level of corruption), which is, therefore, the sign of coefficient depending on the level of corruption in Tajikistan, to be determined after investigation.

Previous studies (Barro 1991; Acemoglu and Robinson 2010) overwhelmingly concluded that bad governance ( $\beta_2$ ) and greater initial income inequality ( $\beta_6$ ) provoke poverty, even after controlling for initial levels of GDP (Ravallion 1997; Knowles 2001). Moreover, past studies (Burnside and Dollar 2000; Collier and Dollar 2002) concluded that trade openness ( $\beta_5$ ) is seen as one of the main engines to foster the needed for technological progress when there are good economic policies and a supportive institutional environment. It makes it possible for poor countries to access intermediate inputs and technological transfers from more advanced countries promoting exports, generating positive spillovers by exploiting scale economies and encouraging competitiveness and efficiency, and in consequence reducing poverty levels (Balassa 1978; Rodrik 1999).

Accordingly, the coefficient of the average number of years of schooling variable ( $\beta_3$ ) is expected to register a negative sign (Barro 1991; Mankiw et al. 1992). Similarly, we expect a negative sign from ( $\beta_4$ ) because of opportunities for corruption in the disbursement of funds (Knack 2000). We have summarised the definition and sources of variables in Table 1.

## Estimation method: Vector Error-Correction Model

To carry out the analysis described above, we utilised the Vector Error Correction Model (VECM). We have compared the strengths and weaknesses sides of VECM and came to the conclusion that VECM gives us more expected result than alternative models (see Table 2).

In estimating the model, various analytical techniques, such as unit root test, Augmented-Dickey Fuller test (Dickey and Fuller 1979), ADF-GLS (generalised least squares) test (Fuller 1976), KPSS test (Kwiatkowski et al. 1992), Variance Decomposition, Impulse of Response Function (Haug and Smith 2007), and CUSUM and CUSUMQ stability test (Luger 2001).

To determine the order of integration, we used three-unit root tests, the Augmented-Dickey Fuller test (comparing AIC and BIC criterion), ADF-GLS test (comparing modified AIC and

**Table 1. Variables, measures and data sources.**

Variable	Measurement	Data source
L_GDPpc	Natural logarithm of GDP per capita	World Development Indicators ( <a href="http://databank.worldbank.org">http://databank.worldbank.org</a> )
L_ODAGDP	Natural logarithm of real total net official development assistance in ratio to GDP	World Development Indicator ( <a href="http://databank.worldbank.org">http://databank.worldbank.org</a> )
L_POV	The log headcount index measures the proportion of the log of population that is poor and lives below the poverty line	World Development Indicator ( <a href="http://databank.worldbank.org">http://databank.worldbank.org</a> ) Millennium Indicators Databases
L_GINI	The standard measure of income inequality based on Lorenz Curve that ranges from 0% to 100%, with 0 representing perfect equality and 100 representing perfect inequality	World Development Indicator ( <a href="http://databank.worldbank.org">http://databank.worldbank.org</a> )
L_YearEdu	log of secondary school enrollment (in percentage) used as a proxy for the measure of investment in human capital	Barro and Lee (1994) See updated version at: <a href="http://www.cid.harvard.edu/ciddata.ciddata.htm">www.cid.harvard.edu/ciddata.ciddata.htm</a>
L_GovExp	General government final consumption expenditure (% of GDP)	World Development Indicator ( <a href="http://databank.worldbank.org">http://databank.worldbank.org</a> )
L_OPN	Ratio of the sum of imports and exports to the GDP that provides the measure of openness of economy	World Development Indicator ( <a href="http://databank.worldbank.org">http://databank.worldbank.org</a> )
L_CPIACor	Transparency, accountability, and corruption in the public sector rating (1=low to 6=high)	World Bank's Country Policy and Institutional Assessment
L_LF	Labour Force participation ratio	World Development Indicator ( <a href="http://databank.worldbank.org">http://databank.worldbank.org</a> )

**Table 2. The strengths and weaknesses sides of VECM approach**

	Strengths	Weaknesses
1	VECM allows us to obtain jointly the long-term and short-term relationships between variables	We can conduct only for the series which are stations in their differences (I)1
2	VECM model would be correctly specified and the interpretation of results are simple yet intuitive	There is much debate on how the lag lengths should be determined
3	VECM allows us to deal with both stationary and non-stationary variables with different orders of integration	It is possible to end up with a model including numerous explanatory variables, with different signs, which has implications for degrees of freedom
4	VECM allows us to examine the serial correlation, functional form, normality and heteroscedasticity	
5	VECM allows us to find the first differenced variables and error correction term	
6	The advantage of VECM over VAR is that the resulting VAR from VECM representations has more efficient coefficient estimates	



BIC criterion using Perron-Qu method and first differences) and KPSS unit test (robust estimate of variance). Results are summarised in Table 3.

The results show that all variables were confirmed to be stationary, except LnLF, LnEdu, and LnInf, which were suggesting at 1% stationary only with constant and trend. The LnGDPpc is stationary at 1%, with constant and with constant and trend. The remaining variables LnODA, LnGE, LnCPIA, LnOPN, LnGINI, and LnPOV are stationary at 5% and 10% with constant and with constant and trend, respectively.

**Table 3. Summary of ADF, DF-GLS and KPSS unit root tests**

Varibale	ADF		DF-GLS	KPSS	
	with constant	with constant and trend	Perron-Qu method including a trend	test statistic including trend	robust estimate of variance
$LnGDPpc_t$	-0.0816	-0.2690	-0.2737	0.1216	0.0886
$LnODA_t$	-0.0717	-1.2621	-0.7271	0.1473	0.1418
$LnEdu_t$	-0.4482	-0.4649	-0.3185	0.1005	0.0004
$LnGE_t$	-0.5098	-1.2262	-0.8548	0.0561	0.0232
$LnCPIA_t$	-0.0769	-0.3581	-0.3531	0.1476	0.0077
$LnOPN_t$	-0.2690	-0.3133	-0.3171	0.1473	0.1418
$LnGINI_t$	-0.4485	-0.4331	-0.4486	0.0854	0.0070
$LnPOV_t$	-0.1892	-0.1563	-0.2076	0.1285	0.9590
$LnLF_t$	-0.0138	-0.0425	-0.1322	0.1763	0.0003
Variables' first difference					
$\Delta LnGDPpc_t$	-0.6115*	-0.5965*	-0.6060	0.1633	0.0401
$\Delta LnODA_t$	-1.6068***	-1.6078***	-1.1059	0.0826	0.0279
$\Delta LnEdu_t$	-0.8774	-0.8793*	-0.8791	0.0844	0.0001
$\Delta LnGE_t$	-1.2158***	-1.2280***	-1.2244	0.0575	0.0247
$\Delta LnCPIA_t$	-1.0625***	-1.0978**	-1.0955	0.0790	0.0020
$\Delta LnOPN_t$	-1.0160***	-1.5137***	-1.0190	0.1287	0.0375
$\Delta LnGINI_t$	-1.0754***	-1.0836***	-1.0778	0.0928	0.0029
$\Delta LnPOV_t$	-0.9283***	-1.0159**	-1.0111	0.1225	0.2071
$\Delta LnLF_t$	-0.0806	-0.2800*	-0.2219	0.1631	Mar-02

Source: Authors' computation

Note: the lag of ADF test is determined by the AIC and BIC values.

Lag order is shown in parenthesis based on AIC and BIC at ADF level. \* , \*\* and \*\*\* indicate significant at 1%, 5% and 10%, respectively.

For DF-GLS critical values after the first difference as follows: -2.89 (10%), -3.19 (5%), -3.46 (2.5%), -3.77(1%)

For KPSS critical values after the first difference: 0.125 (10%), 0.150 (5%), 0.204 (1%)

## Results and discussion

The VECM test allows us to determine the causality direction between our selected variables (Table 4). The result indicates that the coefficient of GDPpc is positive ( $1.6865 > 0$ ). Furthermore,

the ODA coefficient is positive ( $0.62408 > 0$ ) and statistically significant at 1%. Consequently, we can confirm the Hypothesis 1. Accordingly, the coefficient of public corruption (L\_CPIA) variable is negative; however, it is not statistically significant. This indicates that the spread of corruption erodes the effectiveness of ODA in promoting economic growth. Corruption is a severe problem in Tajikistan, partly favoured by the numerous rules and regulations inherited from Soviet times. Corruption Perceptions Index by Transparency International (“Corruption perceptions index 2017.” 2018) reports that Tajikistan scored 21 points out of 100 on the 2017 report.

The coefficient of fiscal policy variable (L\_GovExp) is significant, at a 5% level. This indicates that the level of government expenditure is an important factor of economic growth.

As expected, the coefficient of trade openness is found to be positive and significant at 1% level. Fenny (2005) states that openness encourages a skilled labour force to contribute more to growth, with the help of technology, research and development imports. Moreover, as was expected, the coefficient of labour force (l\_LF) is found to be positive and significant, at a 5% level.

Furthermore, the coefficient of human capital accumulation (L\_Edu) is positive, but it is not statistically significant.

**Table 4. Vector Error Correction Estimates.**

Maximum likelihood estimates, observations	AIC = -25.5907			
1999-2016 (T = 18)	BIC = -22.0292			
Determinant of covariance matrix = 1.127486	HQC = -25.0996			
	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-ratio</b>	<b>p-value</b>
D_L_GDPpc	1.68651	0.750309	2.24771	0.0412 ***
D_L_ODA/GDP	0.62408	0.433775	1.43871	0.1722*
D_L_CPIACor	-0.03843	0.359568	-0.1069	0.9164
D_L_GovExp	0.80176	0.352051	2.27741	0.0390 **
D_L_OPN	2.54193	1.31979	1.92601	0.0747 *
D_L_Edu	0.02785	0.08983	0.3101	0.7611
D_l_LF	0.05830	0.02279	2.55731	0.0228 **
R-squared	0.411288			
Adjusted R-squared	0.374493			
Durbin-Watson	1.603910			

P-value of t-statistics are in parentheses \*Significant at 1% level; \*\*Significant at 2% level; \*\*\*Significant at 5% level

Table 5 shows the results of Model 1 (OLS) and Model 2 (VECM) regressions. The results of the analysis confirm our expectations. Particularly, the results reveal that GDP per capita and ODA variables have a negative and statistically significant effect on poverty levels in the case of the Tajik economy. In consequence, we would confirm hypothesis 2 presented in the introduction. Model 1 suggests that GDP per capita has a statistically significant negative impact on poverty at 1% and 5% levels. As a 1% increase in GDP leads to a 0.79% decrease in poverty, ODA triggers

a 0.0305 reduction in poverty. As was expected, Model 2 suggests that ODA has a negative and statistically significant impact on poverty at 1% and 10%, thus confirming hypothesis 2 presented in the introduction. According to Model 2, a 1% increase in ODA and GDP per capita reduces poverty in 0.50% and 0.48% respectively.

The coefficients of GINI and institutional quality have a positive and significant coefficient; therefore, they indicate that greater inequality and a higher level of corruption are associated with higher poverty levels in Tajikistan. The results confirm the findings of Mosley et al. (1987), Ijaiya and Ijaiya (2004), and McGillivray et al. (2006), suggesting that ODA effectiveness depends on institutional quality of the recipient country. The coefficient of secondary school (L\_Edu) enrolment also has a negative correlation with poverty level in Model 1, and consequently reveals that a more skilled labour force in Tajikistan has played a key role in reducing poverty.

**Table 5. Impact of Foreign Aid on Poverty Levels Results**

Variables	Dependent variable POV	
	MODEL 1	MODEL 2
Const	-6.61228 (0.3306)	-1.33650 (0.0102**)
L_GDPpc	-0.791557 (0.0338 **)	-0.50117 (0.007***)
L_ODA/GDP	-0.030769 (0.9052)	-0.48140 (0.0625*)
L_CPIACor	1.12763 (0.2180)	Jun-33 (0.9992)
L_GovExp	0.652253 (0.309**)	0.33745 (0.1871)
L_GINI	6.21623 (0.0001***)	0.10627 (0.1586)
L_OPN	1.08636 (0.02525**)	0.59160 (0.0178**)
L_Edu	-6.32528 (0.0443**)	0.01862 (0.2166)
Mean dependent var.	3.040299	0.071546
R-squared	0.594105	0.321320
Adjusted R-squared	0.514899	0.282027
Log-likelihood	5.550056	170.04314
Akaike criterion	4.899888	
Hannan-Quinn	6.178580	
Durbin-Watson	1.966459	1.459002
AIC		-10.8937
BIC		-7.3322
HQC		-10.4026

P-value of t-statistics are in parentheses \*Significant at 1% level; \*\*Significant at 2% level; \*\*\*Significant at 5% level

**Table 6. Summary Statistics, using the observations 1998–2016 (after the log transformation)**

Variable	Mean	Median	S.D.	Min	Max
L_GDPpc	6.101	6.260	0.705	4.940	7.010
L_OPN	4.671	4.670	0.294	4.220	5.300
L_POV	3.040	3.440	0.866	1.590	3.960
L_GINI	3.450	3.460	0.0654	3.300	3.530
L_Edu	2.350	2.350	0.0164	2.330	2.370
L_GovExp	2.380	2.410	0.210	2.110	2.690
L_ODAGDP	-13.7	-13.7	0.530	-14.4	-12.9
L_CPIAcor	0.764	0.693	0.107	0.693	0.916
L_LF	14.80	14.81	0.173	14.51	15-Jan

Source: Authors' computation

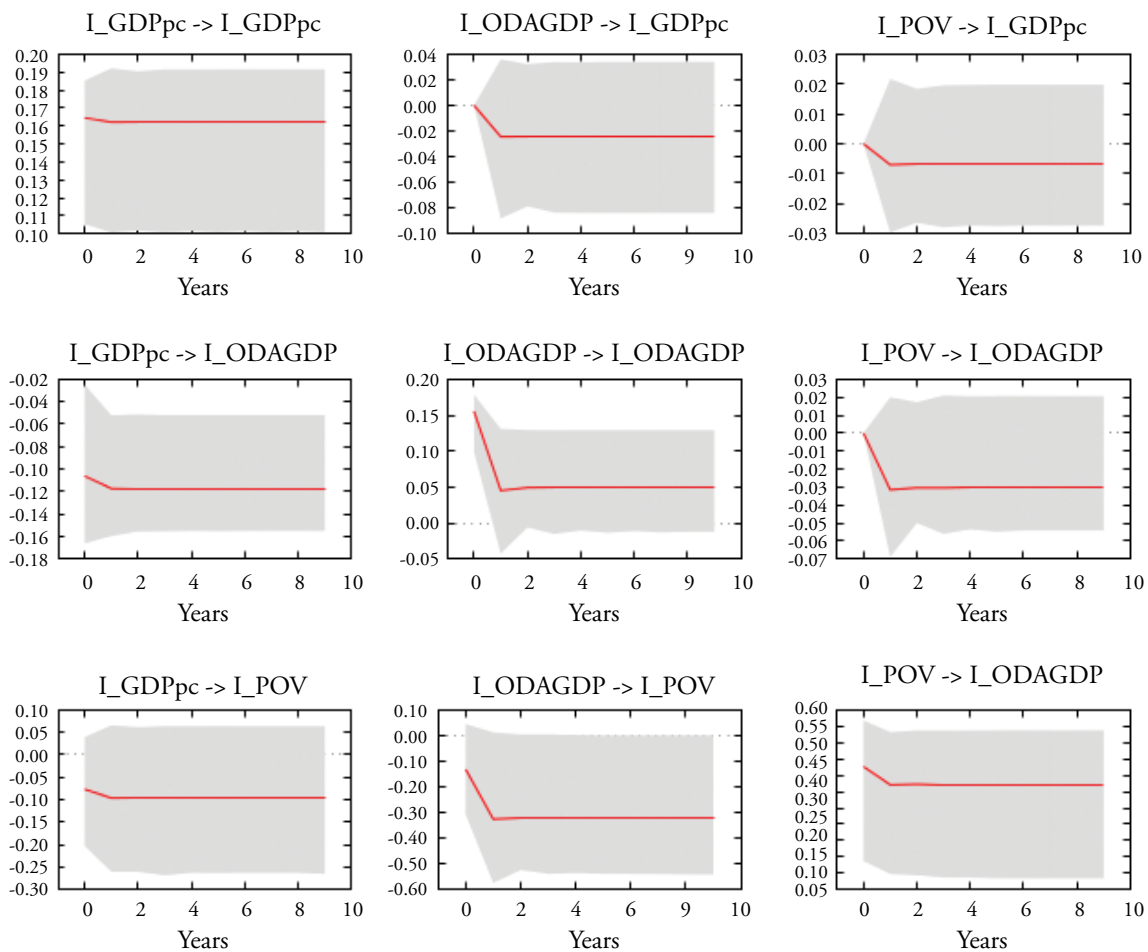
**Table 7. Correlation coefficients, using the observations 1998–2016**

<b>L_GDPpc</b>	1.0	-0.6	-1.0	0.5	0.4	-0.0	0.6	0.7	1.0
<b>L_OPN</b>	-0.6	1.0	0.4	-0.8	-0.4	-0.0	-0.3	-0.0	-0.4
<b>L_ODA/GDP</b>	-1.0	0.4	1.0	0.5	-0.4	0.0	-0.5	-0.8	-0.9
<b>L_POV</b>	0.5	-0.8	-0.5	1.0	0.5	-0.1	-0.0	0.1	0.4
<b>L_GINI</b>	0.4	-0.4	-0.4	0.5	1.0	-0.2	-0.1	0.3	0.4
<b>L_Edu</b>	-0.0	-0.0	0.0	-0.1	-0.2	1.0	-0.2	-0.1	0.1
<b>L_GovExp</b>	0.6	-0.3	-0.5	-0.0	-0.1	0.2	1.0	0.5	0.6
<b>L_CPIAcor</b>	0.7	-0.0	-0.8	0.1	0.3	-0.1	0.5	1.0	0.8
<b>L_LF</b>	1.0	-0.4	-0.9	0.4	0.4	0.1	0.6	0.8	1.0
	<b>L_GDPpc</b>	<b>L_OPN</b>	<b>L_ODA/GDP</b>	<b>L_POV</b>	<b>L_GINI</b>	<b>L_Edu</b>	<b>L_GovExp</b>	<b>L_CPIAcor</b>	<b>L_LF</b>

Source: Authors' computation

Figure 4 shows the reaction in one variable due to shocks in another variable. Results indicate that both economic growth and poverty reduction experiment a positive response because of shocks in ODA.

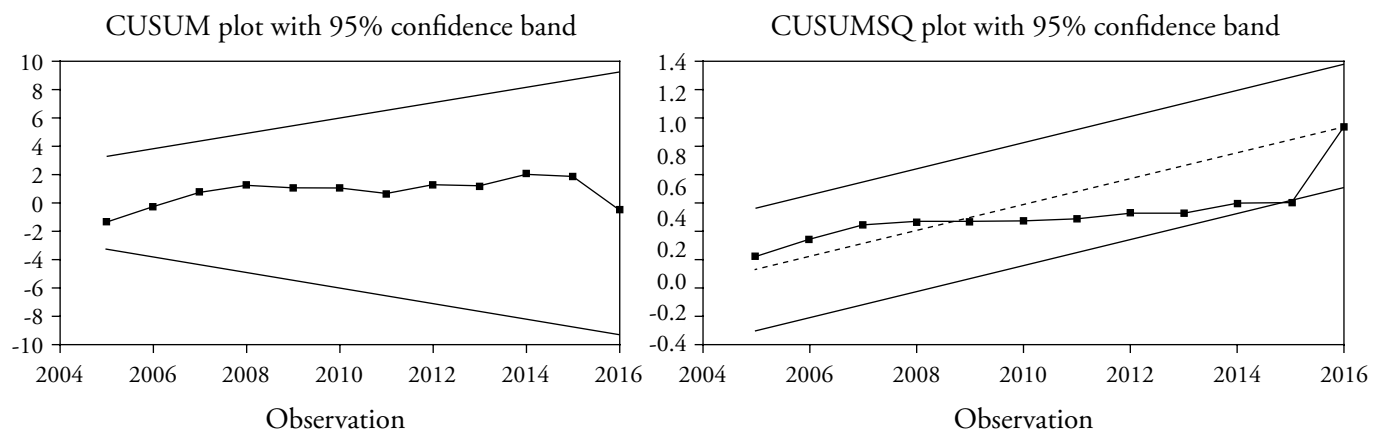
**Figure 4. Impulse of Response Function**

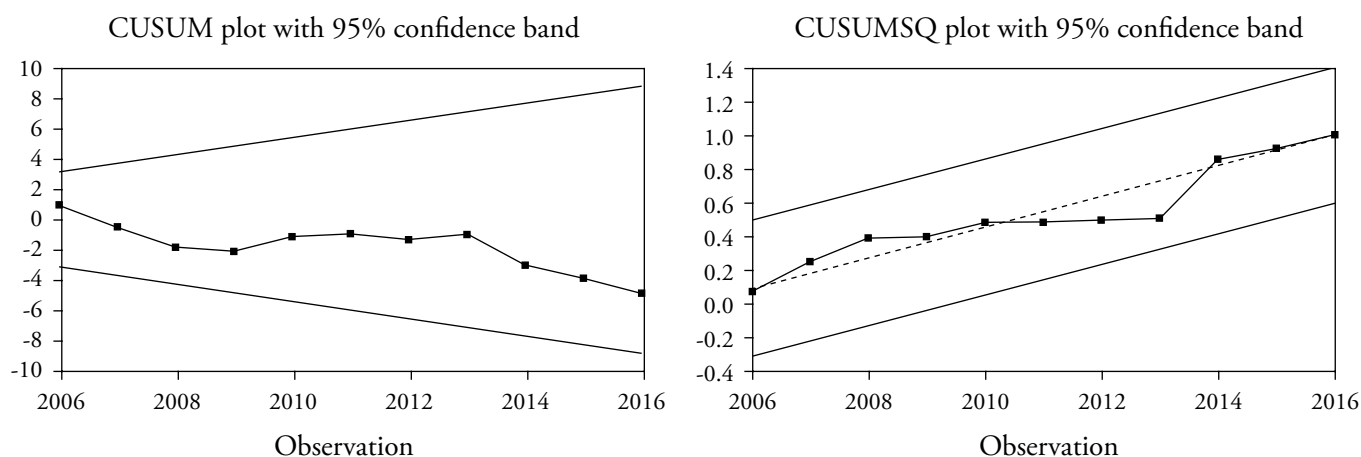


### Stability test result

We applied CUSUM and CUSUMQ to determine the parameter stability and monitor the change of detection. The diagnostic test examines heteroscedasticity and serial correlation, and the reliability of our estimation result (Brown et al. 1975). The CUSUM and CUSUMQ are plotted at a 5% level of significance (figures 5 and 6).

**Figure 5. Plot of CUSUM and CUSUMQ (Stability test for GDP per capita)**



**Figure 6. Plot of CUSUM and CUSUMQ (Stability test for poverty reduction)**

Figures 5 and 6 indicate that CUSUM and CUSUMQ statistics are well inside and between the critical bounds of the 5% confidence interval of parameter stability, whereas Figure 5 shows that CUSUMQ lines suggest a 1% (0.509) value outside of the 95% confident band in 2015.

## Conclusions, discussion and further research

One of the main conclusions of this paper is that aid has played a crucial role in Tajikistan's development, and it is hard to imagine further development of the country without coordinated external support from the donor community.

As was expected, this study confirms our two first hypotheses and reveals that there is a positive relationship between ODA and economic growth, and a negative effect of ODA in poverty levels, once the institutional environment in Tajikistan is considered.

The VECM and OLS estimations show that an increase of 1% of ODA provokes a rise in 1.6% of per capita GDP, and a 0.48% decrease in poverty levels in the case of the Tajik economy. Additionally, the level of corruption hinders economic development as well as boosts poverty levels in Tajikistan. Alesina and Dollar (2002) document that two-thirds of aid are spent in government consumption, which means that, in case aid is not channelled to productive uses, its usefulness will be reduced. Moreover, although openness seems to have a positive effect on GDP, it increases poverty. Government consumption contributes to an improvement in economic growth, however suggesting a negative effect on poverty reduction.

Our results tend to bring into question the third proposed hypothesis. In the present moment, South-South Cooperation has become of paramount relevance in Tajikistan, especially as a result of the Chinese upsurge as the main aid provider for the Tajik economy. However, the way through which aid has been conceded does not allow us to think that these finance flows are going to create new job opportunities and a higher standard of living in Tajikistan. South-South Cooperation in Tajikistan remains far from being considered a win-win phenomenon, due to several factors,



such as the government's high debt to China, strong commercial dependence on China, lack of a genuine industrial or agricultural development programme, low quality of institutions, as well as some of the conditions required to ease the financial flows.

Regarding the potential use of this piece of research in order to better understand the future effectiveness of the so-called South-South Cooperation, this is not but a case study that could shed light on the future implications of this relatively new genre of development cooperation. We must add that more research is needed before, to analyse and compare aid concession to the other Central Asian countries, in order to acquire a broader vision for the entire region. Furthermore, future research should compare the behaviour of South-South Cooperation in different parts of the world, namely aid behaviour in Asia in comparison with Africa or South America.

To summarise, although our empirical results generally suggest the expected signs, the result obtained by this study has a number of policy implications. Given the challenges faced by the Tajik economy, the Tajik government needs to be responsible for the accountability of ODA use. Those accountability levels must be enforced, and ODA should be channelled to favour economic growth and social sectors, with the purpose of reorienting ODA in order to optimise its impact on economic growth and poverty reduction in the country.<sup>1</sup>

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<sup>1</sup> Appendix 1 and 2 can be accessed at: <https://doi.org/10.7910/DVN/DSRPXH>

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