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Foreign aid and international trade: evidence for Cambodia

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1. Introduction

Economic theory attempting to explain impact of foreign aid on recipient least developed and developing countries is attributed to the early work of Rostow (1963) who stressed the significance of aid on the take-off to sustained economic growth of low-income countries. In this sense, foreign aid is believed to allow the economies of poor countries to take off and to be put on the right path of their economic development, thereby contributing to poverty reduction (Gounder and Sen, 1999). Gounder and Sen (1999) indicate that donor countries have different objectives, with respect to their decisions to provide aid. For instance, Australian aid is provided for promoting economic and social progress in development countries and for its political, strategic and commercial interests. Similarly, the United States aid is designed to provide humanitarian relief and further the long-term economic and social development of low-income recipient countries. Despite these different objectives, the common motivation of donors is to promote economic development, reduce poverty, and lessen the inequalities between the developing and developed economies as well as to pursue their economic, security, and political self-interests in the recipient countries.

Broadly defined, official development assistance (ODA) refers to development assistance and humanitarian assistance and emergency relief or food aid, administrative costs of aid programs and educational costs arising from scholarship awards to students from developing countries. It has been shown that foreign aid helps promote exports from donor countries to the recipients (Martinez-Zarzoso et al., 2009). Wagner (2003) finds that foreign aid is associated with an increase in donors' exports of goods amounting to 133% of aid provided. Similarly, Martinez-Zarzoso et al. (2009) and Nowak-Lehmann et al. (2011) find for Germany that, in the long run, German aid is associated with an increase in German exports of goods that is larger than the German aid flow. In a recent study, Cali and Te Velde (2011) used a large data set of developing countries to examine if aid has any impact on trade performance, and find that aid—in particular aid for trade—has an overall positive and significant impact on exports for developing countries.

Cambodia has received a large sum of assistance from its development partners in the form of ODA since its general elections of 1993. The volume of ODA to Cambodia is one of the major financing sources for its development programs, and it has contributed to the implementation of major public development projects. These programs also included promotion of trade and investment as well as public private partnership activities. A small part of total ODA is aid-for-trade (AfT) which supports the technical assistance for trade policy and regulations, e.g. helping recipient countries to develop trading strategies, negotiate trade agreements and implement their outcomes. According the data obtained from the Council for the Development of Cambodia, total disbursement has gradually increased over the period under consideration. Likewise, the Kingdom has also received AfT, which is directed to help Cambodia promote its trade.

The motivation of the current study is twofold. First, Cambodia has received a handsome sum of assistance from its development partners in the form of ODA since its general elections of 1993. However, how foreign assistance has impacted upon Cambodia is not much understood. Second, no study on the impact of ODA on Cambodia's trade performance has been systematically investigated, to the best of our knowledge, except an institutional analysis of foreign aid from four emerging donors—China, India, South Korea, and Thailand—to Cambodia undertaken by Sato et al. (2011). An understanding of aid-trade relations is important for development policymakers, researchers and stakeholders.

The above discussion has provided a brief overview of the factors that may exert influence on international trade in Cambodia. Of course, general descriptions need to be analyzed in more detail. Research questions need to be formulated, and rigorous analyses are required to systematically answer the questions before any sound policy implication can be provided. The following research questions are the main focus of the study: What determine Cambodia's international trade? Do aid inflows promote Cambodia's trade performance?

The remaining parts of the study are structured as follows. Section 2 presents theoretical foundation and empirical literature on which the econometric model is based in order to answer the aforementioned research questions. Section 3 provides brief overview of the foreign aid to Cambodia. The empirical model using the augmented gravity model and the research methodology as well as data sources will be presented in Section 4. Section 5 reports the estimation results. Section 6 draws conclusion and offer some policy implications.

2. Linkages between foreign aid and trade

Official development assistance may exert an effect on trade flows, either through general macroeconomic impact of foreign aid, or because foreign aid is directly tied to trade, or because it reinforces bilateral economic and political relations or a combination of the three (McGillivray and Morrissey, 1998; Suwa-Eisenmann and Verdier, 2007). The macroeconomic impact of aid likely occurs as foreign aid augments savings of domestic economy, which translates into higher domestic investment and higher growth rate of domestic growth than would be possible in the absence of aid. The higher economic growth rate, in turn, induces greater import capacity of the recipient to absorb foreign goods and services; some of which are originating from donor countries (Suwa-Eisenmann and Verdier, 2007). This leads to an increased trade flows between donors and recipient countries.

The links between aid and trade flows are documented. It is often indicated that foreign aid is linked to structural economic reforms of the recipient countries, such as the liberalization of

trade regimes, trade facilitation, etc. The good example of this type of aid is the one provided to the recipient countries by the multilateral donors, such as the World Bank and the International Monetary Fund on condition that the former engage seriously in its macroeconomic stabilization and adjustment programs. This type of conditional aid can possibly induce importation of products from donors as the implementation of the economic reforms in the recipient countries can lead to a reduction in international trade barriers to markets of the recipient developing countries (McGillivray and Morrissey, 1998; Lloyd et al., 1998).

However, there seems to be no consensus with regard to the positive relationship between foreign aid and trade flows. First, due to its fungibility, aid may have a negligible economic effect on trade (Heller, 1975; Pack and Pack, 1993). Although all aid is saved, thereby leading to higher domestic investment, it may potentially crowd out public investment and increase investment goods prices, resulting in lower economic growth. Second, aid may be used to finance the consumption of non-tradable goods and services, which will generate an upward pressure on the prices of the non-tradable goods, thereby bringing about a relative price shift in favor of non-tradable sector, given the price of the tradable goods. This makes the price of tradable goods relatively cheaper, leading to an increase in the demand for the goods, and thus more imports. The result is the deterioration of the external balance, which in turn requires more aid—a phenomenon known as ‘aid dependency’. Third, aid may also generate undesirable effects on tax and real exchange rate, thus export competitiveness of the recipient countries—a phenomenon widely known as ‘Dutch Disease’.

There are other channels through which aid and trade are related. The most direct linkages between the two are aid tying, both formal and informal, where aid is provided, dependent upon the recipient purchasing goods from aid-giving countries. This means that aid is given in the forms of goods and services procured in the donor countries, thus the aid itself is exports of the donors. One would expect that tied aid is directly positively associated with exports of donors, thus increasing recipient exposure to donor goods and services, which expand and consolidate commercial ties between aid-giving and receiving countries (McGillivray and Morrissey, 1998; Suwa-Eisenmann and Verdier, 2007; Lloyd et al., 1998). Through this way, aid is directly financed and used as an instrument of trade policy (Morrissey, 1993; McGillivray and Morrissey, 1998). Another variant of aid tying is mixed credits, where donors provide an export subsidy to their companies, seeking contracts in aid-receiving developing countries, paying for this out of aid budget. A less direct form of tying is informal, where donors direct aid towards projects or countries in which their own industries have a strong competitive advantage.

A number of studies have been undertaken to examine the relationship between foreign aid and international trade. In their study on the relationship between bilateral aid and bilateral exports, Arvin and Baum (1997) detected a positive relationship between aid and exports of recipients. Similarly, using panel data from 184 countries over 1990-2005, Johansson and Peterson (2009) suggested that aid was positively associated with international trade between recipients and

donors. Martinez-Zarzoso et al. (2009) investigated the impact of German aid on German export performance to its recipient countries, using both static and dynamic econometric specifications. They found that German aid is positively associated with an increase in German exports of goods that is larger than the aid flow. Similar results were reported by Nowak-Lehmann et al. (2009) for Germany.

However, Lloyd et al. (2000) pointed out that there were very little evidence that aid created trade in their study on the linkages between aid and trade, using a sample of four European donors and 26 African recipients over the period of 1969-1995. Jepma (1991) and Wagner (2003) found that the benefits for donors through tied aid are usually small whereas aid tying significantly reduces the benefits of aid for recipient countries. Based the literature review so far, the aid-trade links are far from clear cut. Thus, the findings obtained from one country cannot be generalized for others as countries differ in many aspects—economic structure, institutions, culture, etc.

To the best of our knowledge, no empirical study has been carried out to examine the impact of foreign aid on trade for Cambodia, except Sato et al. (2011) who performed an institutional analysis of foreign aid from four emerging donors, namely India, South Korea, Thailand, and China. The current paper attempts to examine the effect of aid on trade for Cambodia, using a panel data set over the period of 1995-2011.

3. Brief overview of foreign aid to Cambodia

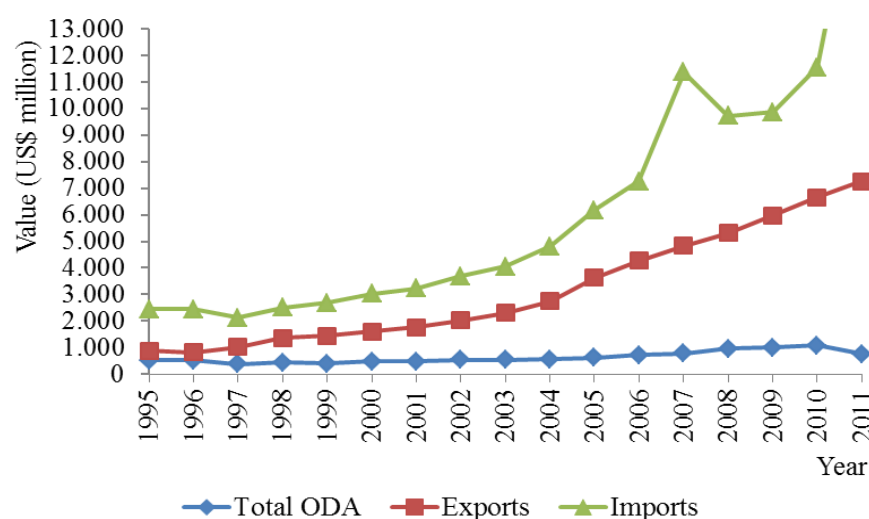
Foreign aid in the form of official development assistance (ODA) to Cambodia has been considered as one of the factors contributing to the rehabilitation and development of the country, which was devastated by more than three years of the genocidal regime, and subsequent internal conflicts, which completely ended in 1998, thanks to the *win-win* strategy initiated by Samdech Techo Prime Minister Hun Sen. The genocidal regime caused an enormous destruction, not only to the country's infrastructure, educational institutions, financial and health systems, but even more importantly, to the human capital, which is important for the development of the country. To rebuild the decades-long, conflicts-stricken country, Cambodia was in dire need of capital as well as foreign aid. The need to build up the nation's capital stock was very acute, and could, to some extent, be alleviated through inward FDI and foreign aid. Cambodia has engaged in the liberalization of its economy by promoting provide investment and by adopting an extremely open policy towards foreign investment and international trade.

After the first-ever national elections in 1993, Cambodia has regained its national confidence and recognition from the international community. The Kingdom also started to undertake economic reforms for which it received financial and technical assistance from a number of donors and from multilateral institutions such as the World Bank and the International Monetary

Fund, and opened its economy more widely to investment and trade with the rest of the world. As a result, Cambodia became a potential location base for FDI, while its international trade got a new impetus and substantially expanded, and foreign aid has gradually increased.

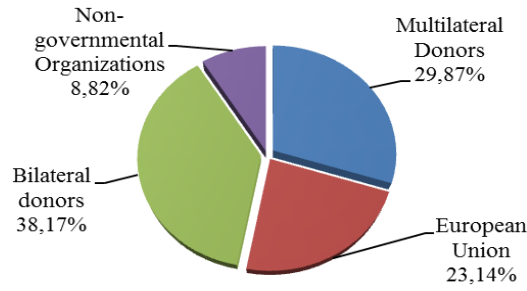
According to data made available from the Council Development of Cambodia, total disbursements of aid have increased gradually, reaching US\$ 1,086 million in 2010 (Figure 1).³ However, foreign aid to Cambodia dropped to around US\$ 745 million in 2011. This may be due to the global economic crisis that hardest hit the world economy, especially the advanced economies—some of them are Cambodia's donors. Among the main development partners, Japan and China are the largest sources of official development assistance. Some of ODA are classified as an aid-for-trade since its objective is to provide technical assistance for trade-related policy, trade-related infrastructure, trade development, and other trade-related projects (Sok et al., 2011).

Figure 1: Total ODA, Exports and Imports over 1995-2011



Source: Council for the Development of Cambodia and IMF's Directions of Trade

ODA to Cambodia was made through multilateral agencies such as the World Bank, the International Monetary Fund, the Asian Development Bank and the Global Fund, accounting for 29.87%; European Union (23.14%); bilateral donors (38.17%); and non-governmental organizations (8.82%) (Figure 2).

Figure 2: ODA by Donors over 1992-2011

Source: Council for the Development of Cambodia, 1992-2011

The data from the Organization of Economic and Development Cooperation (OECD) database show that Cambodia has received some amounts of aid for trade since 2003. Aid-for-trade flow to Cambodia was US\$ 0.32 million in 2003, and gradually increased since then until 2008, reaching US\$ 8.74 million (OECD database). Aid for trade are aimed to help recipients, particularly least developed and developing countries, to build the supply-side capacity and trade-related infrastructure to assist them in implementing and benefiting from WTO agreements, and more broadly in expanding their trade with the rest of the world. It primarily focuses on the following (OECD-WTO, 2013): (i) trade policy and regulations and trade-related adjustment; (ii) economic infrastructure; (iii) building productive capacity and trade development; (iv) mineral resources and mining; and (iv) tourism. These are likely to help strengthen institutional and capacity building to support trade development and facilitation of the recipients.

4. Model specification and estimation techniques

4.1 Model specification

The present study attempts to empirically examine the relationship between Cambodia's international trade and foreign aid, along with other control variables that may affect trade over the period 1995-2011. Following the theoretical foundation and previous empirical literature, the following augmented gravity models are estimated:

$$\begin{aligned} \ln EXP_{cjt} = & \alpha_0 + \alpha_1 \ln FDI_{cjt} + \alpha_2 \ln AID_{cjt} + \alpha_3 \ln HGDP_{cjt} + \alpha_4 \ln RER_{cjt} + \alpha_5 \ln DIST_{cj} \\ & + \alpha_6 GSP + \alpha_7 AFTA + \alpha_8 CRISIS + \varepsilon_{cjt} \end{aligned} \quad (1)$$

$$\begin{aligned} \ln IMP_{cjt} = & \beta_0 + \beta_1 \ln FDI_{cjt} + \beta_2 \ln AID_{cjt} + \beta_3 \ln CGDP_{cjt} + \beta_4 \ln RER_{cjt} + \beta_5 \ln DIST_{cj} \\ & + \beta_6 AFTA + \beta_7 CRISIS + \mu_{cjt} \end{aligned} \quad (2)$$

$i = 1, 2, 3, \dots, N$ and $t = 1, 2, 3, \dots, T$

³ This amount includes foreign aid to non-governmental organizations in operation in Cambodia.

where $\ln EXP$ is logarithm of exports from Cambodia to trading partners, measured in current U.S. dollars; $\ln IMP$ is logarithm of imports from trading partners, measured in current U.S. dollars; $\ln FDI$ denotes logarithm of investment stock of trading partners in Cambodia in current U.S. dollars; $\ln AID$ is logarithm of foreign aid from trading partners in current U.S. dollars; $\ln CGDP$ is logarithm of Cambodia's gross domestic product at purchasing power parity; $\ln HGDP$ is logarithm of trading partner's gross domestic product at purchasing power parity; $\ln RER$ is logarithm of the ratio of the U.S. dollar to the that of partner's currency;⁴ $\ln DIST$ is logarithm of geographic distance between capital city of Phnom Penh and that of each trading partner in kilometers; GSP stands for Generalized System of Preferences and is a dummy variable which is equal to 1 for a country that granted GSP status to Cambodia and equal to 0 otherwise⁵; AFTA is dummy variable for number of years since Cambodia become a member of ASEAN Free Trade Area, defined as being equal to 1 for 2000-2011 and 0 otherwise; and CRISIS is dummy variable for the Asian crisis and global financial and economic crisis, defined as being equal to 1 for 1997,1998, 2008-2010 and 0 otherwise. c , j and t represent Cambodia, home country trading partner and period of time, respectively; and ε_{cjt} and μ_{cjt} are composite error terms.

This paper uses detailed, unpublished FDI data, provided by the Council for the Development of Cambodia (CDC) covering the period 1995-2011. The data on gross domestic product (GDP), exchange rates, total exports and total imports for each country in the sample are from IMF's International Financial Statistics, Direction of Trade Statistics, and World Economic Outlook database, the World Bank's World Development Indicators. The data on official development assistance to Cambodia are made available by the Cambodian Rehabilitation and Development Board (CRDB) and OECD database. Data on geographical distance is from the Great Circle Distances between Capital cities in kilometers. The data on the generalized system of preferences are obtained from the Cambodian Ministry of Commerce and UNCTAD database.

4.2 Estimation techniques

The data used to estimate specifications (1) and (2) are panel data set, which is the pooling of observations on cross-section of Cambodia's trading partners over 17 years.

Panel data have several advantages over the usual cross-sectional or time series data (Hsiao, 2003, 2005, 2007; Plasmans, 2006). Plasmans (2006) has shown that panel data are more efficient with respect to random sampling and ease of identification, present less multicollinearity and are better for aggregation as the aggregation may vary over time. Similarly, Hsiao (2005, 2007) has indicated that an important advantage of panel data is that it allows to control for the impact of omitted variables, and contain information on the inter-temporal dynamics, and also

⁴ Cambodian economy have been highly dollarized and seems to be on the rise. Most of business transactions, including wages and salaries of private firms and international organizations and NGOs, are made in U.S. dollars.

⁵ GSP was granted to Cambodia by Australia (since 1998 to present). Canada (since 2000 to present). China (2006 to present). Japan (2000 to present). Korea (2008 to present). Russia (over the period 1995-2011). Switzerland (2007-present). the United States (since 1997 to present). the European countries (Belgium, France, Germany, Italy, Netherlands, Norway, Spain, Sweden, United Kingdom (from 2001 onwards).

that the individuality of the entities allows the effects of missing or omitted variables to be controlled for. Wei and Liu (2001) have argued that the use of panel data takes into account the diversity and the specificity of trading partner's unobservable behavior.

Panel data sets allow us to use three estimation procedures: pooled OLS, fixed-effects (FE), or random effects (RE) estimations. If the assumption holds that the unobservable individual country-specific effects are not very different, pooled OLS estimations are the most simple and efficient method. The FE estimator allows for the unobservable country heterogeneity, and is always less efficient than the RE estimator, but the latter may suffer from endogeneity bias (Hausman test) so that the FE estimator is preferred in that case. However, the use of a fixed-effects model will drop the time-invariant variable DIST, and will make FE estimations less efficient than the RE estimation counterpart. Like the FE model, RE estimations take into consideration the unobservable country heterogeneity effects, but incorporate these effects into the error terms, which are assumed to be uncorrelated with the explanatory variables.

To choose the appropriate model for the panel data set from these three competing models, three tests are available (Plasmans, 2006): the F test, the Hausman specification test (Hausman, 1978), and the Lagrange multiplier test (LM test) (Breusch and Pagan, 1980). The F test is used to carry out a test for the FE model against the pooled OLS. The null hypothesis of the F test is that all individual effects are equal (pooled regression), or algebraically, $H_0 : \alpha_1 = \alpha_2 = \dots = \alpha_N = \bar{\alpha}$, with the F test statistic for the joint significance of the individual effects as follows:

$$F_{N-1, NT-N-K+1} = \frac{(R_{FE}^2 - R_{pooled}^2)/(N-1)}{(1 - R_{FE}^2)/(NT - N - K + 1)}, \quad (3)$$

where N is the number of FDI-investing countries, and K is the number of explanatory variables. A large value for F will lead to the rejection of the null hypothesis in favour of the FE model.

The Hausman test is for testing the appropriateness of the fixed effects model against the RE model. The Hausman test statistic is computed as follows (Verbeek, 2004):

$$\psi_H = (\hat{\beta}_{FE} - \hat{\beta}_{RE})' [\hat{V}\{\hat{\beta}_{FE}\} - \hat{V}\{\hat{\beta}_{RE}\}]^{-1} (\hat{\beta}_{FE} - \hat{\beta}_{RE}), \quad (4)$$

where $\hat{V}$ s denote estimates of the true covariance matrices. Under the null hypothesis that the explanatory variables and α_i are uncorrelated, the Hausman test statistic ψ_H is asymptotically Chi-square distributed with K degrees of freedom, where K is the number of slope coefficients in

the random effects model. A large value of ψ_H leads to the rejection of the null in favour of fixed effects model.

Since the regression equations above contains both time-variant and time-invariant variables, the use of FE estimation is deemed inappropriate as it will drop the time invariant variables. Therefore, this chapter will opt for the estimation of pooled OLS and RE models. One model against the other model will be tested using the LM test. If individual country-specific effects do not exist, the pooled OLS model is known to deliver the best linear unbiased estimators (BLUE). while RE estimators are not efficient. The opposite is true if individual country-specific effects do exist in the panel data set.

The pooled OLS model assumes that the individual specific effects, α_i , are equal and different from zero, while the RE model assumes that they follow a random, independently and identically distributed stochastic process, that is, $\alpha_i \sim iid(0, \sigma_\alpha^2)$; u_{it} is assumed to be normally distributed with zero mean and constant variance, that is, $u_{it} \sim iid(0, \sigma^2)$. It has been shown by Breusch and Pagan (1980) that, under the null hypothesis $H_0: \sigma_\alpha^2 = 0$ against the alternative hypothesis $H_1: \sigma_\alpha^2 > 0$, the LM test statistic is as follows:

$$LM_{BP} = \frac{NT}{2(T-1)} \left[\frac{\sum_{i=1}^N \left(\sum_{t=1}^T \hat{e}_{it} \right)^2}{\sum_{i=1}^N \sum_{t=1}^T \hat{e}_{it}^2} - 1 \right], \quad (5)$$

which is asymptotically χ^2 -distributed with one degree of freedom; $\hat{e}_{it}$ denotes OLS residuals obtained under H_0 (pooled regression). A large value for the LM test statistic will reject the null hypothesis in favour of the RE model.

To avoid spurious regression results, it is important to carry out unit root tests of each variable before sound estimations and useful analysis can be performed. A number of panel unit root tests are available in the econometric literature (see, for instance, Quah, 1994; Choi, 2001; Levin, Lin and Chu, 2002; Im, Pesaran and Shin, 2003). Since the time span of the individual series in the available panel data set is relatively short, the recently-developed panel unit root test (see Im et al., 2003). known as the IPS test, will be used, as it allows for residual serial

correlation and heterogeneity of error variances across groups, and also as it is more powerful even with relatively short sample periods.⁶

The IPS test starts with the specification of a separate Augmented Dickey-Fuller (ADF) regression for each cross section:

$$\Delta y_{it} = \alpha_i + \beta_i y_{i,t-1} + \sum_{j=1}^{p_i} \rho_{ij} \Delta y_{i,t-j} + \varepsilon_{it} \quad (6)$$

$$i \in [1, N], \quad t \in [1, T]$$

Since almost all time series have deterministic trends, incorporating the trend into growth equation (6) leads to equation (7):

$$\Delta y_{it} = \alpha_i + \gamma_i t + \beta_i y_{i,t-1} + \sum_{j=1}^{p_i} \rho_{ij} \Delta y_{i,t-j} + \varepsilon_{it} \quad (7)$$

$$i \in [1, N], \quad t \in [1, T]$$

where Δ presents the operator for the first-order difference, y_{it} denotes each dependent and explanatory variable, p_i is the number of lags of Δy_{it} , ρ_{ij} is the slope parameters of the lagged changes, and ε_{it} is assumed to be independently and normally distributed with mean zero and finite heterogeneous variances. The null hypothesis of unit roots to be tested is: $H_0 : \beta_i = 0$ for all i versus the alternative, $H_1 : \beta_i = 0$ for some i 's and $\beta_i < 0$ for at least one i .

The IPS test statistic, which is referred to as the t-bar statistic, is based on the ADF statistic averaged across the groups. The standardized t-bar statistic is of the following form:⁷

$$W_{t\text{-bar}} = \frac{\sqrt{N} \left\{ \frac{1}{N} \sum_{i=1}^N t_{iT}(p_i, \rho_i) - \frac{1}{N} \sum_{i=1}^N E[t_{iT}(p_i, 0) | \beta_i = 0] \right\}_{T,N}}{\sqrt{\frac{1}{N} \sum_{i=1}^N \text{Var}[t_{iT}(p_i, 0) | \beta_i = 0]}} \Rightarrow N(0,1) \quad (8)$$

Im, Pesaran and Shin (2003) tabulated the values of $E[t_{iT}(p_i, 0) | \beta_i = 0]$ and $\text{Var}[t_{iT}(p_i, 0) | \beta_i = 0]$ for different values of T and p . Under the null hypothesis, the t-bar

⁶ Im, Pesaran and Shin (2003) indicate that their panel unit root test technique is generally better than previously-proposed tests, and is usually simpler. The minimum time observations for the Im et al. (2003) results are greater than five time observations in the case of ADF regressions with intercepts, and greater than six time observations in the case of ADF regressions with intercepts and linear time trends.

⁷ See equation (4.10) in Im et al. (2003).

statistic has a standard normal distribution. Under the alternative hypothesis of stationarity, the t -bar statistic diverges to $-\infty$. The rejection of the null hypothesis will lead to the conclusion that the variable considered is stationary.

To obtain stable estimated slope parameters, additional tests such as collinearity and heteroskedasticity tests are carried out. The collinearity check is based on the variance inflation factor (VIF), which has been shown to be equal to $1/(1-R_i^2)$, where R_i^2 is obtained from the multiple correlation coefficient of an explanatory variable X_i regressed on the remaining explanatory variables. Evidently, a higher VIF_i indicates R_i^2 to be near unity and therefore points to collinearity. The commonly-used rule of thumb states that if $VIF < 5$, there is no evidence of damaging multicollinearity (Studenmund, 2006).

Greene (2003) proposes a test for groupwise heteroskedasticity, which is based on the Wald statistic. Under the null hypothesis of common variance, the Wald test statistic is shown to be of the following form:

$$W = \sum_{i=1}^N \frac{(\hat{\sigma}_i^2 - \sigma^2)^2}{Var(\hat{\sigma}_i^2)}, \quad (9)$$

W is χ^2 -distributed with N degrees of freedom. Failure to reject the null indicates the absence of groupwise heteroskedasticity.

5. Estimation results

Table 1 presents the basic descriptive statistics and panel data unit root test results for both dependent and independent variables included in the specifications above. Coefficients on most of the variables are highly statistically significant at the 1% level, except for imports and exports, which are significantly different from zero at the 5% significance level. These results indicate that both dependent and other explanatory variables in the model are all stationary and can be used for estimation and for further hypothesis testing.

The collinearity checks for all variables in specifications 1 and 2, based on the VIF statistics of much less than 5, suggests that there is no harmful multicollinearity among the included explanatory variables. The statistically significant LM statistics for the export and import equations indicate that the RE model performs better than OLS.⁸ The results of the test statistics are reported along with the estimation results.

Table 1: Descriptive Statistics and IPS Panel Data Unit Root Test Results

Variable	Mean	Standard Deviation	t-bar Statistics
LnEXP	16.8684	1.7662	-1.805**
LnIMP	17.1151	2.1225	-1.676**
LnFDI	15.0824	6.7317	-4.727***
LnAID	9.6670	7.9305	-3.154***
LnHGDP	27.2784	1.1547	-4.791***
LnRER	0.4494	0.4980	-13.940***
LnDIST	8.4237	0.9570	–
GSP	-2.3266	2.8448	–

Notes:

1. *, **, and *** refer to statistical significance levels at the levels of 10%, 5% and 1%, respectively.
2. LnEXP is logarithm of Cambodia's exports to each trading partner; LnIMP is logarithm of Cambodia's imports from each trading partner; LnFDI is logarithm of foreign direct investment stocks of each trading partner in Cambodia; LnAID is logarithm of foreign aid to Cambodia by each donor; LnHGDP is logarithm of partner's GDP, measured at purchasing power parity; LnRER is logarithm of the ratio of U.S dollar to trading partner's currency; LnDIST is logarithm of geographical distance; and GSP is the generalized system of preferences.

Tests for groupwise heteroskedasticity proposed by Greene (2003) for both equations 1 and 2 suggest that there is the presence of heteroskedasticity in the models.⁹ Hence, given the strong rejection of the null hypothesis, all specifications are estimated with heteroskedastic consistent standard error.

⁸ LM statistics for export and import equations, along with estimated slope parameters, are reported in Tables 2-5, respectively.

⁹ Results of groupwise heteroskedasticity test statistics can be obtained from the authors upon request.

Table 2: Effect of Foreign Aid on Cambodia's Exports

Variable	(1)	(2)
Constant	-13.666 (8.890)	-4.514 (7.135)
LnFDI	0.042*** (0.016)	0.037** (0.016)
LnAID	0.050*** (0.019)	—
LnAFT	—	0.037*** (0.013)
LnHGDP	1.447*** (0.398)	0.941*** (0.323)
LnRER	0.001 (0.068)	0.016 (0.082)
LDIST	-1.254*** (0.379)	-0.653* (0.351)
GSP	0.998*** (0.238)	0.831*** (0.248)
AFTA	-0.529 (0.330)	-0.555* (0.319)
CRISIS	0.135 (0.098)	0.116 (0.100)
No. of Observations	407	408
Overall R^2	0.2894	0.3106
LM statistic $\chi^2(1)$	OLS vs. RE: 1190.76***	OLS vs. RE: 1337.14***

Notes:

1. *, **, and *** denote that the slope parameter estimates are statistically significant at the levels of 10%, 5%, and 1%, respectively.
2. Standard errors are groupwise heteroskedasticity robust standard errors in parentheses.
3. AFTA is Cambodia being a member of Asian Free Trade Agreement (AFTA); and CRISIS is Asian and global crises.
4. See notes below Table 1 for the definitions of the other variables.

Table 2 presents estimation results from regression specification 1, the effect of foreign aid on Cambodia's exports over the period under investigation. The estimated coefficient on LnFDI is, as expected, positive and is highly statistically significant at the 1% level, indicating that Cambodia's exports is positively affected by inward foreign direct investment. The result of the estimation suggests that, holding other factors fixed, one percent increase in FDI stock leads to 0.042 percent increase in Cambodia's exports. The finding is consistent with those of previous studies for Cambodia and for other countries (Soeng, 2008 for Cambodia; Wei and Liu, 2001 for China).

The coefficient on LnAID in columns (1) bears a positive sign and is statistically significant at the 1% level, indicating that foreign aid has played an important role in inducing exports from Cambodia to the donors. The finding is consistent with Nowak-Lehmann et al. (2011) who found that development aid has a positive and significant impact on recipient countries' exports in

Asian, Latin American and Caribbean countries. Similarly, Karingi and Leyaro (2009) found that aid for trade promoted trade for Africa. In column (2), we re-estimated our econometric specification by replacing LnAID with aid-for-trade variable, LnAFT. The result shows that LnAFT is also highly significant at the 1% level. This should be the case as aid-for-trade's objectives focus on the trade-enhancing projects.

The coefficient on LnHGDP is positive and statistically significant at the 1% significance level, indicating that partner's gross domestic product has strongly affected exports of Cambodia. The estimated coefficient of around 1.45 suggests that, *ceteris paribus*, one percent increase in partner's GDP is estimated to result in 1.45 percent increase in Cambodia's exports. GSP bears an expected positive sign, and is statistically different from zero at the 1% level. This implies that Cambodia has benefited from GSP status granted by the United States, the European Union, and other developed countries. The result is in line with the previous studies (Soeng, 2008; Cuyvers and Soeng, 2013).

The coefficient on LnDIST is statistically significant at the 5% level, implying that countries that are farther away from Cambodia trade less with the Kingdom, which is consistent with previous empirical studies (Cuyvers et al., 2008; Soeng, 2008; Wei and Liu, 2001). Other variables such as LnRER and CRISIS are not statistically different from zero at the conventional significance level in both columns (1) and (2).

Table 3: Effect of Foreign Aid on Cambodia's Exports (with one-year lag)

Variable	(3)	(4)
Constant	-14.203 (8.681)	-2.870 (7.005)
L.LnFDI	0.037*** (0.014)	0.030** (0.014)
L.LnAID	0.061*** (0.017)	—
L.LnAFT	—	0.048*** (0.012)
L.LnHGDP	1.463*** (0.381)	0.832*** (0.306)
L.LnRER	0.016 (0.050)	0.024 (0.062)
LDIST	-1.217*** (0.378)	-0.464 (0.320)
GSP	0.790*** (0.218)	0.607*** (0.225)
AFTA	-0.323 (0.278)	-0.396 (0.274)
CRISIS	0.072 (0.096)	0.001 (0.104)
No. of Observations	392	392
Overall R^2	0.3049	0.3306
LM statistic $\chi^2(1)$	OLS vs. RE: 1193.58***	OLS vs. RE:1358.74***

Notes:

1. *, **, and *** denote that the slope parameter estimates are statistically significant at the levels of 10%, 5%, and 1%, respectively.
2. Standard errors are groupwise heteroskedasticity robust standard errors in parentheses.
3. See notes below Tables 1&2 for the definitions of the variables.

It is unlikely that time-variant explanatory variables may instantaneously react, we therefore re-estimated the export equation with one-year lag to account for the lagged effect of these variables on exports on the one hand and to reduce the endogenous relationship between exports and the time-variant variables on the other. The results, reported in column (2), appeared to be robust. All variables including the variables of our interest, LnAID and LnAFT, retain their statistical significance, confirming that these variables have played a positive, significant role in promoting Cambodia's exports. Yet, AFTA is now significant at 10%. As AFTA has a negative sign, it seems to suggest that Cambodia appeared to have an export diversion. This is consistent with a recent study on Brunei Darussalam, Cambodia, Laos and the other AFTA members by Coulibaly (2004) who showed that AFTA has been net export diverting.

Table 4: Effect of Foreign Aid on Cambodia's Imports

Variable	(5)	(6)
Constant	5.239 (3.973)	7.490* (4.236)
LnFDI	0.022* (0.012)	0.023** (0.011)
LnAID	0.006 (0.018)	—
LnAFT	—	0.008 (0.009)
LnCGDP	1.042*** (0.132)	0.933*** (0.178)
LnRER	-0.010 (0.041)	-0.007 (0.042)
LDIST	-1.550*** (0.282)	-1.516*** (0.273)
AFTA	-0.073 (0.224)	-0.055 (0.228)
CRISIS	-0.009 (0.066)	-0.009 (0.065)
No. of Observations	411	412
Overall R^2	0.5951	0.5972
LM statistic $\chi^2(1)$	OLS vs. RE: 1700.55***	OLS vs. RE: 1708.02***

Notes:

1. *, **, and *** denote that the slope parameter estimates are statistically significant at the levels of 10%, 5%, and 1%, respectively.
2. Standard errors are groupwise heteroskedasticity robust standard errors in parentheses.
3. LnCGDP is logarithm of Cambodia's GDP at purchasing power parity. See notes below Tables 1&2 for the definitions of the variables.

Table 4 presents estimation results for the effect of foreign aid on Cambodia's imports. The coefficient of LnFDI, as expected, bears a positive sign and is statistically significant. This indicates that foreign direct investment is positively related to imports from the FDI investing countries. *Ceteris paribus*, one percent increase in FDI stock leads to 0.022 percent increase in imports to Cambodia from its trading partners. The effect is small compared to the previous study by Soeng (2008). who found a percent increase in inward FDI leads to an increase in Cambodia's imports of 0.07-0.11 percent. The finding is consistent with Beresford et al. (2004) and EIC (2007) who reported that most of the cloth, i.e. raw materials for the production of garments, is imported from Asian countries, such as China, Hong Kong and Taiwan, and that garment factories in Cambodia only perform cut-make-trim activities for exports. This means that the value added in the finished garment industry is relatively small. This may also explain the low productivity spillovers from FDI in the Cambodian manufacturing industry as was found by Soeng (2008).

The coefficient of LnCGDP is positive, and is statistically significant at 1% level, implying that Cambodia's GDP is positively related to its imports. This is true as higher GDP translates into higher income, thus leading to higher demand for goods; some of which are imported from its trading partners. Holding other factors constant, one percent increase in Cambodia's gross domestic product leads to around 1 percent increase in imports to Cambodia. Like in the case of exports, geographic distance is negatively related to Cambodia's imports. Other variables such as LnAID, LnAFT, LnRER, CRISIS, and AFTA are not significant at any conventional significance level, suggesting these factors have not affected Cambodia's imports. This result is consistent with the previous study (Soeng, 2008).

Table 5: Effect of Foreign Aid on Cambodia's Imports (with one-year lag)

Variable	(7)	(7)
Constant	4.104 (3.900)	11.540** (4.857)
L.LnFDI	0.019 (0.013)	0.022* (0.012)
L.LnAID	0.008 (0.016)	—
L.LnAFT	—	0.023*** (0.008)
L.LnCGDP	1.093*** (0.133)	0.749*** (0.185)
L.LnRER	-0.025 (0.042)	-0.019 (0.042)
LDIST	-1.545*** (0.278)	-1.486*** (0.276)
AFTA	-0.029 (0.216)	0.021 (0.224)
CRISIS	-0.052 (0.073)	-0.063 (0.071)
No. of Observations	393	393
Overall R^2	0.5983	0.5971
LM statistic $\chi^2(1)$	OLS vs. RE: 1577.91***	OLS vs. RE: 1600.24***

Notes:

1. *, **, and *** denote that the slope parameter estimates are statistically significant at the levels of 10%, 5%, and 1%, respectively.
2. Standard errors are groupwise heteroskedasticity robust standard errors in parentheses.

Similar to the case of export equation, as time-variant explanatory variables may not instantaneously react, we therefore re-estimated the import equation with one-year lag. The result also appears to be robust (Table 5). Most variables retain their statistical significance, except LnAFT, which is now highly significant at the 1% level, implying that AFT and Cambodia's imports are positively related.

6. Conclusion

This paper attempts to identify the factors that determine Cambodia's international trade and examine the effect of foreign aid on the country's exports and imports over the period 1995-2011. The study is undertaken, using the widely-used gravity model and tested panel data set over the period under investigation. A set of commonly used variables, such as foreign direct investment, foreign aid, income, exchange rate, geographic distance and a set of dummy variables, which are believed to affect Cambodia's trade. To report the best possible results, several diagnostic tests were carried out. It is found that RE model is statistically better than OLS, and thus the econometric results are produced by the random effects model. Additional tests were also undertaken: the Im–Pesaran–Shin test for unit roots of all time-variant explanatory variables, multicollinearity checks based on the variance inflation factor (VIF). and groupwise heteroskedasticity test.

The estimation results indicate that FDI is positively related to both exports and imports in Cambodia. This result is consistent with the theoretical explanations of trade-FDI models, as well as previous empirical findings for many other developing countries such as China. Concerning the effect of total foreign aid, we find strong evidence that foreign aid has played a significant role in promoting Cambodia's international trade with its trading partners who are also its donors. Aid-for-trade to Cambodia is also found to have had a positive impact on the country's exports. Yet, aid flows do not seem to have impacted upon Cambodia's imports, except Cambodia's income which is highly significant in inducing its imports from its trading partners. GSP is shown to be significantly contributed to the promotion of exports for Cambodia, which is consistent with Soeng (2008) and Cuyvers and Soeng (2013). Other variables such as exchange rate, AFTA, and crisis do not seem to exert any effect on Cambodia's international trade over the period under investigation.

The findings may offer several important policy implications. First, it is interesting to emphasize that inward FDI has played a positive role in Cambodia's international trade. Therefore, FDI should be further encouraged to Cambodia by reducing several remaining constraints that may weaken Cambodia's competitiveness. Second, foreign aid and aid-for-trade have positively affected Cambodia's exports. Thus, more aid, in particular aid-for-trade, to Cambodia should help, among others, promote the country's international trade, which in turn raise living standards and reduce poverty of Cambodian people through employment and income generation for low-skilled workers; many of them are women. Third, since the role of the exchange rate is ineffective due to the high degree of dollarization of the Cambodian economy, the de-dollarization is expected to reactivate the role of exchange rate in stimulating the economy although this may not be possible in the short run. However, it might be argued that the use of the dollar rather than the 'soft' national currency (riel) lowers the exchange rate risks of foreign investors producing, e.g., garments, in Cambodia for exports.

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