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Effects of Development Aid on Donor's Exports: A Case of the Czech Republic

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Abstract: The main goal of foreign aid should be the support of developing regions; however, due to the rising international requirements on the amount of provided aid, donors start to focus on the benefits aid can bring them as well. Both country-specific and general studies have been conducted to evaluate the return of aid from the donor's perspective, with the majority of them suggesting that provided aid boosts donor's exports to the developing countries. As no such analysis exists for the Czech Republic, this paper tries to fill this gap and aims to find out whether there is a positive relationship between the Czech aid and Czech exports. While employing the gravity model of international trade, the study, however, suggests that the Czech aid is not statistically significant for the volume of Czech exports. Unlike other donors, the Czech Republic thus leaves a considerable trade potential arising from the foreign aid untapped. The reasons might be other motives behind the Czech aid (both official and unofficial), poor co-operation of aid and trade policies, or changes in trade patterns.

Key words: Development aid, donors, exports, gravity model, return of aid

JEL Classification: F14, F35

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Introduction

Development aid should be ideally provided with the main goal to improve conditions in the developing countries, decrease poverty or increase human development (among others) and should thus focus on the needs of the recipient countries. However, literature (Chong and Gradstein, 2008) suggests that to understand the aid flows and its trends, it is important to focus also on the donors as their willingness to provide aid strongly depends on their inner political-economic circumstances, namely per capita income and the general satisfaction with the government. Martínez-Zarzoso et al. (2009) argue that although donor's exports are not taken into consideration in Chong and Grandstein's model, the increase of donor's export capacity might further cause the increase of income,

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and the export volume is therefore also a catalyst that influences the donor's willingness to provide aid.

Existing literature (Martínez-Zarzoso et al., 2016, Otor, 2014 etc.) indicates that development aid might affect donor's trade flows from and to the recipient countries and might be therefore used by donors to promote their economic interests in the developing regions. This suggestion is also supported by the fact that most members of the Organisation of Economic Development and Co-operation (OECD) direct their aid funds to their important trading partners in the developing regions (Berthélemy, 2006, Hoeffler and Outram, 2011), with the Czech Republic being no exception to the rule as the amount of Czech export is a significant factor of country selection and aid allocation as well (Harmáček et al., 2017).

Furthermore, donor countries and especially those from the OECD group have made international pledges to increase their aid volumes to 0.7% of their gross national incomes (GNI) by 2030 – and 0.33% of GNI in the case of the Czech Republic (OECD, 2015) – and do therefore more and more focus on the return of their aid which can be achieved and measured by improved exports to the supported developing countries (Martínez-Zarzoso et al., 2016). Several studies (Noh and Heshmati, 2017, Otor, 2014, Nowak-Lehmann et al., 2009, etc.) have been conducted to evaluate the return of aid provided by the OECD member but also non-member donor countries, however, to the author's knowledge, there is no analysis focusing on the Czech Republic specifically. The Czech Republic is an emerging Central-European donor with a new development programme re-established no sooner than in the mid-1990s, and the results of the existing literature on traditional donors might therefore not fully apply.

This paper, therefore, tries to fill this gap and answer the following question: Does official development aid (hereafter ODA) provided by the Czech Republic boost Czech exports to the developing countries? The answer might be interesting for state institutions, companies, organisations, and society alike for many reasons: firstly, it would show that providing aid could actually be a win-win situation for both the donor and the receiver, and thus help the policy makers justify the amount of aid funds to the Czech taxpayers. It would also help them understand whether/what changes of the aid policy would be necessary to make it more efficient. Secondly, it would also benefit NGOs to lobby for more funds and to make campaigns to the public. And thirdly, it might bring more insights to companies considering business in the developing countries and searching for suitable opportunities.

This study is structured as follows. The first chapter discusses similar studies: it gives a brief context and historical background to the research topic, then brings an overview of the recent (post-2000) country-specific studies and finally it explains how donors may influence its export through aid. The following chapter focuses on the official development aid and brings more insights into the development flows provided by the Czech Republic. The third chapter describes the methodology used in this study, outlines selected variables, gives more details about the collected data, and describes the selection of the used method. The fourth chapter presents the results of the analysis with the results being discussed in the last chapter of this paper.

Aid from the donor's perspective

The trade-aid nexus can be examined from various points of view. Firstly, the research can be conducted from the donor's perspective and evaluate the impact of aid on the donor's trade flows. Secondly, the research can focus on the receiver's perspective and the effect aid has on their trade flows (e.g., Nowak-Lehmann et al., 2010, Pettersson and Johansson, 2013). And last but not least, there is a number of studies that analyse the relationship from both sides at the same time (e.g., Hühne et al., 2013). The main focus of this study is on the donor's exports to the developing countries, and hence only literature on the donor's perspective is discussed in this chapter.

The research dates back to the early 20th century to the discussion on German repatriations by Keynes-Ohlin (Martínez-Zarzoso et al., 2009) and the transfer paradox suggested by Leontief in 1936 that states that foreign aid might paradoxically enrich its donors but impoverish its recipients as the terms of trade might change with provided aid (Martínez-Zarzoso et el., 2009). In the 1980s, analyses (e.g., Brecher and Bhagwati, 1981, Bhagwati et al., 1983) were conducted to confirm or contradict the transfer paradox, however, they brought mixed findings: they suggested that the transfer paradox might still be valid, but under some conditions and in some cases, aid transfers might be actually beneficial for both donors and aid-receivers (Liu and Tang, 2017, Martínez-Zarzoso et al., 2009).

In the 1990s and early 2000s, the focus shifted and studies (e.g., Arvin and Baum,1997 and Arvin and Choudry, 1997) evaluated the impact of tied and untied bilateral aid on donors' exports and showed that the impact of both was roughly the same, which was explained by the creation of good will in the recipient countries and the existence of trade agreements and trade concessions between the two countries (Nowak-Lehmann et al., 2009). At the same time, country-specific studies analysing aid and trade flows mainly from the 1970s to the 1990s were also conducted (e.g., Nilsson, 1997, Vogler-Ludwig et al., 1999, Wagner, 2003), suggesting that the return of aid was rather significant for the selected donors. However, Nowak-Lehmann et al. (2009) advise to exercise caution when considering the results of studies from this period due to methodological caveats.

In the new millennium, studies have been conducted for both a group of donor countries and individual donors as well. One of the frequently studied donors in this area is Germany as one of the biggest donors in the world (OECD, 2021). Literature (Nowak-Lehmann et al., 2009, Martínez-Zarzoso et al., 2009, Martínez-Zarzoso et al. 2016) suggests that aid is a statistically significant positive factor for the growth of German exports with one US dollar spent on aid bringing on average 0.83 to 1.50 USD back in German exports (figures vary based on the studies). Furthermore, it appears to have also a significant and positive impact on German employment with 216,000 jobs in Germany being associated with export production triggered by the provided aid (Martínez-Zarzoso et al., 2016).

Similar findings have been confirmed for other traditional donors as well. Studies indicate that donors such as the United States (Liu and Tang, 2017) and Sweden (Skrävall, 2012) benefit from their aid in the form of increased exports to the developing countries too. However, aid does not enhance exports only of the traditional European and Anglo-American donors, but also of Asian donors, namely Japan (Otor, 2014) and Korea (Noh and Heshmati, 2017). Not surprisingly, a very significant and positive impact on exports has also been confirmed for China (Liu and Tang, 2017), an emerging trade-oriented donor and a competitor to the traditional aid concept.

The hypothesis of aid boosting donor’s exports has also been tested on a group of donor countries: Wagner (2003) analysed data on 20 donors and 109 aid recipients between 1970 and 1992 with the result that the return of aid in this period was in general between USD 0.73 and USD 2.29 per each dollar spent on aid.

The effect of aid on donor’s exports is not stable though and might change over time or vary based on the type of provided aid, recipient countries, or economic sectors. Few studies (Otor, 2014, Martínez-Zarzoso et al., 2017) compared the return of aid of donor countries before and after changes in the donor’s foreign aid policies. For some countries, the return of aid grows in time (Japanese return grew approximately 1.5 times when comparing pre- and post-1992 periods (Otor, 2014)), while other donors decreased their aid return over time: Dutch aid was boosting Dutch exports till 1999, however, it is not statistically significant in the new millennium (Martínez-Zarzoso et al., 2017). The Netherlands is thus one of the exceptional cases where aid is not a statistically significant determinant for the boost of donor’s exports in the recent years, which is explained by the change in policies, such as reducing the number of sectors and partner countries.

Not only time but also other factors might influence the return of aid in increased exports. Noh and Heshmati (2017) looked deeply into the return of various aid types and suggested that humanitarian aid and loan-type aid generated higher return for Korea, compared to grants and technical co-operation. Martínez-Zarzoso et al. (2016) then analysed the impact on different economic sectors and concluded that in the case of Germany, machinery and electrical and transport equipment benefited from German aid more than other sectors. Last but not least, Martínez-Zarzoso et al. (2009) investigated differences between recipient countries and concluded that strategic aid recipients were associated with a higher return on aid in German exports than non-strategic recipients.

The above-mentioned existing literature generally agrees that aid provided to developing countries has a positive impact on the donor’s exports. The explanation why donor countries can directly and/or indirectly boost their exports through provided ODA might be because:

(1) they can provide their aid through projects in which they have a comparative advantage, and implementation of such projects would therefore mean the import of goods and services from the donor country (Otor, 2014);
(2) they can create trade dependence between themselves and the receiver country as they can allocate their aid funds to projects that would require an import of goods and services from the donor country to the aid receiver in the future (e. g., spare parts, technical support) (Otor, 2014);
(3) they can create a positive image of their goods and services among the local consumers and generate goodwill to purchase products from the donor’s exporters rather than from other countries (Nowak-Lehmann et al., 2009, Liu and Tang, 2017, Otor, 2014, Martínez-Zarzoso et al., 2009, Djajić et al. 2004 etc.);
(4) they can even encourage a habit formation that would lead to subsequent purchases of donor’s goods and services (Nowak-Lehmann et al., 2009, Otor, 2014, Martínez-Zarzoso et al., 2009, Djajić et al., 2004 etc.);

(5) they can combine their aid missions with trade missions, and thus create a door-opening opportunity for their exporters (Martínez-Zarzoso et al., 2009);
(6) they can strengthen both their political and economic links, while discussing and proving aid (Liu and Tang, 2017); and last but not least because
(7) aid can also boost donor's exports through macroeconomic channels as it might increase the recipient's budget and purchasing power, and thus improve its import capability and demand (Nowak-Lehmann et al., 2009, Otor, 2014, Liu and Tang, 2017, Kruse and Martínez-Zarzoso, 2016).

Czech development aid

OECD defines official development aid as funds provided by official agencies in the donor countries to the recipient countries in order to boost their economic development and increase their welfare (OECD, 2022b). These funds can be provided bilaterally, that is from the donor to the recipient countries directly, or multilaterally, that is to be channelled through contributions to the international organisations that use the pooled funds independently based on their set goals.

The Czech Republic re-established itself as an aid-provider with its accession to the OECD in 1995. Still facing its own economic challenges, the Czech Republic fulfilled its international commitments to provide aid by the implementation of small projects and more importantly by the payment of contributions to international institutions and organisations (Jankowski, 2018). Till today, the Czech Republic has provided more aid multilaterally as only around 31% of its ODA is provided on bilateral basis (OECD, 2022).

In this study, multilateral aid is excluded from the analysis as the Czech Republic has no power to influence to which countries and/or sectors it will be directed. Projects implemented with these funds cannot be linked back to the Czech Republic either, making it impossible to evoke most of the export-supporting effects mentioned in the previous chapter.

As per the form, ODA can be provided as a loan, grant, technical cooperation, and humanitarian assistance (OECD, 2021). According to the OECD reports (OECD, 2022), the Czech Republic provides its aid mostly in the form of grants and in limited cases as technical cooperation. Therefore, we do not look deeper into the efficiency of individual aid forms in this analysis and take into account total bilateral flows from the Czech Republic in general. Geography-wise, the Czech development aid is highly fragmented and was, based on our data (OECD, 2021), directed to over 130 countries from 1998 to 2018, however, some countries received only marginal or one-off aid during this period.

When measuring the aid as a percentage of GNI, the Czech Republic is one of the smallest donors from the OECD member states as it allocated 0.13% of its GNI for development aid in 2020 (OECD, 2022b), leaving only Greece on lower levels. As the bilateral aid is rather limited, it might not reach the return of aid on the same levels as the big traditional donors such as Germany or the United States. For comparative purposes, it would be best to focus on the Visegrád countries as they share some similarities; however, no country-specific studies for this group were found during the literature review.

Methodology

This analysis draws on the existing literature and employs a similar approach for the Czech aid, i.e., it uses the gravity model of international trade. This model is one of the frequently used econometric models to analyse and explain trade flows between countries. It is inspired by the gravity laws as defined by Isaac Newton where the force between two objects is directly influenced by the masses of the objects and inversely by the distance between them.

The gravity model was applied to the trade analysis for the first time by a Dutch economist Jan Tinbergen in 1962 (Bergstrand, 1985, Linders and de Groot, 2006). Tinbergen adjusted the original gravity model to reflect the specifics of trade and stated that the bilateral trade flows between two states defined as exports from a country i to a country j (Xij) are directly influenced by the economic sizes of these two countries (measured as their gross domestic products – GDPi and GDPj) and inversely by the distance between them (τ_{ij}). Tinberger's gravity equation furthermore included a regression constant (c), a random error term (e), and coefficients (b) that were to be estimated in the model (Shepherd, 2013). In its basic form, the gravity equation is as follows:

$$\log X_{ij} = c + b_1 * \log GDP_i + b_2 * \log GDP_j + b_3 * \log \tau_{ij} + e$$

This basic gravity equation can be extended with other factors that might facilitate or obstruct bilateral trade flows between countries. The selection of such factors depends on the area of study and some of these factors might even be defined in the augmented models by binomial dummy variables (Linders and de Groot, 2016). To offer some examples of such variables, models often include common language, border and religion, historical ties, the existence of trade agreements, or membership in economic organisations. The literature focused on foreign aid adds to this model also variables describing official development aid provided by a country i and by other donors (Martínez-Zarzoso et al., 2016, Nowak-Lehmann et al., 2009, Otor, 2014, etc.).

This analysis is based on panel data including information on 117 recipient countries of the Czech aid in the past 21 years, i.e., in the period between 1998 and 2018. Countries that gained their independence in later years (for example Kosovo) are included only after their independence. All countries that received the Czech aid at least once during this period, and where there are no obvious trade obstacles, are counted in the data sample. The potential dataset size is 2,457 observations, however, due to missing data (discussed further below), there were 2,402 observations entering into the analysis.

All monetary variables are measured in USD current prices, although this might lead to a slight distortion due to the length of the time series. As the analysed data come from various sources (World Bank, OECD, Comtrade), each database offers a different year as the base for the constant prices, thus making it problematic to use constant prices with the same base year. It was considered to recalculate the monetary variables and enter them into the analysis in the form of their ratio to GDP (e.g., export to GDP or ODA to GDP), however, due to combined variables (such as ODA of all other OECD countries), this solution turned hardly feasible. After conducting the literature review summarised in the chapter Aid from the donor's perspective, it was concluded that other studies also measure their monetary variables in USD current prices, and therefore we decided to proceed with current prices in the end.

The variables selected are introduced in detail below with their source, measurement unit, and the expected impact on Czech exports.

The dependent variable is the volume of Czech exports to the developing countries, which is indicated in the equation as CZEXP. The figures were retrieved from the Comtrade database and are measured in USD current prices. For some recipient countries and years, no exports were reported by the Czech Republic. As described by Frankel et al. (1997) and Linders and de Groot (2006), zero-valued observations are usually observed for trade between distant or relatively small states that trade a little with each other. The countries with no reported exports by the Czech Republic in some years are in majority small islands or states such as Sao Tome and Principe, Solomon Islands or Tuvalu, and no mirror data (i.e., imports from the Czech Republic) were reported by them in those years either. Therefore, an assumption was made that there were no exports and the missing records are considered as zeros in the analysis.

The selection of independent variables is inspired by the existing literature and includes the following variables:

(1) The first independent variable is the size of the Czech economy measured as the GDP of the Czech Republic and marked as CZGDP in the equation. The data were retrieved from the World Bank database and are in the USD current prices. There are no zeros or missing values for this variable. It is expected that this variable will have a positive impact on Czech exports because higher GDP means also larger production capabilities, and thus also more goods and services to export (Martínez-Zarzoso et al., 2016, Otor, 2014).

(2) The second independent variable is the size of economies of the developing countries measured as their GDP and marked as DCGDP in the equation. Similarly as for the Czech Republic, data were taken from the World Bank database and are in the USD current prices. There were no data reported for some countries in some years, so the time series of GDPs were not complete in several cases. The forward or backward filling based on the linear growth rate (mean growth rate of the known observations) was used to deal with these missing values. It is expected that this variable will have a positive impact on Czech exports as growing GDP will increase the income and strengthen local demand for imports (Nowak-Lehman et al., 2013, Otor, 2014).

(3) The third independent variable is the geographical distance between Prague and the capitals of the developing countries that is marked as DIS in the analysis. The data were taken from CEPII database and are measured in kilometres. As there were no figures for South Sudan in the CEPII database, this distance was taken from Geodatos. There are therefore no missing or zero-values. In line with the gravity model (Linders and de Groot, 2006), it is expected that this variable will have a negative impact on export volumes as longer distance means higher transportation costs and also poorer economic ties.

(4) The official Czech development aid provided to the developing countries is marked as CZODA in the equation. The data were taken from the OECD statistics, are in the USD current prices and include the total net amount of ODA disbursements (i.e.,

actual expenditures) with only bilateral flows being considered. As for the zero values, this variable appeared to be the most problematic. Firstly, many countries received only one-off aid in one or two years with no aid provided during the rest of the period. Therefore, no values are recorded for them in the other years. Secondly, OECD measures ODA in million USD meaning that in the case a small amount was provided, it is recorded as zero but carries the information that some aid was recorded. For our analysis, the small amounts were considered as zeros as well because omitting these limited funds does not distort the results. Despite the fragmentation, it is expected – based on the existing literature listed and described in the literature review – that the Czech ODA will have a significant and positive impact on the Czech export volumes.

(5) The official development aid provided by other donors is indicated as RESTODA in the equation. The data were taken from the OECD statistics, are in the USD current prices and the variable is calculated as a sum of ODA provided by other OECD donors to the given recipient country in the particular year. Countries considered as other donors in this analysis are other members of the OECD Development Assistance Committee, namely: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, the United Kingdom, and the United States. As the figures include multiple donors, the number of missing observations is very limited. The impact of RESTODA on Czech exports may be ambiguous. It can be a positive catalyst for Czech exports as aid can generally increase the import capacity (as mentioned above), but it can act as a trade deterrent for the Czech Republic if other countries manage to promote their products at the expense of Czech exports (Martínez-Zarzoso et al., 2016). In line with point 7 in the chapter Aid from the donor´s perspective, we, however, expect that RESTODA will have a positive impact on Czech exports.

(6) The last two variables are binomial dummy variables related to the historical and economic ties. There are no missing values for any of the following variables. The first of them reflects historical ties defined as a membership, affiliation, or observation status in the Council for Mutual Economic Assistance (Comecon), which is marked as RVHP in the equation and the information comes from Encyclopedia Britannica. This variable has a value of 1 if a developing country was a member, associate member or observer of this organisation in the given year, otherwise, the value of this variable is zero. It is expected that this variable will have a positive impact on exports (Martínez-Zarzoso et al., 2010) as the Czech exporters can build on the good reputation of Czechoslovak products in the developing regions, former ties and experience and sometimes also similar language, culture and history.

(7) The last variable is the existence of a mutual trade agreement that is further referred to as TA. This variable has a value of 1 in the case that no trade agreement (free trade agreement, preferential trade agreement or economic co-operation agreement) was in place between the Czech Republic and a developing country in the particular year, otherwise, the value of this variable is zero. The data before the accession of the Czech Republic into the European Union in 2004 were taken from the World Trade Organisation, the data after 2004 are retrieved from the European Commission. It is expected that this variable will have a positive impact on exports

(McCallum, 1995, Larson et al., 2018), as trade agreements reduce barriers and promote international trade.

The model was selected as follows. The estimation technique is using unbalanced panel data as discussed above. The panel specification is much better suited for the data used for the estimation because the additional time points result in more degrees of freedom which leads to a more accurate estimation.

Another choice made regarding the panel data estimation was connected to the question of whether to choose the random effects model or the fixed effects model. The random effects implies that unobserved heterogeneity is strictly random and that it is not correlated with the regressors and fixed effects. There is a significant drawback regarding the fixed effect model which directly effects the sample, the fixed effect model drops all time-invariant variables meaning that our data set contains only data for exports for the Czech Republic. Additionally, the Czech GDP is invariant across all importing countries and the fixed effects model would treat it as less significant. These drawbacks would significantly influence the core gravity model estimations. Another argument made by Maddala (1983) is that fixed effect estimation of limited-variable models which includes a large number of cross-sectional units compared to time observations gives inconsistent parameter estimations. After carefully weighing the consequences, the random effect model was chosen for the estimation.

The export volumes contain a significant number of zero trade flows which are either complete zeros or very small trade flows rounded to zero. The technique which is generally used for the estimation of limited variables (i.e., zero trade flows) is a left-censored linear regression model – a technique that was used to estimate the gravity model by, for example, Rose (2004).

The final model used for the estimation is a left-censored linear random effect model. All numeric variables enter into the model in their logarithmic form and the relationship between Czech exports and the selected variables can be formulated in the following equation:

$$\begin{aligned}\ln CZEXP_{ijk} = \; & c + \beta_1 * \ln CZGDP_{ijk} + \beta_2 * \ln DCGDP_{ijk} + \beta_3 * \ln DIS_{ijk} + \beta_4 \\ & * \ln CZODA_{ijk} + \beta_5 * \ln RESTODA_{ijk} + \beta_6 * \ln RVHP_{ijk} + \beta_1 \\ & * \ln TA_{ij} + u_i + v_j + w_{ijk}\end{aligned}$$

, where u_i is a country-specific random effect, v_j is a time-specific random effect and $w_{i,j}$ is an individual random effect.

As mentioned above, several data transformations and manipulations were needed in order to fit the discussed model in the specific form. In addition to the changes described above, the constant 1 was added before the logarithmic transformation to deal with the zero values of the export volumes. This transformation is in line with censored regression as ln(1) = 0.

Furthermore, the constant 0.0099 was added before the logarithmic transformation to deal with the zero values of both development aids variables. The reason for this is that (1) this constant is the nearest lower number than the minimum of both development aids values and (2) simply adding constant 1 in this case would result in biased results, as the logarithmic transformation of these values can be negative. The descriptive statistics for the data are shown in Table 1 below.

Table 1. Descriptive statistics

Variable (mil USD)	Mean	St. deviation	Max	Min	Expected sign
CZEXP	65.83	215.11	2 583.49	0.00	
CZGDP	162 226.40	62 535.39	244 987.40	61 649.49	+
DCGDP	139 972.80	698 385.90	13 894 820.00	322.41	+
DIS (km)	6 110.36	2 983,96	13 772.91	492	-
CZODA	0.41	1.67	42.10	0.00	+
RESTODA	656.69	962.94	13 926.74	0.00	+

The estimation has been performed for 5 models: Model (1) includes all countries that received Czech aid within the research period and the analysis includes all years. Model (2) focuses only on the current strategic countries (priority, phase-out and special partners) as defined by the Czech Development Agency. The countries included are therefore Afghanistan, Bosnia and Herzegovina, Cambodia, Ethiopia, Georgia, Kosovo, Moldova, Mongolia, Palestine, Serbia, Syria, Ukraine and Zambia. All years are taken into consideration. Models (3) and (4) include all countries but divide the timespan into two periods, pre-2008 in model (3) and post-2008 in model (4). The reason for this division is that the Czech development aid faced many issues at the beginning of its existence (such as the lack of institutional framework) and in 2008, the Czech Development Agency was founded as an organisation to implement and monitor Czech bilateral projects. Models (3) and (4) therefore test whether the results are affected by this change. The last model (5) focuses only on Czech development aid with all the other variables removed, except for the core gravity model ones.

A left-censored random effects model was chosen for the estimation of the models (1), (3), (4) and (5). These models include a significant number of censored observations and a censored model is an appropriate solution to this. The random effect model was chosen for model (2) as there are almost no censored observations initially, and for the higher-lags models, the censored observations are removed completely due to the lag computation. Therefore, choosing a censored model for model (2) would lead to biased estimation.

Results

Various lags are taken into consideration in the analysis as well because the impact of aid on exports might take some time to show (Otor, 2014). Three tables are therefore presented below, with Table 2 showing results of all models with variables CZODA and RESTODA lagged by one year, Table 3 showing results of all models with variables CZODA and RESTODA lagged by two years, and finally Table 4 showing results of all models with variables CZODA and RESTODA lagged by three years. For model (4), the start date reflects the lag.

Table 2. Models with CZODA and RESTODA lagged by 1 year

	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)	
Predictors	*Estimates*	*std. error*	*Estimates*	*std. error*	*Estimates*	*std. error*	*Estimates*	*std. error*	*Estimates*	*std. error*
Intercept	-12.00	2.61	-29.50	7.71	-15.48	4.99	-4.35	12.17	-9.12	1.89
DIS	-1.14	0.24	-1.43	0.18	-1.24	0.35	-1.16	0.27	-1.60	0.19
CZODA	-0.01	0.04	-0.06	0.08	-0.03	0.10	-0.00	0.03	-0.00	0.04
RESTODA	-0.01	0.04	0.01	0.06	-0.01	0.07	0.01	0.08		
CZODA L(1)	-0.00	0.04	-0.08	0.07	0.00	0.11	0.01	0.04	0.01	0.04
RESTODA	0.06 *	0.03	0.04	0.06	0.18	0.05	-0.03	0.07		
CZGDP	0.48	0.07	1.51	0.35	0.57	0.15	0.12	0.46	0.55	0.06
DCGDP	1.02	0.05	0.71	0.16	1.07	0.10	1.12	0.05	1.02	0.05
RVHP	1.29	0.35	2.16	0.34	1.38 **	0.42	1.01 **	0.33		
TA	0.28 **	0.09	0.08	0.23	0.28	0.38	0.13	0.16		
Observations	2285		244		1013		1272		2285	
R^2 adjusted	0.130		0.634		0.586		0.572		0.127	
AIC	7929.762		778.671		3784.838		3909.160		7949.281	

* $p<0.05$ ** $p<0.01$ *** $p<0.001$

Source: Created by the author.

When considering CZODA and RESTODA lagged by one year, the analysis shows that the Czech development aid is not statistically significant in any of the models in both the lagged and non-lagged form, which does not comply with the findings of other studies mentioned in the first chapter. This may be due to the size and structure of the Czech aid. The Czech Republic is one of the smallest donors from the OECD members and it allocates approximately 70% of its aid multilaterally (OECD, 2022). The amount of bilateral ODA flows is therefore limited and with the high geographical fragmentation of the aid in mind, the aid may not initiate the export evoking effects mentioned in the chapter Aid from the donor's perspective, and its return of aid may not thus reach the levels of the big donors.

Noh and Heshmati (2017) indicate that the return of aid is higher for the loan-type aid for the Asian donors mentioned above, however, the traditional European and Anglo-American donors in the literature review use – similarly to the Czech Republic – mostly grants as the form of their bilateral aid as well and yet, the provided aid was still a significant catalyst for their trade. Therefore, we assume that this result is not caused by the fact that the majority of Czech aid is provided in the form of grants.

Table 3. Models with CZODA and RESTODA lagged by 2 years

	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)	
Predictors	*Estimates*	*std. error*	*Estimates*	*std. error*	*Estimates*	*std. error*	*Estimates*	*std. error*	*Estimates*	*std. error*
Intercept	-9.73	2.29	-15.55	6.89	-11.94	4.32	-4.18	12.64	-6.86	1.70
DIS	-1.19	0.20	-1.36	0.10	-1.24	0.36	-1.17	0.27	-1.60	0.16
CZODA	-0.01	0.03	-0.02	0.07	-0.02	0.07	-0.00	0.04	-0.01	0.03
RESTODA	-0.01	0.07	-0.07	0.05	0.00	0.09	0.01	0.08		
CZODA L(1)	0.02	0.06	-0.02	0.07	0.03	0.11	0.02	0.06	0.03	0.06
CZODA L(2)	-0.02	0.04	-0.01	0.06	-0.00	0.09	-0.02	0.05	-0.01	0.04
RESTODA	0.07 *	0.03	-0.02	0.06	0.17 **	0.06	-0.02	0.09		
RESTODA	-0.02	0.05	0.01	0.05	-0.06	0.09	-0.02	0.10		
CZGDP	0.39	0.07	0.71 *	0.30	0.46	0.12	0.11	0.47	0.47	0.06
DCGDP	1.04	0.04	1.02	0.10	1.07	0.10	1.13	0.05	1.01	0.04
RVHP	1.16	0.29	1.74	0.20	1.22 **	0.42	1.01 **	0.34		
TA	0.20 *	0.09	-0.10	0.18	0.20	0.40	0.12	0.16		
Observations	2168		231		898		1270		2168	
R^2 adjusted	0.147		0.819		0.633		0.533		0.145	
AIC	7115.539		666.855		3078.874		3907.353		7127.776	

** p<0.05   ** p<0.01   *** p<0.001*

Source: Created by the author.

The influence of aid provided by other OECD countries proved positive, however, its significance varies based on the selected model: it was significant in models (1) and (3) but it did not show any significance in models (2) and (4). ODA provided by other donors, therefore, does not crowd out Czech exports, but on the contrary, the Czech exporters can take advantage of the increased purchasing power and recipient's budget in models (1) and (3).

As per other factors, the most statistically significant positive catalysts for Czech exports are the historical ties with developing countries – this factor is significant in all models (1), (2), (3) and (4). This shows that historical ties are an important trade catalyst as Czech exporters still prefer countries in which they can build on previous experience and avoid any insecurity arising from the unknown environment.

Table 4. Models with CZODA and RESTODA lagged by 3 years

	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)	
Predictors	*Estimates*	*std. error*	*Estimates*	*std. Error*	*Estimates*	*std. error*	*Estimates*	*std. error*	*Estimates*	*std. error*
Intercept	-8.31	2.34	-7.50	6.14	-9.84 *	4.68	-3.68	13.16	-5.60	1.73
DIS	-1.22	0.19	-1.46	0.26	-1.21	0.29	-1.17	0.27	-1.60	0.15
CZODA	-0.02	0.03	0.00	0.05	-0.01	0.07	-0.00	0.04	-0.01	0.03
RESTODA	0.00	0.07	-0.01	0.03	0.01	0.09	0.00	0.08		
CZODA L(1)	0.03	0.05	0.02	0.05	0.05	0.09	0.03	0.06	0.03	0.05
CZODA L(2)	-0.01	0.06	0.07	0.05	-0.00	0.10	-0.01	0.07	-0.01	0.06
CZODA L(3)	-0.02	0.05	-0.03	0.04	0.01	0.08	-0.02	0.05	0.00	0.05
RESTODA	-0.00	0.07	-0.01	0.04	0.04	0.11	-0.02	0.10		
RESTODA	-0.04	0.06	0.01	0.04	-0.03	0.08	-0.02	0.12		
RESTODA	0.09	0.02	0.05	0.04	0.18	0.05	0.02	0.06		
CZGDP	0.35	0.09	0.69 *	0.29	0.38 **	0.15	0.09	0.49	0.42	0.06
DCGDP	1.04	0.05	0.71	0.15	1.04	0.09	1.13 ***	0.06	1.01	0.03
RVHP	1.12	0.25	1.53 **	0.48	1.14 **	0.36	1.02 **	0.34		
TA	0.16	0.09	-0.05	0.14	0.16	0.36	0.13	0.16		
Observations	2051		218		784		1267		2051	
R^2 adjusted	0.152		0.636		0.671		0.494		0.149	
AIC	6528.118		446.626		2550.957		3904.709		6541.933	

** p<0.05 ** p<0.01 *** p<0.001*

Source: Created by the author.

The next parameter in the analysis was the distance between the Czech Republic and the developing countries. Here, the results are aligned with the expectations and literature as this variable is significant and with a negative coefficient in all models, meaning that the closer the country is, the higher amount of export is recorded due to lower barriers of trade and greater ties (Linders and de Groot, 2006). This finding is supported by previous research on Czech exports as Janda et al. (2012) indicate that the Czech export is directed mostly to the developed countries, however, when it goes to the developing regions, it is connected with those in its close geographical proximity. The mutual trade agreement represented by the variable TA is significant for the overall model (1) but shows no impact for other models.

As per other variables, the gravity model in its simple form holds for models (1), (2) and (3) as both the GDP of developing countries and the GDP of the Czech Republic are statistically significant and positive, confirming the Tinbergen's equation. The Czech GDP is not significant in the post-2008 model (4), however, all other core gravity model variables such as DCGDP and distance are significant at the 5% level of significance. The fact that the Czech GDP is not significant in this model might be connected with the slow post-crisis development of the Czech economy.

The analysis including CZODA and RESTODA lagged by two years shows similar results to the previous analysis lagged by one year: based on our results, the Czech development aid is not statistically significant in any of the models in both lagged and non-lagged forms. As for the development aid coming from the other countries, this does not show any significant effect on the Czech export when considering a two-year lag either.

As per the remaining variables, the results of the second lagged model are again very similar to the first lagged model. The most important positive determinants of Czech exports to the developing countries supported by Czech aid are again the historical ties with developing countries – this factor is significant in all models (1), (2), (3) and (4). The mutual trade agreement is significant for model (1) while showing no significance in the other models. All of the gravity model variables such as DCGDP and distance are significant at 5% level of significance in all models and the signs of the parameters are in accordance with the expectations. Similar to Table 2 above, CZGDP is significant in models (1), (2) and (3), but shows no significance in model (4).

The last table considers CZODA and RESTODA lagged by three years and it indicates similar implications for Czech aid as the previous tables, i.e., Czech aid is statistically non-significant in all models both in the lagged and non-lagged forms.

ODA provided by other donors shows a positive influence again as it is significant in 3-years-lagged form for models (1) and (3). It also shows that the three-year period holds more information than 1 year which is no longer significant in these results, however, this can be the result of removing additional observation from each country due to lagging of the variables. For models (2) and (4), RESTODA does not show any significant influence on Czech export at all.

As per other variables, the findings again correspond with the one-year-lag model and the two-year-lag model: historical ties are once again a statistically significant and positive factor for Czech export, being statistically significant in all models (1), (2), (3), and (4). The TA variable is no longer significant in this form of the models – again, this could be due to the lower number of observations. The results for simple gravity models are again in accordance with the expectation: the GDPs of developing countries are statistically significant in all models. The size of the Czech economy is statistically significant in all models except for the post-2008 model (4). As for the geographical distance between the Czech Republic and the developing countries, it is significant at 5% level with a negative sign in accordance with the gravity model's expectations.

Discussion

The results of the analysis on the return of Czech aid in terms of exports are rather surprising as the impact of aid on exports was not statistically significant in any of the models. There might be several explanations for this fact.

First, as mentioned in Results, the Czech aid is highly fragmented and its volume is – compared to other donors – rather limited. To demonstrate this, we can compare the Czech aid to the German one which is one of the frequently researched in other studies. Germany provides the majority of its aid bilaterally and when considering only the bilateral disbursements, Czech aid amounted to only around 1% of German aid in 2018 – the last year of our data (OECD, 2021). These numbers show that the Czech Republic can hardly compete with the bigger donors and thus the export evoking effects of the Czech trade remain only limited.

Secondly, these results might be associated with the goals of the Czech development assistance: the Czech Republic focuses primarily on the countries where not only it has economic interests, but also its own political and security agenda (Kugiel, 2012). It is thus possible that other factors might outweigh Czech economic interests in the decision-making process.

The third possible explanation might be connected with the alignment of Czech aid and trade policies. Traditional donors, such as Germany and the UK, often combine their aid activities with trade missions and use national brands to promote their products and services – a nice example could be a German programme "A Year of Germany" in which aspects of international development, economic co-operation and political influence were combined. Within the programme to teach Indian schoolchildren the German language, a network of economic and political decision makers was created to present German know-how and experience, goods, and services in the region as well (Pamment, 2016).

To the author's knowledge, a closer co-operation of aid and trade agencies does not exist in the Czech Republic yet. When comparing the supported priority, programmable, phase-out and special countries of the Czech development aid (Afghanistan, Bosnia and Herzegovina, Cambodia, Ethiopia, Georgia, Kosovo, Moldova, Mongolia, Palestine, Serbia, Syria, Ukraine, Zambia) and the locations of the Czech Trade offices, Czech Trade operates only in four countries out of the thirteen mentioned (Czech Trade, 2022). Similarly, when looking at the trade missions planned for 2021, only five countries were supposed to receive outgoing Czech missions and two were planning an incoming mission to the Czech Republic (MZV, 2021). To improve the return of Czech aid, aid and trade activities need to be more closely aligned and a strategic plan needs to be prepared.

The fourth possible explanation might be associated with the trade patterns. Harmáček et al. (2017) show that developing countries are selected to the aid portfolio based on their importance to the Czech exports (a higher export volume to a developing country means a higher chance of its selection to the Czech development programme and a higher amount of Czech aid provided to this country). It might be possible that as trade flows change in time, the interest of Czech exporters shifted to other regions while the aid is still allocated to countries based on their past interests. Further research would be needed to confirm this hypothesis.

Conclusion

Confirming a positive influence of Czech aid on exports would help the Czech Development Agency and the Czech policy makers to justify the aid funds to the Czech taxpayers and support any increase of these funds. It would also benefit NGOs and development institutions to lobby for the enhancement of their development activities.

Findings from the existing literature suggest that traditional European donors such as Germany, the Netherlands and even Asian donors, namely Japan, China and Korea, can utilise their aid funds and create a positive effect on their exports. The aim of this paper was therefore to analyse the aid provided by the Czech Republic and evaluate its return in terms of boosted exports.

However, the results of this analysis do not confirm any positive relationship between the aid and exports, meaning that unlike other donors, the Czech Republic does not achieve any export boost through the provided ODA as the Czech aid is not statistically significant in any of our research models. There might be many reasons behind these findings, some of them being: other motives (official or hidden) behind the Czech aid, the poor co-operation of aid and trade agencies or changed trade patterns.

The influence of economy sizes is significant and positive as per expectations: Czech GDP is significant with all lags but is insignificant for the post-2008 periods with the possible reason being a slow economic recovery after the economic crisis. As per the GDPs of the developing countries, these influence exports positively as per the gravity model expectations.

Finally, the findings furthermore confirmed that Czech exports are positively influenced by ODA provided by other donors in some models and by historical ties with the developing countries.

The next research might therefore focus in detail on the co-operation of the aid and trade agencies in the Czech Republic with the aim to suggest a future strategy or to look into the aid-trade nexus from the point of view of the Czech aid´s receivers.

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Appendix – Data sources and explanation

Variable	Indication	Measurement Unit	Source
Dependent variable			
Czech export	CZEXP	USD	UNCOMTRADE
Independent variable			
Czech GDP	CZGDP	USD	World Bank
GDP of developing countries	DCGDP	USD	World Bank
Geographical distance of capital from Prague	DIS	kilometers	CEPII Geodatos
Czech development aid	CZODA	USD mil	OECD
Development aid of remaining OECD members	RESTODA	USD mil	OECD
Historical ties	RVHP	Binary variable: 0 (Comecon non-member) / 1 (part of Comecon)	Encyclopaedia Britannica
Trade agreement	TA	Binary variable: 0 (no agreement) / 1 (existing agreement)	EU Commission WTO