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Does one good deserve another? Evidence from China's trade and aid policy

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Abstract

In this paper, we study the impact of China's foreign aid on exports. We use a sample of 165 countries over the time span 2000-2014 and employ a gravity model with GDP-weighted multilateral resistance terms. Our findings suggest that the return on Chinese exports of every dollar spent on foreign aid is around 0.156-0.4, at the aggregate level. The aid provided in passed periods also promotes China's exports. We also show, while taking account of the aid heteorogeneity, that the Chinese government could get a higher return in terms of exports when providing development aid relative to infrastructure, to the recipients. Furthermore, we find that China international aid helps the country to trade more with similar income-level economies. Hence, it can, to a certain extent, foster the South-South trade relations.

Keywords: Emerging donors, aid-trade nexus, gravity model, China
JEL classification: F14, F35, P33

1 Introduction

Over the last two decades, China's development has been extremely fast: the ratio of China's international trade to GDP (either export or import) has grown from 0.2% to more than 10%[1]; GDP growth has averaged nearly 10 percent a year (World Bank, 2017). Along with this development, China has a proactive role in providing international aid to other countries. During the 2000-2014 period, the Chinese government gave an international aid of 273.6 billion US dollars:[2] the aid allocation per year is shown in Figure 1 and Figure 2. This assistance is allocated to 140 countries and regions in Africa, Asia and the Pacific, Latin America and the Caribbean, Middle East and Central and Eastern Europe (Dreher et al., 2017). The main sectors on which the Chinese aid is focused are (Global Chinese Official Finance Dataset v1.0, 2014): energy, transport, education, health (Figure 5 in appendix).

Nevertheless, China is still an emerging country and is classified as an upper middle income economy (World Bank, 2017). The country is also characterized by strong regional development disparities (Démurger, 2001). For example, there were 55 millions poor people living in rural areas in 2015 (World Bank, 2017). As China is becoming more active as a donor, there might be a trade-off between the Chinese funds that are spent to provide international assistance and the ones that are directly used in China's local economy (i.e. to enhance internal aid, to boost the poor rural regions' activities etc.). Moreover, China highlights that its foreign aid is unconditional, which means that the country provides the assistance without imposing any economic or political conditions.[3] Furthermore, China provides the foreign aid to "help recipient countries to strength their self-development capacity, enrich and improve their people's livelihood, and promote their economic growth and social progress" (China White Paper on Foreign aid).[4] In this framework, a question that can be raised is if the Chinese foreign aid can be beneficial to the Chinese economy (i.e. in other words, if some positive externalities on the Chinese economy might be expected when the country provides foreign aid to other parts of the world). In particular, Chinese foreign aid can be expected to have positive effects on the country's exports and therefore on its international economic development: this line of analysis will be addressed further on in this paper.

Several studies demonstrate that international aid could promote trade between the donor and the recipient, when the former is a developed country (Wagner, 2003; Martinez-Zarzoso et al., 2009; Hühne et al., 2014). However little evidence is available for the case in which donors are emerging countries. Hence, we aim at filling the gap and investigating the case of an emerging country, China, as a foreign aid donor. Within this framework, the research questions we raise are the following: Is Chinese unconditional foreign aid enhancing trade? Which type of aid is the most efficient in terms of trade boosting? Which sectors and countries are the most impacted by the aid - trade nexus?

The aid-trade relation could be explained through several channels. Firstly, the income effect is assumed to be the key channel: a development aid could rise the recipient government's revenue and further increase the domestic income level, which triggers

[1] Authors' calculation based on data taken from World Bank.

[2] Data is from Global Chinese Official Finance Dataset.

[3] By contrast, conditionality means that aid is provided under specific conditions that have to be met by the recipient country (e.g. good governance, democracy) (Liu et al., 2018).

[4] Available on http://www.gov.cn/english/official/2011-04/21/content_1849913.htm

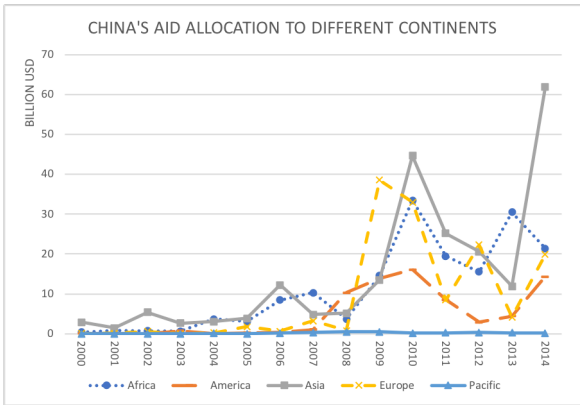

Figure 1: The development aid provided by China to different continents

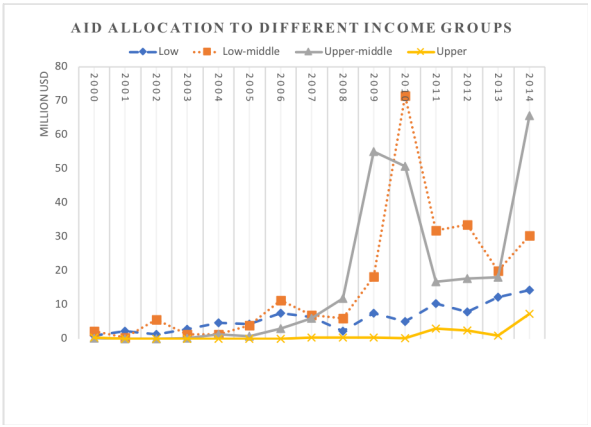

Figure 2: The development aid provided by China to different income groups

a higher consumption and more imports. Secondly, apart from the debt forgiveness, the assistance could also be provided on infrastructure and productive capacity building. This kind of aid could support the trade openness, improve the trade environment and generate more trade: this represents the habit formation. Finally, aid can improve the recipient-donor relationship and create goodwill (Djajic et al. 2004) in the recipient country. Goodwill could "cause a shift in preferences of the recipient country in the following period" (Djajic et al. 2004). Furthermore, it can lead to a reduction in effective trade barriers and to the emergence of good trade relations between donors and recipients (Djajic et al., 2004; Hansen et al., 2014; Martinez-Zarzoso et al., 2015).

Most of the studies on Chinese foreign aid are rather descriptive (Ali Zafar, 2007). Only few econometric studies are performed in relation to China's foreign aid. In general, they aim at investigating the Chinese foreign aid allocation and effectiveness with respect to the recipients' economies (Dreher et al., 2017, Busse et al., 2016). For example, Dreher et al. (2017) find that Chinese aid increases recipients' economic growth and this aid does not harm the effectiveness of western assistance. Using a different database, Busse et al. (2016) find that China's foreign aid positively affects recipient countries' economic growth, but this impact is not always statistically significant.The authors argue that the lack of significance could be due to political motives behind Chinese aid. For instance, Chinese aid may be used to influence recipient's voting behavior in international organizations. As far as we know, only one study shows that China could have benefits from the foreign aid provided at the international level (Liu et al., 2018).

The contribution of this paper to the literature is three-fold: (i) it identifies key determinants of the huge increase in the Chinese exports that allowed the country to become the world's largest exporter (Berger and Martin, 2011); (ii) it complements the scarce literature on emerging donors, putting the emphasis on the Chinese unconditional foreign aid - trade nexus. To do this, a large number of trading partners (165) and foreign aid flows are considered, over the 2000-2014 period, in a panel framework; (iii) it underlines the South-South relations: the results show that China's foreign aid helps to trade with similar income level countries, and can partially foster the South-South trade relations.

The structure of this paper is as follows. In Section 2, we present the literature review. Section 3 discusses the methodology and describes the data. The empirical results are reported in Section 4. Robustness checks are presented in Section 5. Section 6 concludes.

2 Literature Review

At the empirical level, the literature on emerging donors is not very abundant. Dreher et al. (2011) develop a study on "new" donors using a database on the non-DAC (OECD Development Assistance Committee) countries that includes some emerging economies. Using a probit and a tobit setting, based on AidData during 2001-2008 for 16 non-DAC countries, they conclude that non-DAC countries act differently with respect to traditional donors and their behavior is more diversified and careless concerning the recipients' need.

Several other empirical analyses focus on specific emerging donors and their aid allocation. Fuchs et al. (2013) investigate the motivation of India's aid allocation by applying a probit and an OLS methodology on the Indian AidData during 2008-2010. Their findings are in line with Dreher et al. (2011) and demonstrate that commercial and political self-interests dominate India's aid policy. Moreover, they also find that India prefers to provide aid to adjacent countries in order to strengthen its regional power. Neumayer

(2003) shows, using probit and OLS econometric approaches, that Arab countries provide international aid based on ethnic and religious similarities (i.e. Arab and Muslim countries are the main recipients) and on political considerations (i.e. voting in the UN General Assembly). In China's case, as noted earlier, most of the studies investigate the effectiveness of Chinese aid on African countries' economic growth (Dreher et al., 2017; Busse et al., 2016[5]. Hence, overall, we can argue that most of the existing literature on emerging donors, and on China in particular, is oriented towards understanding aid allocation.

Empirically the relation between trade and foreign aid is usually analyzed in the case of advanced countries acting as donors. These studies find a positive link between the donor's foreign aid and its exports to the recipient (Wagner, 2003; Hühne et al., 2014; Nowak-Lehmann et al., 2009; Martinez-Zarzoso et al., 2017; Hansen et al., 2014).

Wagner (2003) runs a pooled OLS and fixed effect model to analyze the relation between international aid and exports. His sample covers the OECD-DAC listed countries over the period 1970-1990. He finds that trade elasticity varies from 0.062 to 0.195 under different estimations. Furthermore, he also shows that every dollar spent on aid has a direct effect on trade that equals 35 cents. However the indirect effect is even higher and amounts 98 cents.

Little is said in general about the aid-trade link focus from the individual donors perspective (Nowak-Lehmann et al., 2009; Martinez-Zarzoso et al., 2017; Hansen et al., 2014).

Nowak-Lehmann et al. (2009) analyze the case of Germany as donor. They employ a dataset that includes 77 countries of the BMZ cooperation (Federal Ministry for Economic Cooperation and Development) from 1962 up to 2005 and investigate to what extent the official international development assistance promotes German exports. Using a ECM and DOLS/DFGLS methodology, they report a long-run trade elasticity of aid of 0.15, and a short run-elasticity of 0.06. They also show that every dollar spent in international assistance can lead to an increase of exports of 1.49-1.72 euro on average.

Another research on the case of Netherlands is put forward by Martinez-Zarzoso et al. (2017). The authors estimate both static and dynamic gravity models by using two-way fixed effects, GMM and PDOLS and data on 130 countries over the period 1973-2009. They conclude that in static terms, every dollar spent by the Dutch government on foreign assistance increases by about 0.29$ the value of exports. Furthermore, they report a short-run elasticity of 0.06 and a long-run one, in the dynamic model, of 0.1. Compared to the German case, the effect of Dutch foreign aid is rather moderate in terms of trade.

A similar result is obtained by Hansen et al. (2014) using fixed effects and GMM. They focus on Denmark and the Danish aid towards 144 recipient countries for the period of 1981-2010. They find that for every dollar spent on aid by Denmark, the return on exports is of 30 cents. They also note that the long term elasticity of Danish bilateral aid is 0.075 while the short term one is equal to 0.059.

Different other empirical techniques have also been used to understand the link between foreign aid and trade. For example, Osei et al. (2004) employ Granger causality tests to analyze the causal relationship between bilateral foreign aid and trade. Using data on 4 European donors and 26 African recipients between 1969-1995, they split their sample into five sub-panels and find that there is no clear evidence that aid could increase trade.

As previously argued, the literature on the emerging donors' trade development-foreign aid relation is limited. In particular, for China, only few empirical analyses, oriented towards understanding the aid-trade link can be found.

[5]This is due to the fact that most recipients are based in Africa (Dreher et al., 2017).

Zhu et al. (2015) use FGLS on China's trading data with 15 recipients during the 2005-2011 period. They conclude that China's foreign aid could decrease the trading cost in recipient countries. Xiong et al. (2014) use data on 123 countries during the 1994-2011 period to investigate if China's foreign aid could promote international trade. They develop a cointegration analysis and show that there is no link between China's foreign aid and trade. Nevertheless, their study, as the authors underline it as well, is based on a database that is incomplete.

Moreover, Liu et al. (2018) compare the aid from U.S. and China in Africa. They use bilateral data over the time span 2003-2012 and cover the trade relations of 26 African economies with the U.S. and of 30 African countries with China. Based on a gravity model, they conclude that 1% increase of China's aid flow to Africa leads to a 0.05% rise of the country's exports towards the African. They also report that this export return might not be immediate. Moreover, they show that 1% increase of U.S. foreign aid in the African countries triggers a rise of 0.07% of American exports to their African partners. On the imports side, their results show that aid has a positive and significant impact on China's imports from Africa and that the current aid is not affected by the imports from the previous period. They also report that U.S. foreign aid in Africa has no impact on the U.S. imports from Africa.

3 Methodology and Data

3.1 Methodology

We aim at investigating whether an emerging donor, as China, can enjoy a return in terms of exports in relation to the foreign aid it provides. In order to understand the possible link between foreign aid and exports, for China, we employ a gravity model (Anderson et al., 2003). The gravity model derived by Anderson et al. (2003) links bilateral trade flows to country size, relative trade costs and other country or country-pair characteristics. It has become a standard setting in international economics, used to explain trade relations. Applied to our case, the gravity model can be written as:

$$X_{cjt} = \frac{Y_{ct}Y_{jt}}{Y_{wt}} * \left(\frac{d_{cjt}}{P_{ct}P_{jt}}\right)^{1-\sigma} \tag{1}$$

where c stands for China, j denotes the trading partner and t is the time dimension. Y_{ct} and Y_{jt} denote the income in China and country j, respectively; Y_{wt} is the world nominal income; P_{ct} and P_{jt} are the price indices in China and country j respectively, seen as "multilateral resistance" terms; d_{cjt} captures the trade cost between China and country j. Trade costs can be modelled as a function of observable factors, including bilateral ones as: distance between trade partners, a common border, a common language or regional trade agreements (RTA) (Bagayev and Lochard, 2017), bilateral aid and exchange rates. In our case, trade costs are captured by:

$$d_{cjt} = \{Aid_{cjt}, ER_{cjt}, DIS_{cj}, CON_{cj}, RTA_{cjt}\} \tag{2}$$

The variable Aid_{cjt} is the foreign aid from China to trading partner j at year t; ER_{cjt} is the real exchange rate between China and country j at time t; DIS_{cj} represents the distance between China and trading partner j; CON_{cj} is the contiguity dummy variable

(the dummy is 1 if China shares a common border with trading partner j, otherwise it is 0.); RTA_{cjt} translates the presence of a regional trade agreement (the dummy is 1 if the trading partner j is member of a trade agreement with China, otherwise it is 0).[6]

We replace the trade cost factor in the standard gravity equation presented previously by these variables described above and then log-linearize the model.

We also augment the model by using exchange rates. This is done for two reasons: first, as China does not share the same currency with any other country, exchange rates, in a panel setting as ours, could bring in additional information (Martinez-Zarzoso et al., 2003), especially since no joint country-time fixed effects are considered in our framework;[7] second, exchange rates could influence the structural form of the gravity model through scale effects and incomplete pass-through (Anderson et al., 2013). In standard gravity models that suppose constant returns to scale and complete pass-through, the use of country-time fixed effects to control for multilateral resistance was supposed to absorb any exchange rate effects as underlined by Anderson et al. (2013). These authors show, however, that non-uniform scale elasticity and incomplete pass-through can open channels through which exchange rates have real effects on trade in goods.

In this general model of trade, we introduce the size of countries captured through the population variable (i.e. the size of the Chinese economy and of the partner country j are represented by the Pop_{ct} and Pop_{jt} respectively). We also take account of the total aid that a destination country receives ($TotalAid_{jt}$). Hence, our baseline model becomes:

$$\begin{aligned} ln(X_{cjt}) = \beta_0 + \beta_1 ln(Aid_{cjt}) + \beta_2 ln(TotalAid_{jt}) + \beta_3 ln(Y_{ct}) + \beta_4 ln(Y_{jt}) \\ + \beta_5 ln(Pop_{ct}) + \beta_6 ln(Pop_{jt}) + \beta_7 ln(ER_{cjt}) + \beta_8 ln(DIS_{cj}) \\ + \beta_9 (CON_{cj}) + \beta_{10} (RTA_{cjt}) + \gamma_t + \alpha_c + \varepsilon_{cjt} \end{aligned} \quad (3)$$

where $ln(.)$ denotes the natural logarithm;
X_{cjt} captures China's export to trading partner j at year t in current US dollars;
$TotalAid_{jt}$ is the total aid received by trading partner j at year t in current US dollars;
Y_{ct}, Y_{jt} is China and trading partner j's GDP per capita in US dollars at year t (they are used to capture countries' income);
Pop_{ct}, Pop_{jt} is the population in China and in trading partner j;
γ_t is time fixed effect, α_j is country fixed effect, ε_{cjt} is the error term.

Multilateral resistance (MR) indicators capture the fact that "the more resistant to trade with all others a region is, the more it is pushed to trade with a given bilateral partner" (Anderson et al., 2003). A way to control for the time-varying unobservable multilateral resistance terms is to use country-year fixed effects (e.g. Baldwin and Taglioni, 2006).[8] In order to approximate the multilateral resistance (MR) indicators, we also use the method proposed by Baier et al. (2009). These authors suggest applying a first-order log-linear Taylor-series expansion to construct the MR terms. The advantages of this method over the traditional approach are the following: it authorizes time variations

[6] A country (Singapore) and some regions (Hong Kong China, Macau China) do share the same language as China. However, as they represent an extremely small share of China's export, this dummy is omitted. Moreover, as China does not share the same currency with any other trading partner, this variable is ignored as well in our model.

[7] In our empirical analysis, due to the structure of our panel, we introduce both country and time fixed effects

[8] However, as we have already underlined, due to the structure of our panel we can't jointly use country and time fixed effects.

in the multilateral resistance (MR) terms, it allows dealing with the omitted variables with the third countries (without having to introduce country-year fixed effects) and it is based on a theoretically grounded gravity model. Specifically, we compute the following MR variables in relation to the trade cost bilateral variables captured under the d_{cjt} (i.e. the aid value (MR_Aid_{cjt}), exchange rate (MR_ER_{cjt}) distance (MR_DIS_{cjt}), contiguity (MR_CON_{cjt}) and regional trade agreements (MR_RTA_{cjt})), using a time-varying GDP-weighted average and a world sample that covers all reporting and partner countries.

$$MR\_Aid_{cjt} = \sum_{k=1}^{N} \theta_{kt} lnAid_{ckt} + \sum_{m=1}^{N} \theta_{mt} lnAid_{jmt} - \sum_{k=1}^{N}\sum_{m=1}^{N} \theta_{kt}\theta_{mt} lnAid_{kmt} \quad (4)$$

where, at each period t, for each couple c (China) and j, $\theta_{kt} = Y_{kt}/Y_{wt}$ and $\theta_{mt} = Y_{mt}/Y_{wt}$ and Y_{kt}, Y_{mt}, Y_{wt} denote the GDP of countries k (which is a trading partner of China, other than j) and m (which is a trading partner of country j) as well as the world GDP; $lnAid_{ckt}$ denotes the aid that China provides to each of its other trading partners (besides j), k; $lnAid_{jmt}$ captures the aid that is provided by China's trading partner j to country m; $lnAid_{kmt}$ translates the aid provided by k and m.

$$MR\_ER_{cjt} = \sum_{k=1}^{N} \theta_{kt} lnER_{ckt} + \sum_{m=1}^{N} \theta_{mt} lnER_{jmt} - \sum_{k=1}^{N}\sum_{m=1}^{N} \theta_{kt}\theta_{mt} lnER_{kmt} \quad (5)$$

where, for each moment t, $lnER_{ckt}$ denotes the bilateral exchange rate between China and each of its trading partners, k; $lnER_{jmt}$ denotes the bilateral exchange rate between China's trading partner j and each of j's trading partners; $lnER_{kmt}$ translates the bilateral exchange rate between countries k and m.

$$MR\_DIS_{cjt} = \sum_{k=1}^{N} \theta_{kt} lnDIS_{ck} + \sum_{m=1}^{N} \theta_{mt} lnDIS_{jm} - \sum_{k=1}^{N}\sum_{m=1}^{N} \theta_{kt}\theta_{mt} lnDIS_{km} \quad (6)$$

where, for each year t, $lnDIS_{ck}$ captures the logarithm of the distance from China to each of its other trading partners, k; $lnDIS_{jm}$ represents the logarithm of distance from China's trading partner j to each of the other countries; $lnDIS_{km}$ is the logarithm of the distance between countries k and m.

$$MR\_CON_{cjt} = \sum_{k=1}^{N} \theta_{kt} CON_{ck} + \sum_{m=1}^{N} \theta_{mt} CON_{jm} - \sum_{k=1}^{N}\sum_{m=1}^{N} \theta_{kt}\theta_{mt} CON_{km} \quad (7)$$

where, at time t, CON_{ck} denotes the contiguity between China and each of the other trading partners, k; CON_{jm} represents the contiguity between China's trading partner j and each of the other countries; CON_{km} captures the contiguity between countries k and m.

$$MR\_RTA_{cjt} = \sum_{k=1}^{N} \theta_{kt} RTA_{ckt} + \sum_{m=1}^{N} \theta_{mt} RTA_{jmt} - \sum_{k=1}^{N}\sum_{m=1}^{N} \theta_{kt}\theta_{mt} RTA_{kmt} \quad (8)$$

where, for every year t, RTA_{ckt} is the regional agreement between China and each of its other trading partners, k; RTA_{jmt} denotes the regional agreement between China's trading partner j and each of other countries; RTA_{kmt} captures the regional agreement between countries k and m.

In order to include the MR terms described above, our MR baseline model will be written as follows:

$$\begin{aligned} ln(X_{cjt}) = \beta'_0 + \beta'_1 ln(Aid_{cjt}) + \beta'_2 ln(TotalAid_{jt}) + \beta'_3 ln(Y_{ct}) + \beta'_4 ln(Y_{jt}) + \beta'_5 ln(Pop_{ct}) + \beta'_6 ln(Pop_{jt}) \\ + \beta'_7 ln(ER_{cjt}) + \beta'_8 (DIS_{cj}) + \beta'_9 (CON_{cj}) \\ + \beta'_{10}(RTA_{cjt}) + \beta'_{11}(MR\_Aid_{cjt}) + \beta'_{12}(MR\_ER_{cjt}) + \beta'_{13}(MR\_DIS_{cjt}) \\ + \beta'_{14}(MR\_CON_{cjt}) + \beta'_{15}(MR\_RTA_{cjt}) + \gamma'_t + \alpha'_c + \varepsilon'_{cjt} \quad (9) \end{aligned}$$

In these models (baseline and MR baseline), the variable of interest is foreign aid: if the foreign aid can increase export from China to recipient countries, the coefficient β_1 (and β'_1 respectively) should be a positive one. Moreover, the total aid received by the destination (β_2, and β'_2) can also trigger a higher income level in trading partner j, and further an increasing demand can be translated on the foreign market, and can thus positively impact trade. An increase of the development level in China and destination j could boost the productivity and hence the trade. Thus, β_3 (β'_3) and β_4 (β'_4) are expected to be both positive. Population is used, in the model, in order to capture the market size: its coefficients (β_5, β_6 in equation 3, and β'_5, β'_6 in equation 9, respectively) in both previous equations is expected to be positive. Distance can also impact trade: "commerce declines dramatically with the distance" (Leamer, 2007). In this case β_8 (β'_8) is expected to have a negative sign. In the same time, $\beta_9(\beta'_9)$ should be positive when China shares its border with the trading partners. Concerning the bilateral exchange rate, it captures a price effect: an appreciation of the Chinese yuan can reduce exports (β_7 and β'_7 respectively are negative in this case). If the partner country is member of a regional trade agreement such as ASEAN or APEC to which China belongs as well, the impact on trade (β_{10} and β'_{10}) is supposed to be positive. The signs of the MR terms are varying: these terms are solely computing to take account of the third world effect. The signs of MR_RTA_{cjt}, MR_Aid_{cjt} and MR_ER_{cjt} are restricted to have identical but oppositely signed values as the variables RTA_{cjt}, Aid_{cjt} and ER_{cjt} respectively. We do not impose the same restriction for the MR_Dist_{cjt} and MR_Con_{cjt} as the initial $Dist_{cj}$ and Con_{cj} do not vary over time and are hence captured by the country fixed effects (in this case the variability in the MR terms comes from the GDP weights) (Lavallee and Lochard, 2019).

The empirical analysis is developed first using a pooled OLS regression on China's bilateral export and foreign aid. Then we include fixed effects (i.e. country specific and time effects).[9] When using the MR terms, we first apply a first-order Taylor expansion to the explanatory variables and then we use OLS and fixed effects.

3.2 Data

The above models are run on a dataset that covers 165 countries and the time span 2000-2014. Data on China's foreign aid ($lnAid_{cjt}$) is taken from Global Chinese Official Finance Dataset, using the nominal USD value of the amount specified for the project.

[9] A Hausman test has been run and allowed us to choose the fixed effects model against the random effects one. Results are available upon request.

China's bilateral export value (lnX_{cjt}) in US dollars is from BACI database. The total aid ($lnTotalAid_{jt}$) received by trading partner j in current US dollars from other countries is from World Bank Statistics; GDP per capita (lnY_{ct} and lnY_{jt}), population ($lnPop_{ct}$ and ($lnPop_{jt}$), distance ($lnDIS_{cj}$), contiguity (CON_{cj}) and regional agreement (RTA_{cjt})) are gravity variables drawn from CEPII. Real exchange rate ($lnER_{cjt}$) are calculated using consumer price index and nominal exchange rates obtained from BRUEGEL datasets. In order to improve the accuracy of bilateral exchange rate, we follow the strategy of Freund et al. (2011) to calculate, at each year t, the bilateral real exchange rate: $ER_{cjt} = NER_{jt}/NER_{ct} * CPI_{ct}/CPI_{jt}$, where ER_{cjt} denotes the bilateral effective exchange rate, NER_j is j partner's currency per US dollar and NER_c is the Chinese yuan per US dollar. CPI_c is the consumer price index in China and CPI_j is the consumer price index of trading partner j. A rise in the effective exchange rate implies an appreciation of the Chinese yuan while a decrease translates a depreciation. In the robustness check, we also include some additional variables: trade freedom index ($Tradefreedom_{jt}$) from Heritage Foundation; data on FDI inflows ($lnFDI\_inflow_{cjt}$) and outflows ($lnFDI\_outflow_{cjt}$) is collected from United Nations Conference on Trade and Development Online database. Descriptive statistics are showed in Table 1.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
lnX_{cjt}	2,595	19.75722	2.770439	11.5453	26.70745
$lnAid_{cjt}$	2,595	6.97669	8.662136	0	24.31498
$lnTotalAid_{jt}$	2,595	13.78288	8.34623	1	23.15968
lnY_{ct}	2,595	7.874769	0.7043551	6.855597	8.946831
lnY_{jt}	2,595	8.248322	1.603973	4.682266	11.66662
$lnPop_{ct}$	2,595	7.182184	.0234417	7.140964	7.218375
$lnPop_{jt}$	2,595	1.679655	2.051727	-3.9542	7.166491
$lnDIS_j$	2,595	9.011148	0.5256678	7.06319	9.857974
$lnER_{cjt}$	2,475	-0.0343658	0.2586203	-1.733703	1.061802
$Tradefreedom_{jt}$	2,325	70.55729	13.87136	0	95
$lnFDI\_inflow_{cjt}$	2,595	10.89672	7.485749	1	25.12102
$lnFDI\_outflow_{cjt}$	2,595	1.554871	1.233298	.6931472	6.848005

4 Empirical Results

In this section we study the impact of China's unconditional foreign aid on trade at aggregate trade level. First, we present the benchmark results that capture the overall effect of aid-trade nexus. Then a dynamic framework is constructed to disentangle the potential endogeneity issue. Furthermore, the aid heterogeneity will be examined by analyzing the impact of different categories of aid (i.e. related to infrastructure, productive capacity, public welfare and other activities) on export at aggregate level. Lastly, we address the issue of aid allocation's impact on exports, by analyzing the heterogenous effect of aid on different groups of recipient countries.

4.1 Baseline results

The baseline results capturing the impact of China's foreign aid on aggregate exports are presented in Table 2. These results suggest that Chinese foreign aid has a positive and significant impact on exports. This is in line with what the literature finds in the case of developed countries acting as donors (see Wagner., 2003; Martinez-Zarzoso et al., 2009

etc). The first column reports the pooled OLS results with standard gravity variables: it shows that 1 dollar spent by the Chinese government on foreign aid increases by 0.4 dollars the value of export.[10] Column (2) presents the OLS results with MR terms and shows again a positive impact of Chinese foreign aid on trade. It can be seen that a dollar spent on foreign aid, increases the Chinese exports value by 0.256 dollars. The results obtained by controlling for country and year fixed effects are reported in Column (3). The coefficient suggests that one dollar spent on foreign aid exerts an increases of 0.171 dollars of China's exports. Column (4) presents the country-year fixed effects estimation with MR variables: we find that one dollar spent on foreign aid by the Chinese government increases by 0.156 dollars the exports value.

All the other control and gravity variables have the expected sign and are statistically

Table 2: Baseline results

	(1) OLS	(2) OLS	(3) Country&Year FE	(4) Country&Year FE
$lnAid_{cjt}$	0.0140***	0.00896**	0.00599***	0.00547**
	(0.003)	(0.00436)	(0.00159)	(0.00232)
$lnTotalAid_{jt}$	-0.0127***	-0.00842	0.00521	0.0126**
	(0.00437)	(0.00626)	(0.00362)	(0.00637)
lnY_{ct}	-0.188	0.785		
	(0.23)	(0.526)		
lnY_{jt}	0.816***	0.766***	1.033***	0.880***
	(0.0235)	(0.0361)	(0.0715)	(0.103)
$lnPop_{ct}$	33.71***	32.21***		
	(6.891)	(-11.07)		
$lnPop_{jt}$	0.953***	0.974***	1.124***	1.198***
	(0.0121)	(0.0191)	(0.122)	(0.385)
$lnER_{cjt}$	-0.220**	-0.0626	-0.390***	-0.337**
	(0.0859)	(0.0695)	(0.0932)	(0.146)
$lnDIS_{cj}$	-0.371***	0.0926		
	(0.0549)	(0.145)		
CON_{cj}	0.504***	-10.81***		
	(0.103)	(2.484)		
RTA_{cjt}	0.225***	-0.0915		
	(0.0663)	(0.0876)		
Country FE	no	no	yes	yes
Year FE	no	no	yes	yes
MR terms control	no	yes	no	yes
N	2475	1211	2475	1208
adj. R-sq	0.843	0.826	0.973	0.967
Return (USD)	0.4	0.256	0.171	0.156

Notes:
(a) Robust standard errors in parentheses
(b) ***, **, and * denote significance at 1, 5 and 10% level, respectively
(c) Dependent variable: China's bilateral exports at time t

significant overall. Firstly, an appreciation of the Chinese yuan could exert a reduction of China's exports. Taken account of this information, one can underline the importance of price competitiveness effect of China's exports in relation to its trading partners. The GDP per capita both in China and in the trading partner positively affect bilateral trade. The coefficient of population is positive meaning that bigger markets import more. The distance among countries hinders trade. Furthermore, the dummies for contiguity and regional trade agreements (RTA) are both positive and statistically significant.[11]

This "return" of Chinese international assistance, in terms of exports, seems to be

[10]The static terms is calculated as followed: $\beta_{Aid} = \frac{\partial X}{\partial Aid_{cjt}} * \frac{Aid_{cjt}}{X}, thus, \frac{\partial X}{\partial Aid_{cjt}} = \beta_{Aid} * \frac{Av(X)}{Av(Aid_{cjt})} = 0.014 * \frac{6.54e+09}{2.29e+08} = 0.4.$

[11]We compute the OLS with MR terms without fixed effect. All the variables of interests keep the same sign with the exception of gravity model. However, as in references (i.e.

much smaller, compared with the one of other developed countries as underlined by the empirical studies on donors. For example, Nowak-Lehmann et al.(2008) find that the return on each euro spent by Germany on international aid is "in the range of EUR 1.49 to 1.72." In the case of other emerging donors, as India, Fuchs et al.(2013) show that Indian exports rise by 1% if Indian foreign aid increases by 0.4%.

4.2 Endogeneity

Endogeneity has been tackled, so far, at least partially: the omitted variable concern has been taken care of by using country-time fixed effects. Moreover, we can consider that the endogeneity issues are also mitigated as the total aid received from other donors is introduced in the regression (Martinez-Zarzoso et al., 2014). However, one may argue that, when analyzing the aid-trade relation, there might be a causality issue (Hühne et al., 2014; Osei et al., 2004; Martinez-Zarzoso et al., 2009). For example, foreign aid could trigger an increase in donors' exports, but causality may run also from exports to foreign aid: donors might condition aid by adding a special clause underlining that the provided funds should be used to buy goods or services from the donor (Wagner, 2003) and donors may favor countries they trade a lot with. However, these aspects might not characterize our framework as China asserts that it provides unconditional foreign aid.

Table 3: Effects of aid on exports (with a one-year lagged aid variable)

	(1) OLS	(2) OLS	(3) Country-Year FE	(4) Country-Year FE
$lnAid_{cjt-1}$	0.0136***	0.00793**	0.00302**	0.000745
	(0.00306)	(0.00361)	(0.00152)	(0.00189)
$lnTotalAid_{jt}$	-0.0133***	-0.00599	0.00675*	0.0176***
	(0.00429)	(0.00652)	(0.00376)	(0.00575)
lnY_{ct}	-0.217	0.656		
	(0.325)	(0.583)		
lnY_{jt}	0.810***	0.768***	1.015***	0.864***
	(0.0274)	(0.0370)	(0.0740)	(0.111)
$lnPop_{ct}$	35.17***	34.46**		
	(10.26)	(14.16)		
$lnPop_{jt}$	0.946***	0.961***	1.209***	1.601***
	(0.0126)	(0.0192)	(0.129)	(0.368)
$lnER_{cjt}$	-0.206***	-0.0475	-0.423***	-0.377**
	(0.0732)	(0.0683)	(0.110)	(0.165)
$lnDIS_{cj}$	-0.377***	-0.0253		
	(0.0470)	(0.141)		
CON_{cj}	0.477***	-10.32***		
	(0.0593)	(0.0856)		
RTA_{cjt}	0.228***	-0.0654		
	(0.0579)	(0.0881)		
Country FE	no	no	yes	yes
Year FE	no	no	yes	yes
MR terms control	no	yes	no	yes
N	2309	1152	2309	1149
adj. R-sq	0.842	0.822	0.975	0.970
Return (USD)	0.36	0.211	0.08	-

Notes:
(a) Robust standard errors in parentheses
(b) ***, **, and * denote significance at 1, 5 and 10% level, respectively
(c) Dependent variable: China's bilateral exports at time t

Lavallee and Lochard, 2019), gravity variables might change the signs when MR terms are computed.

We follow Hühne et al. (2014) and employ extended lags for the aid variable in order to catch a dynamic dimension.[12] The results confirm previous findings and are available in Table 3 and 15 (in appendix). They show that foreign aid in $t-1$ and $t-2$ has a positive and statistically significant effect on exports in t.[13] This outcome is also confirmed both by the theoretical literature (Djajic et al., 2004) and the empirical one (Hühne et al., 2013). The standard gravity model results of Pooled OLS are showed in Column (1): one dollar spent on foreign aid in $t-1$ increases bilateral exports by 0.36 dollars. Column (2) presents the OLS results in the presence of MR terms. It underlines that China's exports increase by 0.211 dollar if the country spends a dollar on foreign assistance. Furthermore, country-year fixed effects are introduced in Column (3) and Column (4). When standard gravity controls are included - Column (3) -, a return of 0.08 dollar could be obtained in t, following every additional dollar spent on foreign aid in $t-1$. In Column (4), while taking account of the MR terms, the aid variable keeps having a positive sign but it is no longer significant. These coefficients are smaller than the ones obtained with contemporaneous variables. Concerning the other controls and gravity variables, the results hold and are overall significant.

4.3 Aid Heterogeneity

To better understand the effects of aid on donor's exports to recipient country, Hühne et al (2013) split the aiding sector into three (four) categories. We follow their classification and decompose China's foreign aid into four categories, where each category ($AidCat$) can correspond to:[14] (i) Economic infrastructure ($Infrastructure$), including Communications, Energy generation and supply, Transport and storage, Other social infrastructure and services; or (ii) Productive Capacity ($Productive\_capacity$) consisting of Agriculture, forestry and fishing, Banking and financial services, Business and other services, Industry, mining, construction, Trade and tourism, Action relating to debt, Emergency response and General budget support; or (iii) Public welfare ($Public\_welfare$) consisting of Education, General budget support, General environment protection, Government and civil society, Health, Support to non-government organization and Women in development; or (iv) Other ($Other$) multi-sector aid and Unallocated/ unspecified. We consider, in turn, each type of aid in the standard log-linearized gravity model and asses its impact on trade, using country-year fixed effects. Results are as follows (in Table 4):

Table 4 shows that the impact of different types of aid on aggregate exports is small. Only the infrastructure aid has a positive effect on export: this elasticity is equal to 0.00587. Hühne et al (2013) also study the impact of different aid categories on exports: their results indicate that both aid relative to infrastructure and productive capacity could trigger the exports, for the OECD donors. The elasticity of the aid coefficients is higher than 0.05: it is bigger, hence, than in the Chinese case. The extended lags of different aid categories are also used to run the regression. The results hold: they are presented in Table 9 (in appendix). This result indicates that the aid relative to infrastructure from

[12] We take the lags from five $(t-5)$ to one $(t-1)$ year: only the results of $t-1$ and $t-2$ are statistically significant.

[13] The results of obtained using $t-2$ are presented in Table 15 in the appendix, it is statistically significant in OLS estimation.

[14] For more information about the aid sectors, please see Figure 5 in appendix. All the details about the sectors are provided by the database of Global Chinese Official Finance Dataset. The sectors are classified similarly to the Chinese Credit Reporting System.

Table 4: Impact of different aid categories on exports

	(1) Infrastructure	(2) Productive_capacity	(3) Public_welfare	(4) Other
$lnAidCat_{cjt}$	0.00587***	-0.000183	0.00181	0.00225
	(0.00139)	(0.00158)	(0.00181)	(0.00161)
lnY_{jt}	1.031***	1.047***	1.048***	1.047***
	(0.0718)	(0.0718)	(0.0718)	(0.0717)
$lnPop_{jt}$	1.094***	1.118***	1.111***	1.116***
	(0.120)	(0.120)	(0.120)	(0.121)
$lnER_{cjt}$	-0.381***	-0.394***	-0.395***	-0.396***
	(0.0943)	(0.0950)	(0.0949)	(0.0947)
Country FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
MR terms control	no	no	no	no
N	2475	2475	2475	2475
adj. R-sq	0.973	0.973	0.973	0.973

Notes:
(a) Robust standard errors in parentheses
(b) ***, **, and * denote significance at 1, 5 and 10% level, respectively
(c) Dependent variable: China's bilateral exports at time t

$t-1$ could also increase the current trade value.

4.4 Recipients Heterogeneity

It has been argued that traditional donors have different preferences when providing development aid. Alesina et al. (2000) find that major DAC (OECD Development Assistance Committee) countries offer the development assistance with different objectives (e.g. colony past, UN friend etc). In this paper, we try to understand how the decision of aid allocation for China's case impact exports. We do this by considering the heterogeneity of recipients along two lines: the income level and the geographical location. Two questions thus could be raised: does China have some specific preferences when providing development aid? Is there a South-South cooperation relative to the trade-aid nexus for emerging donors, as in the case of China?

Firstly, the Figure 3 shows China's exports to different areas, from 2000 to 2014.[15] China exports more to Asia than to America or Europe, for example. We can expect a positive effect of aid on the trade with these regions. The results are reported in Table 5.[16] We find that China's development aid has a positive impact on its exports to Africa, America and Asia. However the results are not significant in the European case. Figure 3 shows that China exports less to the African countries compared to its exports towards other parts of the world: nevertheless, our results suggest that its development aid helps increasing the exports towards this area (as indicated in Table 5).

Next, different groups of countries depending on their development level are considered. Aiming at analyzing the impact of South-South or South-North relations within the trade-aid nexus, we split the recipient countries into different sub-groups, taking account of their income level. Thus, countries are separated into four income level groups: low

[15]Namely: Asia, Africa, America, Europe and Pacific area.

[16]The data availability is extremely low for the case of Pacific area, hence we can not analyze the effect for this area.

Table 5: Effects of aid on the Chinese exports towards different geographical regions

	(1) Africa	(2) America	(3) Asia	(4) Europe
$lnAid_{cjt}$	0.00458*	0.00812**	0.00411*	0.00593
	(0.00251)	(0.00330)	(0.00248)	(0.00556)
$lntaid_{jt}$	0.0178	-0.00189	0.000801	-0.000872
	(0.0157)	(0.0104)	(0.00286)	(0.00627)
lnY_{jt}	0.980***	0.572***	1.222***	1.140***
	(0.156)	(0.139)	(0.123)	(0.181)
$lnPop_{jt}$	2.528***	3.170***	1.112***	-1.870**
	(0.486)	(0.916)	(0.108)	(0.664)
$lnER_{cjt}$	-0.535**	-0.112	-0.659***	-0.204
	(0.211)	(0.205)	(0.162)	(0.301)
Country FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
MR terms control	no	no	no	no
N	705	495	525	615
adj. R-sq	0.963	0.967	0.976	0.973

Notes:
(a) Robust standard errors in parentheses
(b) ***, **, and * denote significance at 1, 5 and 10% level, respectively
(c) Dependent variable: China's bilateral exports at time t

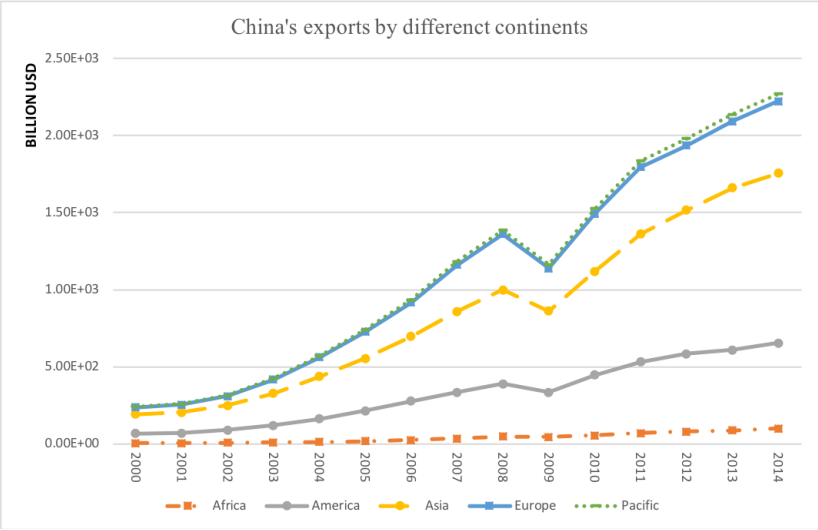

Figure 3: China's exports to different continents, 2000-2014

income, low-middle income, upper-middle income and high income countries.[17] We show firstly the trade value that China exports to different income groups in Figure 4. Moreover, the results are shown in Table 6: China's foreign aid has a positive and significant impact on the exports to low-middle income, upper-middle income and high income countries. In the case of low income, foreign aid is not significant in explaining bilateral trade between these countries and China.[18] Furthermore, the total aid received by destination j has a positive and statistically significant impact on China's exports to low income, low middle income and upper middle income countries. Besides, the results suggest that Chinese foreign aid stimulates more the country's trade relations with the group of upper-middle income countries, to which it belongs to. It indicates that the Chinese development aid helps to promote the trade with economies similar to China (in terms of income). Nevertheless, China's aid can only partially help to foster a South-South trade cooperation. The overall development aid ($TotalAid_{jt}$) which is provided by all the other donors is the one helping to increase the South-South trade relations.

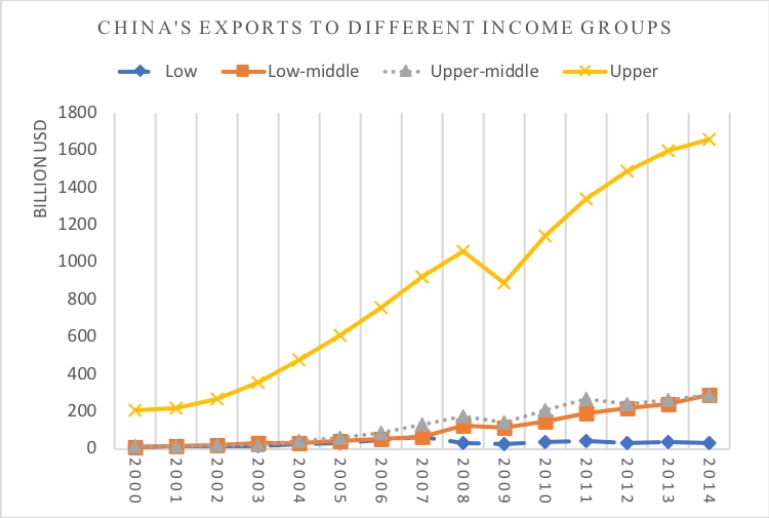

Figure 4: China's exports to different income groups, 2000-2014

5 Robustness Check

In this section, we provide a battery of robustness checks to reinforce our results. We do this along three lines: adding more control variables, splitting the sample into different time spans and employing a different econometric methodologies.

In our first robustness check, we introduce more controls into the model: two additional variables are added. As Liu et al. (2018) use trade freedom and FDI flows (inflows

[17]Data source of GNI per capita and of countries classification per income level: World Bank.

[18]Dataset shows some flows of aid oriented towards high income countries, such as technical assistance, grants, loans and scholarships.

Table 6: Impact of aid on the Chinese exports towards different income groups of countries

	(1) Low	(2) Low middle	(3) Upper middle	(4) High
$lnAid_{cjt}$	0.00149	0.00378*	0.00646**	0.00936*
	(0.00337)	(0.00224)	(0.00282)	(0.00546)
$lnTotalAid_{jt}$	0.202**	0.00804**	0.0148***	-0.0149***
	(0.0812)	(0.00388)	(0.00534)	(0.00574)
lnY_{jt}	1.558***	0.732***	0.741***	1.094***
	(0.215)	(0.127)	(0.210)	(0.167)
$lnPop_{jt}$	0.434	1.507**	2.638***	0.860***
	(0.842)	(0.683)	(0.717)	(0.0796)
$lnER_{cjt}$	-1.020***	-0.0184	-0.377+	-0.474*
	(0.234)	(0.143)	(0.199)	(0.243)
Country FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
MR terms control	no	no	no	no
N	569	642	550	709
adj. R-sq	0.954	0.977	0.972	0.979

Notes:
(a) Robust standard errors in parentheses
(b) ***, **, and * denote significance at 1, 5 and 10% level, respectively
(c) Dependent variable: China's bilateral exports at time t

and outflows) in their gravity model to investigate the link between China's foreign aid and trade, we follow this logic and include these variables into our model as well. In Table 10 (in appendix), the first and second columns report the FDI outflow effects in the presence of the trade freedom variable. The aid coefficients show that every dollar spent on foreign aid by the Chinese government increases the exports value by 0.164-0.192. The coefficient of FDI outflows is statistically significant (in the fixed effects case) and indicates a negative impact of FDI outflows on China's exports. The results obtained with trade freedom and China's FDI inflows are presented in column (3) and (4) (Table 19 in appendix), and suggest that the return on exports is 0.16-0.188 if China provides a foreign aid of one dollar. Compared with the results of Liu et al. (2018) related to the effect of China's foreign aid on export towards Africa, the trade elasticity that we obtain is bigger. Table 10 (in appendix) also underlines that a higher trade freedom of country j stimulates the Chinese exports towards this destination.

As a second robustness check, we divide the panel across time. In other words, we split the sample into different sub-periods: 2000-2004, 2005-2009, 2010-2014. Moreover, we introduce a crisis dummy in order to capture the impact of the Global Financial Crisis (GFC). Thus, the financial shocks could be also detected. A positive impact of foreign aid on trade can be found over 2000-2004 and 2010-2014 when we use the 5-year time spans (Table 11 and Table 12 in appendix). Moreover, in order to analyze the impact of the financial crisis, we also add the crisis dummy. Since the financial crisis started in 2007 and then spread at the global level, the crisis dummy equals 1 for the years 2007, 2008 and 2009, otherwise it is equal to 0. This way we take account of the crisis, in the spirit of Romer et al. (2017). Both Table 11 and Table 12 show that the Global Financial Crisis has a positive impact on China's trade. The results indicate that one dollar spent on foreign aid leads to a 0.149-0.25 dollar rising of exports during the financial crisis.

Our third robustness check supposes the use of a different methodology that can allow to deal with heteroskedasticity and potential zero trade problem. Hence, we use the PPML (Poisson Pseudo Maximum Likelihood) setting, as Santos Silva and Tenreyro (2006). The signs of variables hold, but the elasticity of variables is smaller than in the case of fixed effect and OLS methodology. The results are shown in Table 13 in appendix. The first

column shows the impact of China's aid on exports without considering the MR terms. It underlines that when China provides a development aid of one dollar, this raises by 0.09 dollars the export value. When introducing the MR terms in column (2), it shows that one dollar spent by the Chinese government could increase the export value by 0.075 dollars. Compared with the results obtained using fixed effect, this "return" is statistically smaller. Column (3) and column (4) shows that the aid provided by China in $t-1$ and $t-2$, respectively. The coefficients indicate that the Chinese development aid in last period has no impact on current exports in PPML estimation.

To have a further control on the endogeneity issue, we perform a final robustness check by using the dynamic panel methodology (Arellano and Bond, 1991; Arellano and Bover, 1995; and Blundell and Bond, 1998). The results are shown in Table 14 in appendix. We use the one-year (column (1)), three-year (column (2)) and five-year (column (3)) intervals to ran the estimation. The autocorrelation tests report that both first-order and second-order autocorrelations are present. Moreover, the Hansen test cannot reject the null hypothesis in column (1) but the instruments for 3-year and 5-year period are overidentified. All in all, the results confirm that China's aid can have a positive return on its exports.

6 Conclusions

Our results show that China's foreign aid has a positive impact on trade, result that has been confirmed only in the case of advanced countries acting as donors (Wagner, 2003; Martinez-Zarzoso et al. 2009 etc). On static terms, the return of every dollar spent on foreign aid ranges from 0.156$ to 0.4$ at aggregate level, on average. Compared to the research mentioned above for the case of developed countries, we find that China has a smaller return when providing the foreign aid.

Moreover, we show that every dollar used on international aid in $t-1$ (or $t-2$) leads to an increase of 0.08-0.36 dollar of exports in t. This underlines the medium run effect of aid on exports. When we analyze the different types of aid, we find that only aid on infrastructure has a positive impact on the Chinese exports: it can improve the trading partners capacity to import more, in different parts of the country, and can reduce the transport costs.

If we take account of the trading partners' heterogeneity, two results can be put forward. On the one hand, China's aid decisions seem to trigger stronger trade relations with America, Africa and Asia. However, the trade-aid nexus do not stimulated in the European case. On the other hand, we document that the "return" effect of aid is significant and positive in the low-middle, upper-middle and high-income countries groups. This effect is stronger, in particular, in the case of the upper-middle group, which indicates that China trades more with similar income-level countries. This can by consequence partially spur a South-South trade cooperation. The latter can be even more enhanced by the total development aid provided by all the donors.

Our results hold when several robustness checks are performed. In particular we find that adding more control variables, splitting the sample into different time spans and using different econometric methodologies do not change the results.

Several policy implications can be derived. Foreign assistance seems to stimulate China's exports and furthermore to deepen the international integration (especially the South-South trade relations). Hence, foreign aid could benefit the donor. If this result is

linked to the context of China's project of "Belt and Road Initiative", it can be advanced that foreign aid can also be used as a complementary policy tool leading to benefits for both the donor and the recipients. In this line, we can further highlight that an aid to infrastructure policy can stimulate China's trade relations much more than any other aid policy, especially in the short-medium run.

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Appendix A

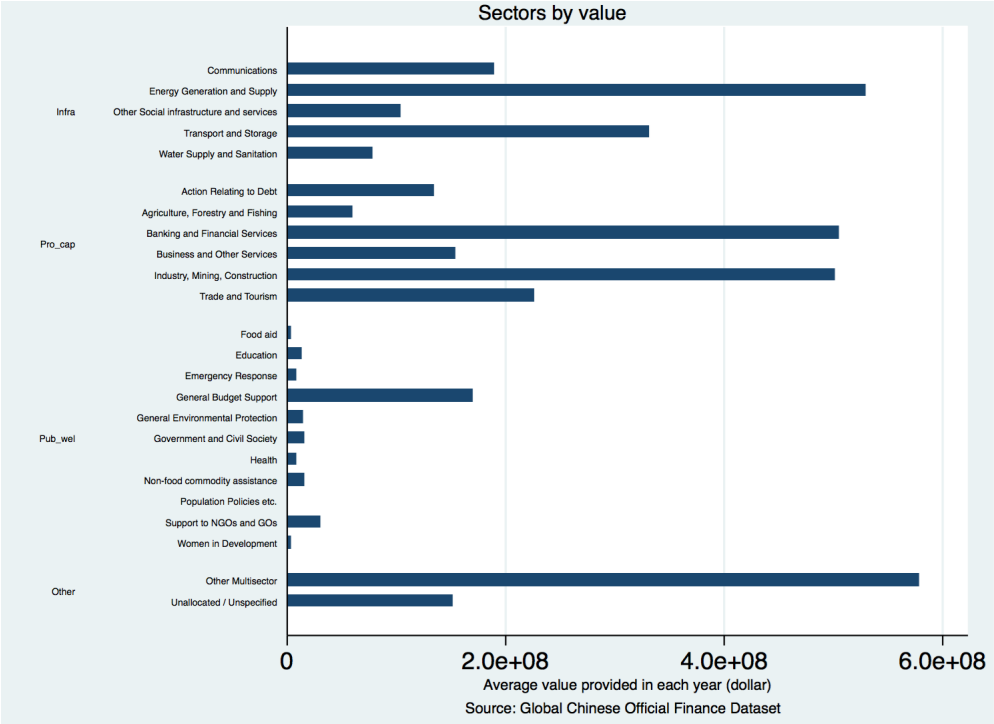

Figure 5: Aiding sectors splitted into categories by value

Appendix B

Table 7: Country list

Albania	Algeria	Angola	Antigua and Barbuda
Argentina	Armenia	Australia	Austria
Azerbaijan	Bahamas, The	Bahrain	Bangladesh
Barbados	Belarus	Belgium	Belize
Benin	Bhutan	Bolivia	Bosnia and Herzegovina
Botswana	Brazil	Brunei	Bulgaria
Burkina Faso	Burundi	Cambodia	Cameroon
Canada	Cape Verde	Central African Republic	Chad
Chile	Colombia	Comoros	Congo, Rep.
Costa Rica	Croatia	Cyprus	Czech Republic
Cote d'Ivoire	Denmark	Djibouti	Dominica
Dominican Republic	Ecuador	Egypt	El Salvador
Equatorial Guinea	Estonia	Ethiopia	Fiji
Finland	France	Gabon	Gambia
Georgia	Germany	Ghana	Greece
Greenland	Grenada	Guatemala	Guinea
Guinea-Bissau	Guyana	Haiti	Honduras
Hong Kong, China	Hungary	Iceland	India
Indonesia	Iran, Islamic Rep.	Ireland	Israel
Italy	Jamaica	Japan	Jordan
Kazakhstan	Kenya	Kiribati	Korea, Rep.
Kuwait	Kyrgyz Republic	Lao PDR	Latvia
Lebanon	Lesotho	Liberia	Lithuania
Luxembourg	Macau, China	Macedonia, FYR	Madagascar
Malawi	Malaysia	Maldives	Mali
Malta	Marshall Is	Mauritania	Mauritius
Mexico	Micronesia	Moldova	Mongolia
Morocco	Mozambique	Myanmar	Namibia
Nepal	Netherlands	New Zealand	Nicaragua
Niger	Nigeria	Norway	Oman
Pakistan	Palau	Panama	Papua New Guinea
Paraguay	Peru	Philippines	Poland
Portugal	Qatar	Russian Federation	Rwanda
Samoa	Sao Tome Prn	Saudi Arabia	Senegal
Seychelles	Sierra Leone	Singapore	Slovak Republic
Slovenia	Solomon Islands	South Africa	Spain
Sri Lanka	St. Kitts and Nevis	St. Lucia	Vincent and the Grenadines
Suriname	Swaziland	Sweden	Switzerland
Tajikistan	Tanzania	Thailand	Togo
Tonga	Trinidad Tobago	Tunisia	Turkey
Turkmenistan	Uganda	Ukraine	United Arab Emirates
United Kingdom	United States	Uruguay	Uzbekistan
Vanuatu	Vietnam	Yemen	Zambia
Zimbabwe			

Table 8: Correlation Matrix

	lnX	$lnAid_{cjt}$	$lnTotalAid_{jt}$	lnY_{ct}	lnY_{jt}	$lnPop_{ct}$	$lnPop_{jt}$	$lnER_{cjt}$	$lnRTA_{cjt}$	$lnDIS$	CON_{cjt}	$MRDIS_{cjt}$	$MRRTA_{cjt}$	$MRCON_{cjt}$	$MRER_{cjt}$	$MRAID_{cjt}$
lnX	1.0000															
$lnAid_{cjt}$	0.1994	1.0000														
$lnTotalAid_{jt}$	-0.0547	0.2467	1.0000													
lnY_{ct}	0.4645	0.1034	-0.0219	1.0000												
lnY_{jt}	0.3251	-0.1573	-0.4940	0.4027	1.0000											
$lnPop_{ct}$	0.4692	0.1038	-0.0186	0.9917	0.4010	1.0000										
$lnPop_{jt}$	0.6558	0.2445	0.2270	-0.0111	-0.2850	-0.0099	1.0000									
$lnER_{cjt}$	-0.0201	-0.0057	-0.0603	-0.1418	0.0331	-0.1311	-0.0083	1.0000								
$lnRTA_{cjt}$	0.3633	0.0818	-0.1641	-0.0116	0.1020	-0.0084	0.3044	-0.0132	1.0000							
$lnDIS_{cj}$	-0.2662	-0.1212	0.0700	0.0697	0.1061	0.0703	-0.2391	0.0133	-0.5040	1.0000						
CON_{cj}	0.2376	0.1636	0.0255	-0.0257	-0.1238	-0.0243	0.2108	0.1164	0.4154	-0.5937	1.0000					
$MRDIS_{cjt}$	-0.2623	-0.1282	0.0820	0.0541	0.0340	0.0530	-0.1705	-0.0148	-0.5840	0.9274	-0.5567	1.0000				
$MRRTA_{cjt}$	0.2764	0.0421	-0.1774	0.1416	0.1117	0.1444	0.1509	0.0326	0.5695	-0.3620	0.1689	-0.4614	1.0000			
$MRCON_{cjt}$	0.2277	0.1581	0.0227	-0.0250	-0.1180	-0.0237	0.1912	0.1166	0.4147	-0.5980	0.9994	-0.5652	0.1717	1.0000		
$MRER_{cjt}$	-0.3201	-0.0273	0.0566	-0.7685	-0.2835	-0.7457	0.0017	0.2153	0.0086	-0.0237	0.0114	-0.0247	-0.0717	0.0106	1.0000	
$MRAID_{cjt}$	0.4564	0.0878	-0.0321	0.9814	0.3920	0.9660	0.0062	-0.1665	-0.0053	0.0597	-0.0208	0.0467	0.1322	-0.0203	-0.8564	1.0000

Table 9: Impact of different aid categories in (t-1) on exports

	(1) Infrastructure	(2) Productive_capacity	(3) Public_welfare	(4) Other
$lnAidCate_{cjt}$	0.00490***	-0.000226	0.000245	-0.000905
	(0.00144)	(0.00155)	(0.00180)	(0.00148)
lnY_{jt}	1.013***	1.014***	1.015***	1.013***
	(0.0739)	(0.0746)	(0.0744)	(0.0747)
$lnPop_{jt}$	1.187***	1.191***	1.191***	1.192***
	(0.126)	(0.127)	(0.127)	(0.127)
$lnER_{cjt}$	-0.417***	-0.432***	-0.431***	-0.428***
	(0.109)	(0.111)	(0.111)	(0.111)
Country FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
MR terms control	no	no	no	no
N	2309	2309	2309	2309
adj. R-sq	0.975	0.975	0.975	0.975

Notes:
(a) Robust standard errors in parentheses
(b) ***, **, and * denote significance at 1, 5 and 10% level, respectively
(c) Dependent variable: China's bilateral exports at time t

Table 10: Robustness check 1: Aid-exports nexus in the presence of additional variables

	(1) FE	(2) FE	(3) FE	(4) FE
$lnAid_{cjt}$	0.00574***	0.00671***	0.00561***	0.00659***
	(0.00147)	(0.00232)	(0.00148)	(0.00232)
$lnTotalAid_{jt}$	0.00207	0.00723	0.00260	0.00758
	(0.00298)	(0.00659)	(0.00299)	(0.00654)
lnY_{jt}	1.140***	0.954***	1.133***	0.950***
	(0.0707)	(0.108)	(0.0704)	(0.108)
$lnPop_{jt}$	1.140***	0.954***	1.133***	0.950***
	(0.0707)	(0.108)	(0.0704)	(0.108)
$lnER_{cjt}$	-0.409***	-0.480***	-0.409***	-0.482***
	(0.0890)	(0.150)	(0.0899)	(0.150)
$Tradefreedom_{jt}$	0.00297**	0.00164	0.00295**	0.00161
	(0.00132)	(0.00169)	(0.00132)	(0.00169)
$lnFDI\_outflow_{cjt}$	-0.0247***	-0.0116		
	(0.00767)	(0.0119)		
$lnFDI\_inflow_{cjt}$			0.000881	0.00106
			(0.00199)	(0.00286)
Country FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
MR terms control	no	yes	no	yes
N	2277	1118	2277	1118
adj. R-sq	0.977	0.968	0.977	0.968

Notes:
(a) Robust standard errors in parentheses
(b) ***, **, and * denote significance at 1, 5 and 10% level, respectively
(c) Dependent variable: China's bilateral exports at time t

Table 11: Robustness check 2a: Aid-exports nexus over different time spans and in the presence of a crisis dummy

	(1) 2000-2004	(2) 2005-2009	(3) 2010-2014	(4) Crisis
$lnAid_{cjt}$	0.00640**	0.00174	0.00392*	0.00879***
	(0.00300)	(0.00216)	(0.00204)	(0.00189)
$lnTotalAid_{jt}$	0.00369	0.00623	0.00172	0.00287
	(0.00537)	(0.0113)	(0.00687)	(0.00471)
lnY_{jt}	2.080***	1.716***	1.266***	2.064***
	(0.164)	(0.0721)	(0.107)	(0.0)
$lnPop_{jt}$	5.424***	2.823***	2.016***	2.347***
	(0.646)	(0.368)	(0.330)	(0.161)
$lnER_{cjt}$	-0.909***	-1.193***	-0.887***	-1.117***
	(0.212)	(0.153)	(0.133)	(0.0903)
Crise				0.136***
				(0.0199)
Country FE	yes	yes	yes	yes
Year FE	no	no	no	no
MR terms control	no	no	no	no
N	825	825	825	2475
adj. R-sq	0.976	0.986	0.987	0.965

Notes:
(a) Robust standard errors in parentheses
(b) ***, **, and * denote significance at 1, 5 and 10% level, respectively
(c) Dependent variable: China's bilateral exports at time t

Table 12: Robustness check 2b: Aid-exports nexus in the presence of a crisis dummy and over different time spans, with MR controls

	(1) 2000-2004	(2) 2005-2009	(3) 2010-2014	(4) Crisis
$lnAid_{cjt}$	0.0110**	0.00188	0.00511*	.00522***
	(0.00436)	(0.00341)	(0.00291)	(.0024091)
$lnTotalAid_{jt}$	0.0321**	0.0386***	0.00856**	.0158***
	(0.0127)	(0.00975)	(0.00422)	(.0069621)
lnY_{jt}	0.904***	1.310***	0.735***	1.173008***
	(0.237)	(0.172)	(0.222)	(.0963536)
$lnPop_{jt}$	-0.146	6.597***	0.809	2.079***
	(1.544)	(1.126)	(0.578)	(0.380734)
$lnER_{cjt}$	-0.605***	-0.916***	-0.196	-0.494***
	(0.178)	(0.331)	(0.274)	(0.132754)
Crise				0.1132***
				(0.0314269)
Country FE	yes	yes	yes	yes
Year FE	no	no	no	no
MR terms control	yes	yes	yes	yes
N	314	411	455	1208
adj. R-sq	0.974	0.982	0.979	0.964

Notes:
(a) Robust standard errors in parentheses
(b) ***, **, and * denote significance at 1, 5 and 10% level, respectively
(c) Dependent variable: China's bilateral exports at time t

Table 13: Robustness check 3: Aid-exports nexus analyzed with the PPML methodology

	(1) Export	(2) Export	(3) Export	(4) Export
$lnAid_{cjt}$	0.00319**	0.00265**		
	0.00319**	0.00265**		
$lnAid_{cjt-1}$			0.00130	
			(0.000860)	
$lnAid_{cjt-2}$				-0.000644
				(0.000798)
$lnTotalAid_{cjt}$	0.00830***	0.00304	0.00649***	0.00621***
	(0.00274)	(0.00211)	(0.00235)	(0.00232)
lnY_{jt}	1.176***	0.845***	1.182***	1.153***
	(0.0477)	(0.0874)	(0.0501)	(0.0563)
$lnPop_{jt}$	1.202***	-0.316	1.210***	1.177***
	(0.102)	(0.359)	(0.106)	(0.110)
$lnER_{cjt}$	-0.277***	-0.285**	-0.340***	-0.364***
	(0.0952)	(0.123)	(0.0985)	(0.105)
Country FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
MR terms	no	yes	no	no
N	2385	1159	2225	2065
adj. R-sq	0.996	0.991	0.996	0.996

Notes:
(a) Robust standard errors in parentheses
(b) ***, **, and * denote significance at 1, 5 and 10% level, respectively
(c) Dependent variable: China's bilateral exports at time t

Table 14: Dynamic Panel methodology

	(1) Exports	(2) Exports	(3) Exports
$lnAid_{cjt}$	0.00905+	0.0184**	0.0187+
	(0.00546)	(0.00681)	(0.011)
$lnTotalAid_{cjt}$	0.0102	-0.00367	0.0543+
	(0.0134)	(0.015)	(0.0321)
lnY_{ct}	-0.0265	0.493	0.0487
	(0.091)	(0.146)	(0.205)
lnY_{jt}	0.226*	0.363**	0.719***
	(0.0934)	(0.126)	(0.186)
$lnPop_{ct}$	0.408***	1.766	8.904+
	(0.0967)	(4.671)	(4.708)
$lnPop_{jt}$	0.187**	0.403***	0.534***
	(0.0717)	(0.107)	(0.127)
$lnER_{cjt}$	0.103	0.584+	1.189***
	(0.288)	(0.315)	(0.345)
$lnDIS_{cj}$	-0.119+	-0.199*	-0.433*
	(0.0671)	(0.0901)	(0.185)
CON_{cj}	0.0741	-0.095	-0.165
	(0.143)	(0.288)	(0.346)
RTA_{cjt}	0.0403	0.107	0.0646
	(0.0503)	(0.111)	(0.143)
Year interval	1	3	5
N	2310	2310	2310
AR(1)	0	0	0
AR(2)	0.045	0.044	0.17
Hansen test	0.599	0.039	0.006

Notes:
(a) Robust standard errors in parentheses
(b) ***, **, and * denote significance at 1, 5 and 10% level, respectively
(c) Dependent variable: China's bilateral exports at time t

Table 15: Impact of a two-year lagged aid on exports

	(1) OLS	(2) OLS	(3) FE	(4) FE
$lnAid_{cjt-2}$	0.0118***	0.00408	0.000511	-0.000342
	(0.00300)	(0.00362)	(0.00135)	(0.00166)
$lnTotalaid_{jt}$	-0.0136***	-0.00654	0.00631	0.0156***
	(0.00434)	(0.00649)	(0.00396)	(0.00570)
lnY_{ct}	0.254	0.770		
	(0.410)	(0.666)		
lnY_{jt}	0.796***	0.750***	0.947***	0.761***
	(0.0280)	(0.0376)	(0.0786)	(0.115)
$lnPop_{ct}$	19.78	32.76*		
	(13.36)	(18.44)		
$lnPop_{jt}$	0.945***	0.956***	1.212***	1.838***
	(0.0129)	(0.0194)	(0.134)	(0.381)
$lnER_{cjt}$	0-0.206***	-0.0517	-0.378***	-0.316*
	(0.0728)	(0.0677)	(0.129)	(0.183)
$lnDIS_{cj}$	-0.377***	-0.0507		
	(0.0482)	(0.139)		
CON_{cj}	0.470****	-10.14***		
	(0.140)	(2.535)		
RTA_{cjt}	0.237***	-0.0110		
	(0.0613)	(0.0847)		
Country FE	no	no	yes	yes
Year FE	no	no	yes	yes
MR terms control	no	yes	no	yes
N	2143	1091	2143	1088
adj. R-sq	0.840	0.817	0.978	0.972

Notes:
(a) Robust standard errors in parentheses
(b) ***, **, and * denote significance at 1, 5 and 10% level, respectively
(c) Dependent variable: China's bilateral exports at time t