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The Effects of Trade Liberalization on the Extensive and Intensive Margins of Trade in Developing Countries

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Abstract

This study examines the effects of trade liberalization on the extensive and intensive margins of import and export in developing countries. The study use the duties and the trade liberalization dummy variable (the year which countries have significant reforms in trade policies) to represent trade liberalization. As a result, the study found that the trade liberalization has a significant impact on the extensive and intensive margins of trade in developing countries. These results are consistent with the implications of the heterogeneous firm model: when trade barriers vary, not only does the intensive margin, but the extensive margin varies as well. This implies that the welfare loss of countries in reality with the existence of trade barriers is larger than the deadweight loss which we usually mention. I use the import and export demand functions and the method to measure the extensive and intensive margins of Hummels and Klenow (2002) to study the above issues.

Keywords: Trade liberalization, extensive margin, intensive margin, Import and export demand functions, dynamic panel regression

JEL Classification: F49

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1 Introduction

This paper studies the impact of significant reforms of trade policies (trade liberalization) and the change of import and export duties across years on the extensive margin of import and export of developing countries. In addition, we also will examine the impact of these variables on the intensive margin of trade (import and export). The extensive margin is an increase in the number of products and the intensive margin is an increase in the value of trade by existing products. The significant reforms of trade policies of countries include the large decrease of tariffs or the elimination of non-tariffs barriers.

Previous studies of the impact of trade barriers (including trade liberalization) on trade usually use the volume of trade to represent trade flows. These studies are based on previous trade theories (.i.e Krugman (1980)) and assume that all firms or products of countries can be traded when trade barriers are moderate ($\tau < \infty$). This implies all of the adjustments in the volume of trade occur through the change of value of exporting products (the intensive margin) when trade barriers change. This means that trade barriers only affect the social welfare through the change of the intensive margin of trade. This loss of social welfare from trade barriers is equal to the area of deadweight loss illustrated in these standard trade theories.

In reality, the existence of trade barriers can block the trade of many goods. This can make society lose the entire amount of welfare that could have been generated from these goods. The loss of social welfare in reality can be larger than the one of the traditional deadweight loss. Romer (1994) through a general equilibrium model performs a numerical exercise to show that the welfare losses arising from reduced variety may be an order of magnitude larger than those associated with the standard trade analysis. He finds that moving from free trade to a 10% tariff reduces welfare by 20% of GDP when the set of goods in use is allowed to fall, compared to only 1% of GDP when the set of goods in use is fixed. As mentioned in Mukerji (2009), the loss of welfare mentioned by Romer (1994) depends on the elasticity of substitution. When elasticity is high, it will decrease the magnitude of the loss since there are many substitute varieties. This is clearly important for developing countries since these countries with backward technology often have low diversification of products and therefore must import many products from developed countries. In addition, developing countries often impose high trade barriers, this can cause domestic consumers who cannot access many varieties. Consequently, the loss of social welfare of developing countries will be significant.

From that, to study whether trade barriers of developing countries have impacts on the extensive and intensive margins of trade of these countries is important work. We will consider the impact of trade barriers on the extensive margin of trade under two respects: the impact of trade liberalization and the impact of normal change of trade barriers on the extensive margin of trade. We use a dummy variable to represent trade liberalization and use the import and export duties to represent the normal adjustment of trade barriers. In addition, we will study their effects on the intensive margin of trade.

There are some empirical studies which have discussed the effect of trade liberalization and trade barriers on the extensive margin of trade flows such as Kehoe and Ruhl (2003), Mukerji (2009), Sandrey and van Seventer (2004), and Debaere and Mostashari (2008). Kehoe and Ruhl (2003) propose a methodology to study changes of the extensive margin in bilateral trade flows. Applying this methodology to country pairs that undergo trade liberalization and to pairs in which one of the countries undergoes significant structural transformation, they find large increases on this extensive margin. For country pairs with no major trade policy change or structural change, they find little or no increases on the extensive margin. Based on their method, Mukerji (2009) found that the liberalization of trade in India in the 1990s affects the extensive margin growth of both Indian exports and imports. Sandrey and van Seventer (2004) also use the methodology developed by Kehoe and Ruhl (2003) to study the trade liberalization brought about by the Closer Economic Relationship agreement between Australia and New Zealand starting in 1988. They find evidence that the extensive margin was growing for New Zealand exports to Australia during this period, while the export share of these goods from New Zealand to the rest of the world was relatively stable. Debaere and Mostashari (2008) uses Eaton and Kortum (2002) to build a empirical model of conditional logit to test the relationship between the extensive margin and tariffs from the export of countries to the US. They find compelling evidence that tariffs do indeed affect the range of goods that countries export to the US. However, they also show that the US tariffs only play a minor role in explaining the large changes of the range of goods that countries export to the US. Other macroeconomics factors play a more important role.

Our study is different from the above studies in several ways. We study the effect of trade liberalization and trade barriers on both the extensive and intensive margins of imports and exports through the import (export) demand functions for a set of developing countries through econometric models. From these results, we can compare the impact of trade liberalization and trade barriers on the extensive and intensive margin of trade. Through that, we can see the impact level of trade barriers on the social welfare. The studies discussed above essentially discuss the impact of trade liberalization on the extensive margin of trade for a country or pairs of countries through the descriptive method of Kehoe and Ruhl (2003) or use another approach method like Debaere and Mostashari (2008).

The import (export) demand functions which are used in this paper are usually used to study the impact of relative price (the real effective exchange rate) and income on import (export) demands of countries or to study the effect of devaluation policies on trade balance of developing countries [1]. However, many studies use them to study the impact of trade barriers on import (export) demand or trade balance such as Melo and Vogt (1984), Bertola and Faini (1990), and Faini et al. (1988), or more recently studies such as Santos-Paulino (2002) and Santos-Paulino and Thirlwall (2004). These studies add variables to represent trade liberalization and trade barriers into the traditional import (export) demand functions to study the effect of these variables on the import, export, and trade balance. In this paper, we use this approach to study the impact of trade liberalization and trade barriers on the extensive and intensive margins of export and import of developing countries.

2 Literature review

In the imperfect substitutes model, the domestic demand for imports (foreign export) is assumed to depend on real income and the relative price of imported goods:

$$M = M\left(\frac{eP^*}{P}, Y\right) \tag{1}$$

where M^d is the domestic demand for foreign goods and Y is the level of real income measured in domestic output. $\frac{eP^*}{P}$ is the relative price (or real effective exchange rate) of imported goods to domestically produced goods, both measured in home currency. e is the nominal exchange rate, defined as the domestic currency price of foreign exchange. From this formula, the import demand depends negatively on the relative price of the foreign good and depends positively on real income. Thus, if the domestic currency depreciates (e is increased), there is a rise in the relative cost of imports and a decline in import demand.

Analogously, the demand for a country's exports (foreign imports) depends on foreign income and the foreign relative price of imports:

$$M^* = M^*(\frac{eP^*}{P}, Y^*) \tag{2}$$

Where Y^* is the level of foreign real income. This demand for a country's export good depends negatively on the relative price of the good, and therefore depends positively on the real exchange rate. Thus if the domestic currency depreciates, foreigners experience a fall in the relative cost of their imports, and there is a rise in the demand for the domestic exports [2].

[1] Rose and Yellen (1989), Rose (1990), and Rose (1991)

[2] These demand functions are assumed to be Marshallian demands with negative price elasticities and positive income elasticities. Even though the model is not built upon explicit microfundations, we may assume that those demand functions are derived from an agent utility maximization problem, that is, they satisfy the properties such as homogeneity

One of the main applications of these functions is to study the effect of depreciation policies on import, export, and trade balance (TB) of countries, especially in developing countries. Since a depreciation of the domestic currency leads to a rise in the quantity of exports and a fall in the quantity of imports, it would seem natural that such a depreciation improves the balance of trade. However, this result is not sure to occur since the balance of trade is a measure of the value of exports relative to the value of imports, not of the quantity of exports relative to the quantity of imports. When there is a depreciation, the foreign demand for domestic products increases, which leads to an export price of domestic products increase; consequently, the value of domestic exports increases. However, when depreciation happens, the domestic demand for foreign products decreases while the price of import products increases. This implies that the effect of a devaluation on import demand or trade balance in this model is ambiguous[3]. The results of empirical works are also inconsistent: some studies say that the real exchange rate has a significant effect on the trade balance, but some other studies find no evidence of this effect (Reinhart (1995))

Many studies used these import and export demand functions to study the impact of trade barriers (including trade liberalization) on import, export, and balance of trade. Some of these studies show a strong positive impact of trade liberalization on import (Melo and Vogt (1984), Bertola and Faini (1990), and Faini et al. (1988), Santos-Paulino (2002)). These studies not only show evidence for the relationship between trade liberalization and import but also present some interesting results. For instance, Melo and Vogt (1984) through their study on Venezuela propose two hypothesis: First, as the degree of import liberalization increases, the income elasticity of demand increases. That is, the relaxation of controls will tend to increase the income elasticity automatically. Second, the price elasticity of import demand also rises as the ability to substitute domestic production for import become easier. However, these results are also not consistent: Boylan and Cuddy (1987) don't find empirical support for the case of Ireland, while Santos-Paulino (2002) finds evidences of these hypotheses for these developing countries. On the export side, some studies show that trade liberalization of countries has improved their export performance (Weiss (1992), Ahmed (2000)). However, some other studies have found little evidence in this relationship (i.e. Greenaway and Sapsford (1994), Shafaeddin (1995)). The impact of trade liberalization on the overall trade balance is also not consistent: UNCTAD (1999) which studied the effect of trade liberalization on the trade balance for 15 developing countries over the period of 1970 to 1995 found a significant negative relationship, while Santos-Paulino and Thirlwall (2004), which studied for 22 developing countries,

of degree zero in prices and income, budget constrains equality, and that the Slutsky matrix is negative semi-definite

[3]The Marshall-Lerner condition says that given an initial position of balance trade, a depreciation will improve the trade balance if the export and import elasticities of demand sum is more than unity

found a positive relationship which means that trade liberalization leads to a worsening of the overall trade balance.

According to Faini et al. (1988), adding variables of trade policies into the import (export) demand functions can make the models better. Their results in studying the impact of trade policy on import demand in developing countries suggested that the real effects of income and price changes on import behavior are more evident when the impact of import controls and/or liberalization policies is also included in the analysis. Thus, import demand studies, which do not evaluate the effect of import policy changes, should be interpreted with caution, as far as the estimates of the income and price elasticities are concerned.

3 Methodology

3.1 Models

As mentioned above, this paper will examine following issues: the impacts of trade liberalization and trade duties on the change of extensive and intensive margins of import and export. In addition, we also discuss the impact of these variables on the volume of import and export. A dummy variable to show the year which the reforms of trade policies of countries occurred is used to represent for trade liberalization of countries.

All above issues will be studied through the import and export demand functions. For instance, to study the impact of the above variables on import, we will add variables of trade liberalization (*lib*) and import duties (*iduty*) into the import demand function. We also know that import demand is usually slow to adjust to changes in trade policies. This can be explained by importers or exporters who depend on contracts or regulations which lead to that they cannot respond instantly to changes in trade policies. As a result, we will use the following dynamic model to study the impact of trade liberalization and import duties on import:

$$log(M_t^j) = \alpha_1 log(M_{t-1}^j) + \alpha_2 log(Y_t^i) + \alpha_3 log\left(\frac{eP_t^*}{P_t^i}\right) + \alpha_4 log(iduty_{it}) + \alpha_5 log(lib_{it}) + \nu_i + u_{it} \quad (3)$$

Here M_t^i is total import of country i in year t, Y_t^i is real GDP of countries, $\frac{eP_t^*}{P_t^i}$ is real effective exchange rate, $iduty_{it}$ is the measure of import duties, and lib_{it} is the dummy variable to represent trade liberalization. The expected signs of the variables in the import demand regression are : $\alpha_1 > 0$; $\alpha_2 > 0$; $\alpha_3 < 0$; $\alpha_4 < 0$, and $\alpha_5 > 0$.

To find the impact of the variables on the extensive and intensive margins of import, we use the method of Hummels and Klenow (2002) to decompose the volume of import of country i (M_t^i) into the product of the extensive (EM_t^i) and intensive margins (IM_t^i) of import: $M_t^i = const(EM_t^i)(IM_t^i)$. The effect of trade liberalization and import duties on the extensive and intensive margins of imports will be studied through the following models:

$$log(EM_t^{i,imp}) = \gamma_1 log(EM_{t-1}^{i,imp}) + \gamma_2 log(Y_t^i) + \gamma_3 log\left(\frac{eP_t^*}{P_t^i}\right) + \gamma_4 log(iduty_{it}) + \gamma_5 lib_{it} + \nu_i + u_{it} \tag{4}$$

$$log(IM_t^{i,imp}) = \delta_1 log(IM_{t-1}^{i,imp}) + \delta_2 log(Y_t^i) + \delta_3 log\left(\frac{eP_t^*}{P_t^i}\right) + \delta_4 log(iduty_{it}) + \delta_5 lib_{it} + \nu_i + u_{it} \tag{5}$$

Since $M_t^j = const(EM_t^j)(IM_t^j)$, we predict that when import volume (M) increases, the extensive and intensive margins of import should also increase. The expected signs of explanatory variables in regression models of the extensive and intensive margins of import are: $\gamma_1, \delta_1 > 0$, $\gamma_2, \delta_2 > 0$, $\gamma_3, \delta_3 < 0$, $\gamma_4, \delta_4 < 0$, and $\gamma_5 >, \delta_5 0$.

Similarly, the impacts of trade liberalization and export duties ($eduty$) on export and its margins are studied through the following models:

$$log(X_t^i) = \alpha_1 log(X_{t-1}^i) + \alpha_2 log(Y_t^i) + \alpha_3 log\left(\frac{eP_t^*}{P_t^i}\right) + \alpha_4 log(eduty_{it}) + \alpha_5 log(lib_{it}) + \nu_i + u_{it} \tag{6}$$

$$log(EM_t^{i,exp}) = \gamma_1 log(EM_{t-1}^{i,exp}) + \gamma_2 log(Y_t^w) + \gamma_3 log\left(\frac{eP_t^*}{P_t^i}\right) + \gamma_4 log(eduty_{it}) + \gamma_5 lib_{it} + \nu_i + u_{it} \tag{7}$$

$$log(IM_t^{i,exp}) = \delta_1 log(IM_{t-1}^{i,exp}) + \delta_2 log(Y_t^w) + \delta_3 log\left(\frac{eP_t^*}{P_t^i}\right) + \delta_4 log(eduty_{it}) + \delta_5 lib_{it} + \nu_i + u_{it} \tag{8}$$

Where Y_t^W is the world real GDP, $eduty_{it}$ is export duties. The expected signs of the explanatory variables are still similar to the case of import except the impact of the relative price on the dependent variables is opposite: $\alpha_3, \delta_3, \gamma_3 > 0$.

3.2 Methodology to estimate the models

In the above models, since there is the relationship between lagged dependent variables and the individual specific effects (.i.e the relationship between M_{t-1}^j and ν_j in the import demand function), the OLS estimator or fixed effects estimators are biased. The OLS estimator is shows positive bias, while the fixed effects estimators are also biased downwards. The bias of fixed-effects estimators gets smaller for larger T. To avoid the biases of OLS and fixed effects estimators, we use some other consistent estimators to estimate these dynamic panel models including: the first difference GMM estimators (Arellano and Bond (1991)), system GMM estimators(Arellano and Bover(1995) and

Blundell and Bond(1998)), and biased corrected fixed effects estimator (or corrected LSDV[4]) (Kiviet (1995), Bun and Kiviet (2003), Bruno (2005)). We use the regression model of import demand to illustrate these methods:

$$log(M_t^i) = \alpha_1 log(M_{t-1}^i) + \alpha_2 log(Y_t^i) + \alpha_3 log\left(\frac{eP_{t-1}^*}{P_t^i}\right) + \alpha_4 log(iduty_{it}) + \alpha_5 lib_{it} + \nu_i + u_{it}$$

or

$$m_{it} = \alpha_1 m_{it-1} + \alpha_2 y_{it} + \alpha_3 reer_{it} + \alpha_4 iduty_{it} + \alpha_5 lib_{it} + \nu_i + u_{it}$$

3.2.1 A first-difference estimator

The first difference estimator is mentioned first by Anderson and Hsiao (1981). They use the first difference method to eliminate the correlation of the lagged dependent variable with the individual specific effects. However, Arellano and Bond (1991) notes that the Anderson-Hsiao estimator is inefficient because it doesn't use all available instruments. Arellano and Bond (1991) improved this method through GMM framework with using all available instruments. To simplify in explaining their method, we assume that the lagged variable is the only explanatory variable in the model and the above equation is written under the first difference:

$$\Delta m_t^i = \alpha \Delta m_{t-1}^i + \Delta u_t^i$$

In this first difference equation, the variable of individual-specific effects is excluded. The correlation between m_{t-1}^i and ν_i is also excluded. However, estimators of the above model are still biased since the error term (u_{t-1}^i) in $\Delta u_{it} = u_{it} - u_{it-1}$ is correlated with m_{it-1} in Δm_{it-1}. If u_{it} is iid, Δu_{it} is correlated with m_{it-1}, but it is not correlated with $m_{it-2}, m_{it-3}, \ldots$. We can use value of m at $t-2$ and before are valid instruments to estimate α . As a result, we can build following moment conditions:

$$E[m_{it-s}\Delta u_{it}] = 0 \text{where } s \geq 2 \text{ and } t = 3, \ldots, T \tag{9}$$

Or we can write under matrix

$$E[Z_i' \Delta u_i] = 0 \text{ for } i = 1, 2, \ldots, N^5$$

[4]Least square dummy variable

[5]
$$Z_i = \begin{pmatrix} m_{i1} & 0 & 0 & \cdots & 0 & \cdots & 0 \\ 0 & m_{i1} & m_{i2} & \cdots & 0 & \cdots & 0 \\ . & . & . & \cdots & . & \cdots & 0 \\ 0 & 0 & 0 & \cdots & m_{i1} & \cdots & m_{iT-2} \end{pmatrix}$$

and $\Delta u_i = (\Delta u_{i3}, \Delta u_{i4}, ..., \Delta u_{iT})'$.

The coefficients of the model will be estimated from minimizing the following criterion:

$$S = argmin\left(\frac{1}{N}\sum_{i=1}^{N}\Delta u_i' Z_i\right)\hat{\Omega}^{-1}\left(\frac{1}{N}\sum_{i=1}^{N} Z_i'\Delta u_i'\right)$$

Where $\hat{\Omega}$ is a consistent estimator of $\Omega = E(Z_i \Delta u_i \Delta u_i' Z_i)$. Under assumption that u_{it} is iid over time, $\Omega = E(Z_i \Delta U_i \Delta U_i' Z_i') = \sigma_u^2 E(Z_i H Z_i')$, where H is the (T-2)x(T-2) matrix with 2's on the main diagonal, -1's on the first off-diagonals and zeros elsewhere. If we use this H matrix to estimate α, this method is called the first stage GMM estimators.

Next, if we use the residuals estimated from the first-stage to calculate

$$\hat{\Omega} = N^{-1}\Sigma_{i=1}^{N} Z_i \Delta\hat{u}_i \Delta\hat{u}_i Z_i'$$

Using this, we can estimate α again. This is a second-stage GMM estimator.

The first stage estimators are only right when u_{it} is *iid*. So, if the disturbances are heteroskedastic, the two step estimator is more efficient. However, simulation studies (Arellano and Bond (1991) and Blundell and Bond (1998)) have suggested that the asymptotic standard errors for the one-step estimator appear to be more reliable for making inferences in small samples. Windmeijer (2005) also found this issue and proposes a finite-sample correction for the asymptotic variance of the two-step GMM estimator.

When there are other explanatory variables in the model, we still use the above method to estimate the model. In this case, different assumptions about the properties of x_{it} will imply different sets of moment conditions. Assume we have the dynamic model with explanatory variable X as follow:

$$\Delta m_{it} = \alpha \Delta m_{it-1} + \beta \Delta x_{it} + \Delta u_{it}$$

If X regressors are strictly exogenous, they are used as instruments for themselves. As a result, we have the moment conditions:

$$E[m_{it-s}\Delta u_{it}] = 0 \; s \geq 2 \text{ and } t = 3 \dots T$$
$$E\left[x_{i,s}\Delta u_{it}\right] = 0 \; s = 1 \dots T \text{ and } t = 3 \dots T$$

If X regressors are predetermined or weakly exogenous variables, regressors are correlated with past errors but uncorrelated with future errors: $E(x_{it}u_{is}) \neq 0$ for $s < t$ and $E(x_{it}u_{is}) = 0$ for $s \geq t$. These regressors can be instrumented in the same way that m_{it-1} is instrumented using subsequent lags of m_{it-1}. Specially, x_{it} is instrumented by $x_{it-1}, x_{it-2}, ...$

$$E[m_{it-s}\Delta u_{it}] = 0 \; s \geq 2 \text{ and } t = 3 \ldots T$$
$$E[x_{i,t-s}\Delta u_{it}] = 0 \; s \geq 1 \text{ and } t = 3 \ldots T$$

Finally, if a regressor is contemporaneously endogenous: $E(x_{it}u_{is}) \neq 0$ for $s \leq t$ and $E(x_{it}u_{is}) = 0$ for $s > t$. Now, $E(x_{it}u_{is}) \neq 0$, so x_{it-1} is no longer a valid instrument in the first difference model. The instrument for x_{it} are now $x_{it-2}, x_{it-3}, ...$

$$E[m_{it-s}\Delta u_{it}] = 0 \; s \geq 2 \text{ and } t = 3 \ldots T$$
$$E[x_{i,t-s}\Delta u_{it}] = 0 \; s \geq 2 \text{ and } t = 3 \ldots T$$

3.2.2 System GMM

Arellano and Bover(1995) and Blundell and Bond(1998) found that lagged levels $m_{i,t-2}, ..., m_{i,1}$ are instruments for $\Delta m_{i,t-1}$ become weak instrument if the endogenous variable is highly persistent (.i.e the case of unit root). Instrument weakness influences the asymptotic and small-sample performance of the difference estimator. Asymptotically, the variance of the coefficient rises. To reduce the potential biases and imprecision associated with the usual difference estimator, above studies use additional moment conditions built from the regression in levels. Assume that we have AR(1) level model:

$$m_{it} = \alpha m_{it-1} + u^*_{it}$$

where $u^*_{it} = \nu_i + u_{it}$. In this model, we showed that m_{it-1} is correlated to ν_i, so estimators are biased. However, under the assumption that the series is stationary, Blundell and Bond (1998) find that although there may be correlation between the levels of the right hand side variables and the country-specific effect in equation, there is no correlation between the differences of these variables and the country-specific effect. This implies that Δm_{it-1} are valid instruments for the equation in levels. So, if u_{it} is not autocorrelated, then Δm_{it-1} are not correlated with $\nu_i + u_{it}$ and are instruments for $m_{i,t-1}$. From that, we have $T-2$ additional moment conditions

$$E(\Delta m_{it-1}(\nu_i + u_{it})) = 0 \tag{10}$$

As a result, coefficients are estimated based on the moment conditions from (9) and (10). We call this method to be system GMM estimator.

In Monte Carlo studies of Arellano and Bover (1995) and Blundell and Bond (1998), they show that system GMM estimator perform much better than the first-difference GMM, especially when series are persistent (close to unity). The finite sample bias in system GMM is dramatic reduction in comparison with the first difference GMM estimator.

The above GMM estimator performs better when T is small (absolute and relative to N). As the number of periods (T) increases, more and more instruments become available. This instrument proliferation can cause many issues: over-fitting endogenous variables and imprecise estimates of the optimal weighting matrix. These issues can lead to severe downward bias in GMM estimators and weakened specification test (Hansen test).

Until now, there is no general rule to determine what is a relatively safe number of instruments. Most researchers have used two main techniques to limit the number of instruments (Roodman (2009)). The first is to use only certain lags instead of all available lags for instruments. The other one is to reduce the number of instruments by choosing linear combinations of the moment conditions rather than treating them as separate (collapsing).

3.2.3 Biased corrected LSDV estimator

Fixed effect estimators (or LSDV) are biased, but it often has a smaller MSE than GMM estimators. Therefore, if the bias of this estimator could be estimated and used to correct the estimate, this method called biased corrected LSDV estimator may be superior to GMM estimators. Judson and Owen (1999) showed this result. Their study results strongly supports the biased corrected LSDV estimator (LSDVC) compared to GMM estimators when N is small. This method uses consistent estimators such as Anderson and Hsiao (1981) or above GMM estimators to estimate the bias of LSDV.

3.2.4 Specification tests

Consistency of the GMM estimator depends on the validity of instruments. To address this issue we consider two specification tests suggested by Arellano and Bond (1991). First, we test the overall validity of the instruments since the moment conditions exceed estimated parameters. From that, we need to test the consistency of the set of instruments used. To test this, we use a Hansen-Sargan test

$$S = \left[\sum_{i=1}^{N} Z_i'(u_i)\right]' \hat{\Omega}^{-1} \left[\sum_{i=1}^{N} Z_i'(u_i)\right]$$

Under the null that instruments are valid, the Hansen-Sargan statistic S is distributed as a chi-squared with $H-K$ degrees of freedom. If errors are homoskedastic, the models are estimated by the first-stage GMM, and the S statistic is calculated from H matrix mentioned the above. In this case, S is called the Sargan test. If errors are not homoskedastic, the models are estimated by the second-stage GMM and S is based on the weighting matrix and called a Hansen test. The intuition behind these tests is that if the moment conditions hold, then the sample moments when evaluated at the parameter estimators should be close to 0. From that, when the value of S is small (p_{value} is large), we should accept the null hypothesis. Limitations of these tests are that Hansen test's size is distorted as the number of instruments grows, while the Sargan test is not appropriate if homoskedasticity fails.

In addition, consistency of estimators depends crucially on the assumption that $u_{i,t}$ is not serially correlated. If serial correlation exists, then some of our instruments will be invalid and the moment conditions used to identify parameters will not hold. If no serial correlation in the $u_{i,t}$, then the first-differenced residuals should display negative 1st-serial correlation but not 2nd-order serial correlation. Arellano and Bond (1991) give tests of 1st and 2sd-order serial correlation based on the residuals from the two-step estimator of the first-differenced equation.

3.3 The extensive and intensive margins of trade

Feenstra (1994), in studying the role of new varieties in price indexes, showed how to use the data of expenditure to measure the change of product varieties of each country across time. From this method, many studies have adopted it to compare the product varieties or export varieties across countries. Hummels and Klenow (2002) and Hummels and Klenow (2005) used this method to define the extensive margin of export of countries[6]. In addition, they also introduce a method to measure the intensive margin of exports across countries. In this paper, we will use the approach of Hummels and Klenow (2002) to measure the extensive and intensive margins of import and export of countries across time.

Using the method of Feenstra (1994), Hummels and Klenow (2002) define the intensive and extensive margins of import of country j from all exporters in a year t as follows:

$$IM_t^{j,imp} = \frac{M_t^j}{\sum_i \sum_{s \in I_t^{ij}} M_t^{iWs}}$$

$$EM_t^{j,imp} = \frac{\sum_i \sum_{s \in I_t^{ij}} M_t^{iWs}}{M_t^W}$$

Where M_t^j is the total value of import of country j from the world (W) in year t. I_t^{ij} is the set of

[6]Hummels and Klenow (2002), while Hummels and Klenow (2005) is a version published in the AER. Hummels and Klenow (2002) measures the extensive and intensive margins of countries at all destinations, while Hummels and Klenow (2005) measure them at each destination, then get the average value to represent countries

products exported from country i to country j. M_t^{iWs} is the import of product s of the world from country i (or export of product $s \in I_t^{ij}$ of country i to the world). $\sum_{s \in I_t^{ij}} M_t^{iWs}$ is the total value of import of the world from country i in products which country i exports to country j (or total export of products $s \in I_t^{ij}$ of country i to the world). M_t^W is the total import of the world from export of all countries i in year t.

We can illustrate above formulas by the following simple example: Assume that we have three countries in the world: i_1, i_2, i_3 and five products: $s_1, ..., s_5$. i_1 and i_2 are two export countries. Country i_1 exports three goods s_1, s_2, and s_3 to the world with respective export values: $M_t^{i_1Ws_1}$, $M_t^{i_1Ws_2}$, and $M_t^{i_1Ws_3}$. Country i_2 exports two goods s_4 and s_5 to the world with respective export values: $M_t^{i_2Ws_4}$ and $M_t^{i_2Ws_5}$[7]. From that, total import of the world in year t is $M_t^W = M_t^{i_1Ws_1} + M_t^{i_1Ws_2} + M_t^{i_1Ws_3} + M_t^{i_2Ws_4} + M_t^{i_2Ws_5}$. Assume that country i_3 imports products s_1 and s_2 from country i_1 with respectively import value: $m_t^{i_1i_3s_1}$ and $m_t^{i_1i_3s_2}$ and imports product s_4 from country i_2 with import value $m_t^{i_2i_3s_4}$. Total import of country i_3 in year t is $M_t^{i_3} = m_t^{i_1i_3s_1} + m_t^{i_1i_3s_2} + m_t^{i_2i_3s_4}$. From that, the intensive margin of import of country i_3 is calculated

$$IM_t^{i_3} = \frac{m_t^{i_1i_3s_1} + m_t^{i_1i_3s_2} + m_t^{i_2i_3s_4}}{M_t^{i_1Ws_1} + M_t^{i_1Ws_2} + M_t^{i_2Ws_4}}$$

and the extensive margin of import of country i_3 is

$$EM_t^{i_3} = \frac{M_t^{i_1Ws_1} + M_t^{i_1Ws_2} + M_t^{i_2Ws_4}}{M_t^{i_1Ws_1} + M_t^{i_1Ws_2} + M_t^{i_1Ws_3} + M_t^{i_2Ws_4} + M_t^{i_2Ws_5}}$$

The extensive margins of import measured as above employ a weighted count of the number of categories to measure the extensive margins of import of countries in year t, where the weights are the world trade in each category. This weighted count measure for the extensive margin is more appropriate than the simple count because it allows varieties to be traded in unequal prices and quantities[8].

The intensive margin of import is measured by comparing the import value of a country with total import value of the world on similar products. For example, the intensive margin of import of country i_3 compares the value of imports of country i_3 with total import of the world on similar products (product s_1 and s_2 of country i_1 and product s_4 of country i_2).

[7] M is the import of the world

[8] We can measure exported (imported) varieties as a simple count of categories. However, this simple count assumes that varieties have equal prices and quantities and it gives the same weight to each variety

Similarly, we define the extensive and intensive margins of exports of a country i as follows:

$$IM_t^{i,exp} = \frac{X_i^t}{\sum_j \sum_{s \in I_t^{ij}} X_t^{Wjs}}$$

$$EM_t^{i,exp} = \frac{\sum_j \sum_{s \in I_t^{ij}} X_t^{Wjs}}{X_t^W}$$

Where $EM_t^{i,exp}$ and $IM_t^{i,exp}$ are the extensive and intensive margins of a exporter i in year t. X_i^t is the total value of export from i to the world in year t. I_t^{ij} is the set of products s exported from country i to country j. X_t^{Wjs} is the value of export of product s from the world to country j. $\sum_{s \in I_t^{ij}} X_t^{Wjs}$ is the total value of export of the world to country j in products which country i exports to country j ($s \in I_t^{ij}$). X_t^W is the total export of all countries.

To illustrate formulas in this case, we use the above similar example with assumptions that country i_1 imports products s_4 and s_5 from the world with import values: $X_t^{Wi_1s_4}$ and $X_t^{Wi_1s_5}$, country i_2 imports products s_1, s_2, and s_3 from the world with respectively import values $X_t^{Wi_2s_1}$, $X_t^{Wi_2s_2}$, and $X_t^{Wi_2s_3}$, country i_3 imports products s_1, s_2, and s_4 from the world with respectively import values $X_t^{Wi_3s_1}$, $X_t^{Wi_3s_2}$, and $X_t^{Wi_3s_4}$. Total export of the world is $X_t^W = X_t^{Wi_1s_4} + X_t^{Wi_1s_5} + X_t^{Wi_2s_1} + X_t^{Wi_2s_2} + X_t^{Wi_2s_3} + X_t^{Wi_3s_1} + X_t^{Wi_3s_2} + X_t^{Wi_3s_4}$. Assume that country i_1 exports products s_1, s_2, and s_3 to country i_2 with export values: $x_t^{i_1i_2s_1}$, $x_t^{i_1i_2s_2}$, and $x_t^{i_1i_2s_3}$. Country i_1 exports s_1 and s_2 to country i_3 with export values: $x_t^{i_1i_3s_1}$ and $x_t^{i_1i_3s_2}$. Total export of country i_1 to the world is $X_t^{i_1} = x_t^{i_1i_2s_1} + x_t^{i_1i_2s_2} + x_t^{i_1i_2s_3} + x_t^{i_1i_3s_1} + x_t^{i_1i_3s_2}$. As a result, the intensive margin of export of country 1 is

$$IM_t^{i_1} = \frac{x_t^{i_1i_2s_1} + x_t^{i_1i_2s_2} + x_t^{i_1i_2s_3} + x_t^{i_1i_3s_1} + x_t^{i_1i_3s_2}}{X_t^{Wi_2s_1} + X_t^{Wi_2s_2} + X_t^{Wi_2s_3} + X_t^{Wi_3s_1} + X_t^{Wi_3s_2}}$$

and the extensive margin of export of country i_1 is calculated

$$EM_t^{i_1,exp} = \frac{X_t^{Wi_2s_1} + X_t^{Wi_2s_2} + X_t^{Wi_2s_3} + X_t^{Wi_3s_1} + X_t^{Wi_3s_2}}{X_t^{Wi_1s_4} + X_t^{Wi_1s_5} + X_t^{Wi_2s_1} + X_t^{Wi_2s_2} + X_t^{Wi_2s_3} + X_t^{Wi_3s_1} + X_t^{Wi_3s_2} + X_t^{Wi_3s_4}}$$

The extensive and intensive margins of export measured as above are also explained similarly as in the case of import. The extensive margin of exports employs a weighted count of the number of categories to measure the extensive margins of countries in year t with the weights to be the world trade in each category. The intensive margin of export of a country compares the export value of this country with the export value of the world on similar products at similar destinations.

From the above results, the approach method to calculate the extensive margin of import (or export) of countries implies that export varieties to different countries are different varieties (of course imports from different countries are different varieties).

The above methods calculate the extensive and intensive margins across countries at a year (t). To compare the extensive and intensive margin across countries and across years (panel data), we have some changes from the above formulas. For instance, to compare the extensive margin of import of country i_3 across years, we will use the average import value of each product of the world from each exporter. For example, instead of using $M_t^{i_1Ws_1}$, the export of product s_1 of country i_1 in year t to the world, we will use the average export value of product s_1 of country i_1 to the world in a year ($M^{i_1Ws_1} = \frac{\sum_{t=1}^{T} M_t^{i_1Ws_1}}{T}$). As a result, the extensive margin of country i_3 at year t can be written:

$$EM_t^{i_3} = \frac{M^{i_1Ws_1} + M^{i_1Ws_2} + M^{i_2Ws_4}}{M^{i_1Ws_1} + M^{i_1Ws_2} + M^{i_1Ws_3} + M^{i_2Ws_4} + M^{i_2Ws_5}}$$

and the intensive margin of country i_3 is

$$IM_t^{i_3} = \frac{m_{s_1t}^{i_1i_3} + m_{s_2t}^{i_1i_3} + m_{s_4t}^{i_2i_3}}{M^{i_1Ws_1} + M^{i_1Ws_2} + M^{i_2Ws_4}}$$

Assume that country i_3 only import products s_1 and s_2 from country i_1 in year $t-1$. Then, the extensive margin of import of country i_3 in year $t-1$ is

$$EM_{t-1}^{i_3} = \frac{M^{i_1Ws_1} + M^{i_1Ws_2}}{M^{i_1Ws_1} + M^{i_1Ws_2} + M^{i_1Ws_3} + M^{i_2Ws_4} + M^{i_2Ws_5}}$$

and the intensive margin of import of country i_3 in year $t-1$ is

$$IM_{t-1}^{i_3} = \frac{m_{s_1t-1}^{i_1i_3} + m_{s_2t-1}^{i_1i_3}}{M^{i_1Ws_1} + M^{i_1Ws_2}}$$

$EM_t^{i_3}$ which is calculated by this method is clearly the extensive margin of import of country i_3 in year t since the change of EM across time or across countries depend on the number of varieties which this country imports at time t. IM measured as in this case is the intensive margin of import of the country since its dominator is the world import which is fixed for each products in period T, so IM measured the above is still the intensive margin of imports of countries across years.

We can write general formulas for the case of panel data follows:

$$IM_t^{j,imp} = \frac{M_t^j}{\sum_{i \neq j} \sum_{s \in I_t^{ijs}} M^{iWs}} \tag{11}$$

$$EM_t^{j,imp} = \frac{\sum_{i \neq j} \sum_{s \in I_t^{ijs}} M^{iWs}}{M^W} \tag{12}$$

Where M^{iWs} is the average import value of product s of the world from the country i in period T. The average import of the world in period T is $M^W = \sum_i \sum_{s \in I^{iW}} M^{iWs}$.

These formulas are similar for the case of export of countries. From above formulas, the product of intensive and extensive margin of import of a country is the ratio of import of countries in the world import.

$$IM_t^{j,imp} EM_t^{j,imp} = \frac{M_t^j}{\sum_j \sum_{s \in I_t^{ij}} M_t^{iWs}} \frac{\sum_i \sum_{s \in I_t^{ij}} M_t^{iWs}}{M_t^W} = \frac{M_t^j}{M_t^W}$$

We can thus decompose the import of a country into the extensive and intensive margin of imports. It is similar for the case of export of countries. We also can decompose the volume of export of a country into the extensive and intensive margins of export of a country, then the product of the extensive and intensive margins of export of countries as follows:

$$IM_{i,exp}^t EM_{i,exp}^t = \frac{X_t^i}{X^W}$$

We use this approach to calculate the extensive and intensive margins of exports (and imports) of countries.

4 Data and Results

4.1 Data

Our model has five explanatory variables: lagged dependent variable and four other explanatory variables: real GDP, real effective exchange rate, trade duties, and trade liberalization. We choose 22 countries with the most available data from 1975 to 1997 to build the sample (Table 1).

- The extensive (EM) and intensive (IM) margins of import (export) are calculated by formulas (11) and (12) for the data of trade flows of all countries from 1975 to 1997 classified at 4-digit SITC. This data is got from Feenstra et al. (1997). The value and the intensive margin of import and export of countries are deflated at constant price 1995.

- Real GDP of countries (at constant prices 1995) is from World Development Indicator (2002) ($gdp95$). We use the weight average GDP of countries which have trade relationships with the export country to represent world GDP of the export country. The weights are based on the export value of the export country to its partners.

Table 1: Countries in the sample

	Country	Year of liberalization	Available data
	South Asia		
1	India	1991	1975-1997
2	Pakistan	1991	1975-1997
3	Sri Lanka	1990	1975-1997
	Africa		
4	Cameroon	1991	1980-1997
5	Cote d'Ivoire	1994	1981-1997
6	Ghana	1987	1983-1997
7	Malawi	1988	1980-1990
8	Morocco	1984	1980-1997
9	South Africa	1990	1976-1997
10	Tunisia	1989	1976-1997
	Latin America		
11	Colombia	1991	1975-1997
12	Costa Rica	1990	1977-1997
13	Dom. REp.	1992	1980-1997
14	Ecuador	1991	1976-1994
15	Mexico	1986	1979-1997
16	Paraguay	1991	1980-1993
17	Uruguay	1985	1980-1997
18	Venezuela	1991	1980-1997
	East Asia		
19	Indonesia	1986	1981-1997
20	Korea	1990	1976-1997
21	Malaysia	1988	1975-1997
22	Philippines	1986	1977-1997
23	Thailand	1986	1975-1997

Source: Years of liberalization are got from Santos-Paulino and Thirlwall (2004), Sachs et al. (1995), and Wacziarg and Welch (2008)

- The real effective exchange rate is from World Development Indicator (2002) and Bahmani-Oskooee and Mirzai (2000)(*reer*).
- Export duty (*eduty*, % of exports) and import duties (*iduty*, % of imports) are from World development indicators (2002). Export duties include all levies collected on goods at the point of export. Import duties comprise all levies collected on goods at the point of entry into the country.
- Trade liberalization (*lib*): it is a dummy variable to represent the year which countries reformed significantly their trade policies. Information for trade liberalization is got from Santos-Paulino and Thirlwall (2004), Sachs et al. (1995), and Wacziarg and Welch (2008).

4.2 Data analysis

In this part, we will discuss generally about the relationship **between export, import, and their margins and** trade liberalization.

Table 2 (Appendix) presents the changes of import duties, import, and the extensive and intensive margins of import of countries before and after trade liberalization. These results are calculated

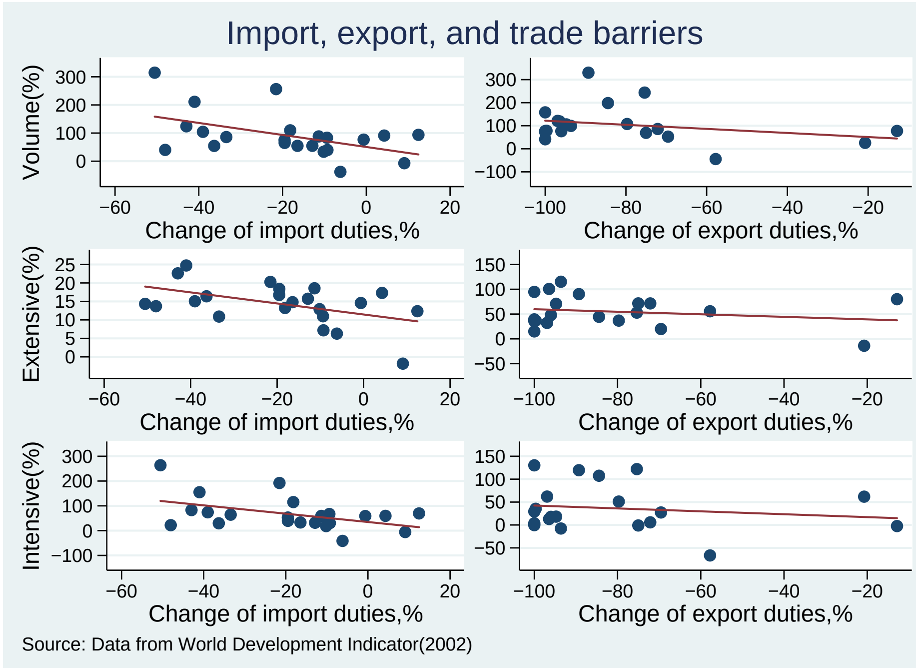

Figure 1: Export, import, and trade barriers

based on the average values of countries before and after trade liberalization episode. The tariff barriers of most of countries go down after the trade liberalization episode. There seems to be a negative relationship between the increase of import (also the extensive and intensive margin of import) and the decrease of tariff barriers across countries: It means that countries with a bigger decrease of tariff barriers have a greater increase of imports (Figure 1). There are some exceptions such as Cameroon, Indonesia, and Philippines: the import tariffs of these countries increased (or didn't decrease) after trade liberalization. Causes can be that these countries remove non-tariff barriers and covert these restrictions into tariffs, so their tariff barriers increased. The import tariff barriers of countries in Latin America and East Asia reduce the most after liberalization. The average tariff of countries in Latin America reduced from 12.46% per year pre-liberalization to 9% per year post-liberalization. These shares in countries of East Asia are from 9.69% to 7.76%. Countries in South Asia and Africa also have the reduce of tariff barriers, but the import tariffs of these countries are still high after trade liberalization (21.65% for South Asia and 17.01% for Africa). Consequently, the changes of import and the margins of import seem to be consistent with the changes of import tariff across regions: The import and the margins of import of countries in East Asia increased the most, while these in Africa increase the lowest. Beside, trade liberalization seems to have stronger influence on the intensive margin of import than on the extensive margin of import: the increase of the intensive margin of imports is larger than the one of the extensive margin of import across all regions.

From the results of import, we can see that countries which still maintain high import duties after trade liberalization seem to have lower increase of import and its margins. To examine this result, we use the index of economic freedom of The Heritage Foundation to divide groups according protective levels[9]. Based on the trade policies, the Heritage Foundation has classified countries into 5 protective categories: very low, low, moderate, high, and very high protection (Santos-Paulino (2002)). To test whether the impact of trade liberalization on import of countries depend on the protection levels of countries we use this index to divide countries into two groups: low protective group including countries with very low, low, moderate protection levels and high protective group including countries with high and very high protection. The results in table 3 say that the import increase of countries in high protective group is much lower than that of countries in low protective group. This can be explained a part of tariffs barriers after trade liberalization: the average import duties of the low protective countries are 8.2%, while the average import duties of the high protective countries are 17.44%. The import of low protective group increases 128.48%, while the import of high protective group increases only 46.95%. The increase of the extensive margin of imports of two groups is not much different (16% and 12%), but the increase of the intensive margin of imports are very different (98.21% and 29.58%). From this result, the trade barriers are real impacts on the increase of import and its margins after trade liberalization. In addition, trade barriers seem to have stronger effects on the increase of the intensive margin of import.

In the case of exports, liberalization reduced export duties to virtually nothing for most countries (table 4). As a result, the average export of countries for per annum in post liberalization episode increased 105% in comparison with the one in pre liberalization episode. The export of countries in East Asia increased the most, then countries in South Asia, and the export growth of countries in Africa is the lowest. In the case of import, the change of the intensive margin of import is larger than the one of the extensive margin of import in all regions. This is not right for the case of export: the change of extensive margin of export is larger than the one of the intensive margin of export for countries in Africa and Latin America. While, this result is contrast for countries in East Asia and South Asia. The disparity in the changes of the extensive and intensive margin of exports are lower than the one of imports.

Through above univariate analysis, trade liberalization appears to have impacts on the change of import, export, and their margins. Countries in East Asia seem to have the largest change in

[9]The Heritage Foundation has used institution factors to construct the index to measure the economic freedom of countries. The trade policies of countries is the one of the important keys to construct this index

import and export and countries in Africa seem to have the smallest change in import after trade liberalization. In addition, the change of import of countries seems to be explained more by the change of the intensive margin of import, while the change of export volume of countries seems to be explained by the quite equivalent change of both the extensive and intensive margin of export. This is only results of univariate analysis, these results can be exchanged when we add many other important control variables into the model: GDP and the real effective exchange rate.

4.3 Results of regression models

We use methods (fixed effects, difference GMM, and system GMM) discussed the above to estimate equations (3), (4), and (5) for import side and equations (6), (7), and (8) for export side.

In the methods of GMM, we will consider two cases: all explanatory variables are exogenous and all explanatory variables are endogenous. As discussed by previous studies, the first stage GMM estimators will give better statistical inference for small samples, so we will be priority to use the first stage GMM estimators to estimate models. However, in some cases, if the results of second stage GMM estimators are better, we will use the second stage GMM estimator to replace. Using all estimative methods mentioned, we will have total 6 regressions for each above model (2 fixed-effects, 2 difference GMM, and 2 system GMM regressions).

The number of cross-section units are small relative to T. So, if all lagged values (from $t-2$ to before) are used to make instruments in GMM methods, this can cause downward biased estimators and weakened specification tests. As a result, instead of using all available instruments, we use a linear combination of moment conditions (The collapse of moment conditions) or a limitative number of lags to make instruments. We will use different groups of instruments to choose the regression results which satisfy specification tests most.

4.3.1 Import

Table 5 presents the regression results of the import case. The first six columns are results of import volume (equation 3), the next of six columns are the results of the extensive margin of import (equation 4), and the last six columns are the results of the intensive margin of import (equation 5). The regression results of each equation are quite consistent about signs across three methods, however, the results of the method of fixed effects and system GMM have better statistical significant than the one of difference GMM method.

The impacts of trade liberalization (Dummy variable, *lib*) on import and the extensive and intensive margins of import have predicted signs across all cases. Most of the cases are statistical significance. After trade liberalization, the total import increases 10.84%, the extensive margin of import increases 2.14%, while the intensive margin of import goes up to 8.8% according to the fixed-effects method. The results from system GMM method are quite similar with the results of fixed-effects methods. These results also say that the impact of trade liberalization on the intensive margin of import are stronger than the one on the extensive margin of import. This is consistent with above univariate analysis.

The effect of decrease of trade barriers (Import duties, $iduty$) on the intensive margin of import is more significant than on the extensive margin of import: the effect of this variable on the extensive margin of import has consistent signs across cases but not significantly different from zero in any cases (from column 7^{th} to column 12^{th} of table 5), while its impact on the intensive margin of imports have consistent signs and are significantly different from zero in some cases (from column 13^{th} to column 18^{th} of table 5). These results imply that import duties affect on the intensive margin of import more than on the extensive margin of import.

The change of real GPD has strong impact on the change of import, the extensive, and intensive margins of import across regressions. The change of real GDP has stronger impact on the change of the intensive margin of import than on the change of the extensive margin of imports. The effects of relative prices (the real effective exchange rate) on import and its margins are not consistent and are not statistically significant across regression models.

The hypotheses of Melo and Vogt (1984) are also tested in this paper[10]. To test these hypotheses, we add two variables: $lgdp95 * lib$ and $lreer * lib$ into the regressions. However, the coefficients to represent two hypotheses are not statistically significant and the signs of these coefficients are not consistent across different estimator specifications.

From the above univariate analysis, we showed the growth of import and its margin are different across regions (South Asia, Africa, Latin America, and East Asia) and protective levels of countries (low and high protective groups): countries in East Asia has the strongest change of import and its margins after trade liberalization, while countries in Africa has the lowest growth of import after trade liberalization. Countries with low protection has stronger change of import and its margin after trade liberalization. Since the number of countries in each region is small relative to the number of years, we only use the corrected fixed effects method and fixed effect method to perform the regressions[11]. Table (7) presents regression results for regions and table (8) shows regression

[10]First, the degree of import liberalization increases, the income elasticity of demand increases. Second, as economics development proceeds, the price elasticity of import demand also rises as the ability to substitute domestic production for import become easier.

[11]Santos-Paulino (2002) and Santos-Paulino and Thirlwall (2004) used TSCS method to regress for small samples, we tried to use it, however results are not better

for protective groups. Most of impacts of trade liberalization on import and its margins are not statistical significance and the predicted signs are not consistent across regions. Only the effect of trade liberalization on the intensive margin of import and import for the East Asian countries have predicted signs and statistical significance.

The results of regressions according to protective levels confirm the prediction of univariate analysis: trade liberalization in countries with low protection has stronger effects on import and its margins. The import and the extensive and intensive margins of import of countries with low protection increases respectively by 16%, 3%, and 12.7%. All these impacts are statistically significant at 1%. Import of countries with high protection only increases 2.6% without statistical significance. The high tariff barriers of these countries after trade liberalization can be causes to explain these results. The effect of change in import duties on import and its margins have predicted signs, but not have statistical significance in any cases for both groups.

4.3.2 Export

Similar for the case of import, we also use 3 estimative methods (fixed effects, difference GMM, and system GMM) for each regression equation: (6), (7), and (8). The results are presented in table 6.

The impacts of the trade liberalization (dummy variable *lib*) on export and its margins have expected signs with high statistical significance in most of cases. For instance, in the normal fixed-effects method, the export, the extensive and intensive margins of exports increase respectively by 13%, 9.6%, and 10.1%. The effect of trade liberalization on the extensive and intensive margins of export have quite similar significance. This is different with the case of import where the impact of trade liberalization on the intensive margin of import is stronger than on the extensive margin of import.

The impacts of export tariffs (*eduty*) on export and its intensive margins have unexpected sign and have statistical insignificance in many cases. While, the impact of this variable on the extensive margin of export have predicted signs in all cases and have statistical significance in some case. This result seem to be opposite with the result of import duties which affect stronger on the intensive margin of import than on the extensive margin of import.

The results of the univariate analysis says that export of countries in East Asia increases the most and the export of Africa countries increase the lowest after trade liberalization. Similarly with the case of import, we use the fixed effect methods to perform the regressions for regions. Table 9 presents the results of the normal fixed-effects method. The impact of trade liberalization and export tariffs on export and its margins are noticeable differences between regions.

The impact of trade liberalization on export appears to have been the greatest in Africa (22%) with statistical significance of 1%, then countries in South Asia (14.225%) with statistical significance of 10%. The increase of export of African countries is explained by the increase of both the extensive and intensive margins of export (The extensive margin of export increases 13.54% with statistical significance of 5% and the intensive margin of export increase 14.68% with statistical significance of 10%). While, the increase of export of South Asia countries are essentially explained by the increase of the intensive margin of export (but without statistical significance). The export of countries in South America and East Asia also increase after trade liberalization, but with low statistical significance. The increase in total export of countries in South America seems to essentially explained by the increase of the extensive margin of export, while the increase of export of countries in East Asia seems to be explain by the increase of the intensive margin of export more (these results are low statistical significance).

The export duties has the most significant effect for countries of East Asia. In these countries, the decrease of export tariffs induces the increase of the intensive margin of export more than the increase of the extensive margin of export. For other regions, the export tariffs seem to not have any impact on export and its margins.

These results of regression models for regions are contrast with the predictions of univariate analysis. However, these results are not real consistent: when we exclude some countries in the sample which have export duties to be zero both before and after liberalization (.i.e Korea, Venezuela), the increase of export of East Asia seems to be the highest. In addition, we think that the regression results for regions are not really believable since the sample for each region is small.

4.4 A comparison with the results of Santos-Paulino (2002) and Santos-Paulino and Thirlwall (2004)

We use sample and approach quite similar with Santos-Paulino (2002) and Santos-Paulino and Thirlwall (2004), but our results for the effects of trade liberalization on the volume of import and export are not similar complete with their results.

Santos-Paulino (2002) studies the effect of trade liberalization on import growth. Santos-Paulino and Thirlwall (2004) study the effect of trade liberalization not only on import growth but on export growth and trade balance. The sample and approach method of Santos-Paulino and Thirlwall (2004) is similar complete with Santos-Paulino (2002). These papers showed that trade liberalization leads to the growth of import and export of countries. In addition, they show that the hypotheses of Melo and Vogt (1984) are right in their studies and the impact of liberalization on import and export growth appears to have been the greatest in Africa.

Two final results are not consistent with our result. What causes explain these differences? They use import and export demand functions to study the impact of liberalization on the import and export growth but there are some different points with our approach: instead of taking logarithm the import (export) demand function and add trade liberalization variables into the regressions like our approach. Above studies use import (export) growths ($\frac{M_t - M_{t-1}}{M_{t-1}}$)and GDP growth ($\frac{GDP_t - GDP_{t-1}}{GDP_{t-1}}$) in models, they use absolute values for other variables (not taking logarithm). We think these can be main causes to explain inconsistences.

5 Conclusion

This paper has examined the impacts of trade liberalization and trade barriers on the extensive and intensive margin of import and export for 22 developing countries. We use trade flows at 4-digit SITC and the method of Hummels and Klenow (2002) to measure the extensive and intensive margin of import (export). This method considers products imported from different countries are different and products of a country exported to different countries are different.

Our study results show that the profound trade policy reforms (liberalization) have strong impact on both the extensive and intensive margin of trade. The impact of this trade reforms on the intensive margin of import is stronger than on the extensive margin of import. While, this impact on the intensive and extensive margin of export of these countries are quite similar. For trade barriers, import tariffs seem to have stronger impact on the intensive margin than on the extensive margin of imports, while export tariffs seem to have opposite results: it has stronger impact on the extensive margin of export than on the intensive margin of import. However, the impact of these trade barriers is not really strong since signs and statistical significance are not consistent across all cases.

We analyze these impacts according to regions. However, the results are not real significant. We think that small sample is one of main causes to explain this.

This paper supplies evidences to show that the trade liberalization affect significantly on the extensive margin of import and export of developing countries, while the normal adjustments of tariffs are unremarkable effects on the extensive margin of import and export. From these, we can withdraw some implications: first, the loss of social welfare of countries with trade barriers are larger than the normal deadweight loss since trade barriers impede the trade of some products. Second, since the normal adjustments of tariffs will not have significant impact on the change of the extensive margin of trade, developing countries should perform significant reforms in their trade policies to increase the extensive margin of trade and reduce loss of social welfare. The results of this paper are consistent with New trade theories (.i.e Melitz (2003)): not all products can be traded when trade barriers are moderate.

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Appendix

Table 2: Imports and trade liberalization of developing countries

country		Average values before liberalization				Average values after liberalization				% Change			
		Import duty	Import	Extensive	Intensive	Import duty	Import	Extensive	Intensive	Import duty	Import	Extensive	Intensive
South Asia													
India	1991	36.17	14971930	0.562	0.009	29.11	26235464	0.656	0.014	-19.51	75.23	16.74	52.99
Pakistan	1991	25.93	7050255	0.541	0.004	23.29	9417116	0.611	0.005	-10.17	33.57	12.92	18.35
Sri Lanka	1990	12.64	2324888	0.482	0.002	12.56	4106482	0.553	0.003	-0.63	76.63	14.58	58.89
Mean		*24.91*				*21.65*				*-10.10*	*61.81*	*14.75*	*43.41*
Africa													
Cameroon	1991	20.14	1246031	0.461	0.001	21.97	1157368	0.452	0.001	9.09	-7.12	-1.83	-5.68
Ghana	1987	26.67	991258	0.42	0.001	16.98	1530365	0.489	0.001	-36.32	54.39	16.39	29.67
Malawi	1991	23.51	465425	0.287	0.001	22.05	289208	0.305	0	-6.18	-37.86	6.29	-41.28
Morocco	1984	20.17	4653708	0.518	0.003	16.85	7194399	0.595	0.004	-16.43	54.59	14.8	33.02
South Africa	1990	5.48	12930391	0.585	0.008	4.77	19994698	0.677	0.01	-12.87	54.63	15.73	31.89
Tunisia	1989	24.11	4473587	0.479	0.003	19.41	7383446	0.567	0.004	-19.49	65.05	18.39	39.52
Mean		*20.01*				*17.01*				*-13.70*	*30.61*	*11.63*	*14.52*
Latin America													
Colombia	1991	14.88	5515269	0.507	0.004	8.49	12354724	0.621	0.007	-42.96	124.01	22.6	82.92
Costa Rica	1990	9.49	1847367	0.445	0.001	8.41	3474760	0.527	0.002	-11.35	88.09	18.56	59.36
Dom. REp.	1992	16.88	2708045	0.438	0.002	15.29	4964593	0.487	0.003	-9.38	83.33	10.98	67.16
Ecuador	1991	16.21	2792594	0.467	0.002	8.43	3914449	0.531	0.003	-48.02	40.17	13.7	22.13
Mexico	1986	8.07	27913240	0.546	0.017	4.92	57064528	0.629	0.03	-39.01	104.44	15.05	74.12
Paraguay	1991	6.68	886447	0.383	0.001	5.47	1858788	0.434	0.002	-18.17	109.69	13.23	115.16
Uruguay	1985	16.48	1228503	0.481	0.001	10.97	2282898	0.533	0.001	-33.42	85.83	10.91	64.45
Venezuela	1991	11.01	9001076	0.577	0.005	9.99	12576925	0.618	0.007	-9.28	39.73	7.18	30.64
Mean		*12.46*				*9.00*				*-26.45*	*84.41*	*14.03*	*64.49*
East Asia													
Indonesia	1986	4.15	14795376	0.598	0.008	4.66	28660872	0.672	0.014	12.45	93.72	12.36	69.53
Korea	1990	8.74	31315432	0.589	0.018	5.15	97413440	0.734	0.045	-41.01	211.07	24.73	155.13
Malaysia	1988	8.68	12606977	0.609	0.007	4.3	52274416	0.696	0.025	-50.52	314.65	14.35	263.88
Philippines	1986	14.01	9589641	0.563	0.006	14.61	18330970	0.66	0.009	4.28	91.15	17.31	59.58
Thailand	1986	12.87	11996639	0.58	0.007	10.1	42737584	0.697	0.021	-21.54	256.25	20.28	192.21
Mean		*9.69*				*7.76*				*-19.27*	*193.37*	*17.81*	*148.07*
All countries		**15.99**				**13.02**				**-18.72**	**90.13**	**14.35**	**65.96**

Source: World Development Indicator(2002)

Note: Results are average values of a year of import duties, imports, and its margins before and after trade liberalization. % change of these variables are from average values.

Table 3: Imports and protective levels of countries

Country	Import duties		ΔDuties	ΔImport	ΔExtensive	ΔIntensive
	Before(%)	After(%)	(%)	(%)	(%)	(%)
Low protection						
Malaysia	8.68	4.3	-50.52	314.65	14.35	263.88
Mexico	8.07	4.92	-39.01	104.44	15.05	74.12
Korea	8.74	5.15	-41.01	211.07	24.73	155.13
Paraguay	6.68	5.47	-18.17	109.69	13.23	115.16
Costa Rica	9.49	8.41	-11.35	88.09	18.56	59.36
Ecuador	16.21	8.43	-48.02	40.17	13.7	22.13
Colombia	14.88	8.49	-42.96	124.01	22.6	82.92
Venezuela	11.01	9.99	-9.28	39.73	7.18	30.64
Thailand	12.87	10.1	-21.54	256.25	20.28	192.21
Uruguay	16.48	10.97	-33.42	85.83	10.91	64.45
Sri Lanka	12.64	12.56	-0.63	76.63	14.58	58.89
Philippines	14.01	14.61	4.28	91.15	17.31	59.58
Average	**11.65**	**8.62**	**-25.97**	**128.48**	**16.04**	**98.21**
High protection						
Indonesia	4.15	4.66	12.45	93.72	12.36	69.53
South Africa	5.48	4.77	-12.87	54.63	15.73	31.89
Dom. REp.	16.88	15.29	-9.38	83.33	10.98	67.16
Morocco	20.17	16.85	-16.43	54.59	14.8	33.02
Ghana	26.67	16.98	-36.32	54.39	16.39	29.67
Tunisia	24.11	19.41	-19.49	65.05	18.39	39.52
Cameroon	20.14	21.97	9.09	-7.12	-1.83	-5.68
Malawi	23.51	22.05	-6.18	-37.86	6.29	-41.28
Pakistan	25.93	23.29	-10.17	33.57	12.92	18.35
India	36.17	29.11	-19.51	75.23	16.74	52.99
Average	**20.32**	**17.44**	**-10.88**	**46.95**	**12.28**	**29.52**

Source: World Development Indicator (2002)
Note: Results are average values of a year of import duties before and after trade liberalization. % change of import duties, imports, and its margins are from average values.

Table 4: Export and trade liberalization of some developing countries

country		Average values before liberalization				Average values after liberalization				% Change			
		Duty	Export	Extensive	Intensive	Duty	Export	Extensive	Intensive	Export duty	Export	Extensive	Intensive
South Asia													
India	1991	1.28	8436444	0.396	0.007	0.2	25163770	0.572	0.015	-84.45	198.27	44.45	107.51
Pakistan	1991	2.21	3248290	0.178	0.006	0	8380253	0.205	0.014	-100	157.99	15	130.25
Sri Lanka	1990	13.54	1523916	0.126	0.004	0.71	3136969	0.215	0.005	-94.76	105.85	70.73	18.28
Mean		*5.68*				*0.30*				*-93.07*	*154.04*	*43.39*	*85.35*
Africa													
Cameroon	1991	3.24	1547749	0.107	0.005	2.57	1946715	0.092	0.008	-20.74	25.78	-13.9	61.87
Ghana	1987	26.49	1962472	0.05	0.016	11.18	1088776	0.078	0.005	-57.77	-44.52	55.69	-66.45
Malawi	1991	0.48	293715	0.029	0.004	0	414927	0.04	0.004	-100	41.27	36.05	3.69
Morocco	1984	1.96	2512359	0.081	0.011	0.49	4249281	0.139	0.011	-75.01	69.14	71.5	-0.99
South Africa	1990	0.21	10262765	0.369	0.01	0	18150190	0.514	0.012	-100	76.85	39.28	29.47
Tunisia	1989	1.19	2347862	0.159	0.005	0.24	4870812	0.217	0.008	-79.7	107.46	36.77	51.17
Mean		*5.60*				*2.41*				*-72.20*	*46.00*	*37.57*	*13.13*
Latin America													
Colombia	1991	4.15	4943348	0.138	0.012	0.15	10821440	0.276	0.014	-96.44	118.91	100.63	13.1
Costa Rica	1990	7.94	1473110	0.072	0.007	2.21	2737605	0.123	0.008	-72.13	85.84	71.43	5.83
Dom. REp.	1992	2.76	1909658	0.094	0.007	0.01	3400490	0.128	0.009	-99.67	78.07	36.8	35.36
Ecuador	1991	1.65	2162259	0.059	0.013	0.11	4308120	0.127	0.012	-93.61	99.24	115.18	-7.64
Mexico	1986	1.97	23230100	0.37	0.022	0.06	51322068	0.489	0.035	-96.93	120.93	32.18	62.07
Paraguay	1991	0.24	532302	0.018	0.011	0	922789	0.034	0.011	-100	73.36	94.73	-0.32
Uruguay	1985	1.4	1269110	0.1	0.004	0.43	1938094	0.12	0.006	-69.55	52.71	19.82	27.39
Venezuela	1991	0	9931852	0.201	0.018	0	16897422	0.248	0.024		70.13	23.21	33.98
Mean		*2.51*				*0.37*				*-89.76*	*87.40*	*61.75*	*21.22*
East Asia													
Indonesia	1986	0.56	21520516	0.23	0.033	0.49	38151944	0.415	0.032	-12.84	77.28	79.97	-2.33
Korea	1990	0	36445188	0.47	0.026	0	1E+08	0.623	0.056		174.95	32.53	115.86
Malaysia	1988	6.71	15552861	0.352	0.015	1.65	53459624	0.538	0.034	-75.36	243.73	52.86	121.95
Philippines	1986	1.38	7828094	0.237	0.011	0.06	13806387	0.351	0.013	-96	76.37	47.9	17.8
Thailand	1986	2.74	8358835	0.266	0.011	0.29	35950832	0.506	0.024	-89.29	330.09	90.24	119.61
Mean		*2.28*				*0.50*				*-68.37*	*180.48*	*60.70*	*74.58*
All countries		**3.67**				**0.93**				**-80.12**	**109.57**	**52.77**	**41.39**

Source: World Development Indicator(2002)

Note: Results are average values of a year of export duties, export, and its margins before and after trade liberalization. % change of these variables are from average values.

Table 5: Imports and trade liberalization of some developing countries

	Imports						Extensive margins of imports						Intensive margins of imports					
	Fixed effects		Difference GMM		System GMM		Fixed effects		Difference GMM		System GMM		Fixed effects		Difference GMM		System GMM	
VARIABLES	Normal	Corrected	Exog.	Endo.	Exog.	Endo.	Normal	Corrected	Exog.	Endo.	Exog.	Endo.	Normal	Corrected	Exog.	Endo.	Exog.	Endo.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
L.lagdep	0.649***	0.724***	0.339	0.624***	0.897***	0.920***	0.646***	0.727***	0.417***	0.469***	0.777***	0.882***	0.668***	0.755***	0.349***	0.603***	0.921***	0.923***
	(0.0390)	(0.0475)	(0.221)	(0.212)	(0.0570)	(0.0220)	(0.0384)	(0.0459)	(0.128)	(0.0828)	(0.0970)	(0.0227)	(0.0380)	(0.0480)	(0.0770)	(0.0524)	(0.0916)	(0.0223)
lgdp95(+)	0.408***	0.309***	0.952***	0.450	0.0931*	0.0776***	0.0739***	0.0529***	0.210***	0.120***	0.0244**	0.0129***	0.309***	0.216***	0.767***	0.416***	0.0641	0.0645***
	(0.0787)	(0.0788)	(0.363)	(0.275)	(0.0476)	(0.0201)	(0.0155)	(0.0146)	(0.0461)	(0.0372)	(0.0121)	(0.00295)	(0.0664)	(0.0682)	(0.112)	(0.0998)	(0.0660)	(0.0178)
lreer (-)	-0.0495	-0.0308	-0.0159	0.0491	-0.0221	-0.0335	-0.00919	-0.00823	-0.0127	-0.0103	-0.00474	-0.00217	-0.0338	-0.0128	-0.116**	-0.0415	-0.0118	-0.0306
	(0.0497)	(0.0521)	(0.193)	(0.141)	(0.0433)	(0.0422)	(0.0103)	(0.0112)	(0.0173)	(0.0179)	(0.0114)	(0.00876)	(0.0454)	(0.0480)	(0.0590)	(0.0625)	(0.0433)	(0.0388)
lduty (-)	-0.478	-0.441	-1.130	-0.352	-0.415**	-0.154	0.000257	0.00102	-0.000788	0.0104	0.0206	-0.0234	-0.471*	-0.436	-0.870**	0.158	-0.362**	-0.154
	(0.300)	(0.301)	(1.647)	(1.470)	(0.168)	(0.164)	(0.0654)	(0.0639)	(0.172)	(0.145)	(0.0866)	(0.0343)	(0.274)	(0.274)	(0.348)	(0.416)	(0.177)	(0.148)
lib (+)	0.103***	0.0959***	0.0917*	0.0853	0.0868***	0.0925***	0.0212***	0.0194***	0.0105	0.0321**	0.0213***	0.0133**	0.0844***	0.0779***	0.0990***	0.115***	0.0768***	0.0845***
	(0.0302)	(0.0304)	(0.0532)	(0.0662)	(0.0298)	(0.0258)	(0.00667)	(0.00672)	(0.00994)	(0.0154)	(0.00770)	(0.00576)	(0.0276)	(0.0277)	(0.0348)	(0.0388)	(0.0275)	(0.0234)
Constant	-2.363				1.228	-0.0556	-2.055***				-0.849	-0.281	-7.242***				-0.323	-1.401
	(2.225)				(0.789)	(0.818)	(0.545)				(0.518)	(0.185)	(2.335)				(1.876)	(0.852)
Observations	409	409	387	387	409	409	409	409	387	387	409	409	409	409	387	387	409	409
R-squared	0.842						0.830						0.812					
No. of countries	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
No. of instruments			61	268	45	341			45	175	23	341			43	175	14	341
Sargan (p_value)			1.22e-05	0.000273	0.288	0.646			0	1.16e-07	1.18e-07	0.131			9.58e-09	0.0156	0.681	0.748
Hansen (p_value)			1.000	1	.	.			0.996	1	0.390	.			.	.	.	.
AR(1)			0.101	0.0290	0	7.17e-11			0.0125	0.00405	0.00200	8.94e-10			5.39e-07	0	5.97e-11	1.19e-09
AR(2)			0.697	0.584	0.222	0.238			0.283	0.256	0.311	0.289			0.865	0.696	0.490	0.501
Wald test			0	0	0	0			0	0	0	0			0	0	0	0

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Exports and trade liberalization of some developing countries

	Exports						Extensive margins of export						Intensive margins of exports					
	Fixed effects		Difference GMM		System GMM		Fixed effects		Difference GMM		System GMM		Fixed effects		Difference GMM		System GMM	
VARIABLES	Normal	Corrected	Exog.	Endo.	Exog.	Endo.	Normal	Corrected	Exog.	Endo.	Exog.	Endo.	Normal	Corrected	Exog.	Endo.	Exog.	Endo.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
lagdep	0.703***	0.768***	0.789***	0.628***	0.674***	0.905***	0.579***	0.652***	0.425***	0.536***	0.323***	0.711***	0.594***	0.670***	0.613***	0.482***	0.561***	0.736***
	(0.0343)	(0.0355)	(0.0810)	(0.0400)	(0.0521)	(0.0377)	(0.0436)	(0.0486)	(0.0977)	(0.0463)	(0.1000)	(0.0500)	(0.0390)	(0.0434)	(0.151)	(0.0744)	(0.0717)	(0.0662)
lgdpw95 (+)	0.150***	0.113**	0.140	0.231***	0.319***	0.128	0.0808*	0.0644	0.106	0.130***	0.346***	0.0767	0.126**	0.102*	0.237**	0.464***	0.210***	0.107
	(0.0537)	(0.0553)	(0.114)	(0.0687)	(0.0538)	(0.0907)	(0.0417)	(0.0426)	(0.0835)	(0.0476)	(0.0553)	(0.0713)	(0.0548)	(0.0565)	(0.107)	(0.138)	(0.0377)	(0.0901)
lreer (+)	0.205***	0.196***	0.202**	0.191***	0.0919*	-0.0129	0.106**	0.0941**	0.152**	0.0895*	-0.0693*	-0.189**	0.121**	0.122**	0.129	-0.0108	0.119**	0.0318
	(0.0564)	(0.0509)	(0.0967)	(0.0604)	(0.0490)	(0.106)	(0.0431)	(0.0408)	(0.0678)	(0.0467)	(0.0364)	(0.0793)	(0.0599)	(0.0547)	(0.106)	(0.0849)	(0.0504)	(0.107)
lduty (-)	0.410	0.466	1.608	0.159	-1.570***	-1.014	-0.567	-0.466	-1.887***	-0.427	-2.287***	-2.816***	0.899*	0.867	2.975***	1.820*	-0.806*	-0.497
	(0.471)	(0.569)	(1.040)	(0.563)	(0.490)	(0.955)	(0.362)	(0.449)	(0.667)	(0.382)	(0.390)	(0.684)	(0.501)	(0.600)	(1.046)	(1.060)	(0.440)	(0.913)
lib (+)	0.130***	0.0957***	0.134**	0.162***	0.126***	0.0308	0.0922***	0.0738***	0.0976**	0.0969***	0.151***	0.0840**	0.0966***	0.0759***	0.134**	0.106**	0.0761**	0.0521
	(0.0334)	(0.0300)	(0.0623)	(0.0358)	(0.0352)	(0.0488)	(0.0248)	(0.0220)	(0.0395)	(0.0257)	(0.0311)	(0.0350)	(0.0319)	(0.0284)	(0.0625)	(0.0450)	(0.0318)	(0.0498)
Constant	-2.635				0.727	1.475	-0.285				-2.397*	9.069**	-9.620***				-4.643**	-2.286
	(3.167)				(1.865)	(5.376)	(2.459)				(1.352)	(3.630)	(3.396)				(1.834)	(5.313)
Observations	419	419	397	397	419	419	419	419	397	397	419	419	419	419	397	397	419	419
R-squared	0.815						0.683						0.548					
N. of countries	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
N. of inst.			43	341	27	97	.		43	363	27	97	.		25	96	15	97
Sargan (p_value)			0.0481	0.383	0.469	0.863	.		0.000	0.493	0.000	0.0151	.		0.496	0.901	0.0872	0.879
Hansen (p_value)			.	.	.	.	.		.	.	.	.	.		.	.	.	.
AR(1)			0	0	0	0	.		0.000	0	0.000	0	.		0.000	0	0.000	0
AR(2)			0.393	0.470	0.538	0.555	.		0.606	0.789	0.193	0.652	.		0.697	0.585	0.586	0.600
Wald test			0	0	0	0	.		0	0	0	0	.		0	0	0	0

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Import and its margins across regions

	South Aisa			Africa			Latin America			East Asia		
VARIABLES	Exports (1)	Extensive (2)	Intensive (3)	Exports (4)	Extensive (5)	Intensive (6)	Exports (7)	Extensive (8)	Intensive (9)	Exports (10)	Extensive (11)	Intensive (12)
lagdep	0.707***	0.746***	0.654***	0.397***	0.381***	0.394***	0.598***	0.429***	0.647***	0.741***	0.745***	0.783***
	(0.0752)	(0.0946)	(0.0812)	(0.0869)	(0.0906)	(0.0884)	(0.0717)	(0.0790)	(0.0675)	(0.0783)	(0.0705)	(0.0743)
lgdp95	-0.0592	0.0447	-0.0879	0.811***	0.227***	0.594***	0.843***	0.231***	0.590***	0.260**	0.0361	0.175
	(0.145)	(0.0467)	(0.127)	(0.208)	(0.0510)	(0.177)	(0.218)	(0.0443)	(0.179)	(0.128)	(0.0286)	(0.106)
lreer	0.263**	0.0257	0.251**	-0.0494	-0.0193	-0.0309	-0.107	-0.0232*	-0.0736	0.0417	-0.00690	0.0586
	(0.120)	(0.0294)	(0.113)	(0.133)	(0.0284)	(0.121)	(0.0807)	(0.0140)	(0.0711)	(0.0957)	(0.0300)	(0.0941)
lduty	0.0137	-0.00842	0.0397	-0.721	-0.131	-0.586	-0.613	-0.0237	-0.562	-0.0272	-0.0984	0.250
	(0.448)	(0.115)	(0.416)	(0.744)	(0.161)	(0.677)	(0.574)	(0.103)	(0.511)	(1.014)	(0.319)	(1.049)
lib	-0.00813	-0.0220	0.00967	0.0299	0.0248*	0.00530	0.0745	0.0226**	0.0631	0.136***	0.0137	0.121**
	(0.0824)	(0.0202)	(0.0770)	(0.0596)	(0.0131)	(0.0544)	(0.0593)	(0.0106)	(0.0531)	(0.0485)	(0.0155)	(0.0487)
Constant	7.391*	-1.056	1.387	-6.789	-5.226***	-14.99**	-11.67**	-5.927***	-13.91***	-1.851	-0.594	-6.272
	(3.918)	(1.456)	(3.969)	(5.947)	(1.527)	(5.974)	(5.409)	(1.201)	(5.271)	(6.053)	(2.130)	(6.193)
Observations	66	66	66	100	100	100	142	142	142	101	101	101
R-squared	0.858	0.890	0.788	0.581	0.742	0.464	0.804	0.837	0.782	0.966	0.896	0.953
Number of wb	3	3	3	6	6	6	8	8	8	5	5	5

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: the results estimated by normal fixed-effects method

Table 8: Import and its margin according to protective levels

	Low protection			High protection		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Import	Extensive	Intensive	Import	Extensive	Intensive
lagdep	0.562***	0.739***	0.563***	0.524***	0.460***	0.515***
	(0.0657)	(0.0597)	(0.0631)	(0.0646)	(0.0730)	(0.0645)
lgdp95	0.645***	0.0195	0.585***	0.588***	0.104***	0.511***
	(0.135)	(0.0185)	(0.115)	(0.152)	(0.0285)	(0.135)
lreer	-0.112	-0.00328	-0.0946	-0.00375	-0.00644	-0.00166
	(0.0676)	(0.0125)	(0.0576)	(0.0961)	(0.0174)	(0.0885)
lduty	-0.0478	-0.000791	-0.0432	-0.0701	-0.00935	-0.0619
	(0.0436)	(0.00798)	(0.0378)	(0.0605)	(0.0114)	(0.0556)
lib	0.151***	0.0299***	0.120***	0.0257	0.0210**	0.00556
	(0.0419)	(0.00846)	(0.0363)	(0.0466)	(0.00880)	(0.0428)
Constant	-11.28***	-0.647	-19.01***	-8.788**	-2.851***	-17.09***
	(2.866)	(0.500)	(3.450)	(3.607)	(0.758)	(3.950)
Observations	197	197	197	159	159	159
R-squared	0.875	0.821	0.876	0.681	0.715	0.629
Number of wb	12	12	12	10	10	10

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 9: Export and its margin across regions

	South Aisa			Africa			Latin America			East Asia		
VARIABLES	Exports (1)	Extensive (2)	Intensive (3)	Exports (4)	Extensive (5)	Intensive (6)	Exports (7)	Extensive (8)	Intensive (9)	Exports (10)	Extensive (11)	Intensive (12)
lagdep	0.552***	0.653***	0.593***	0.393***	0.234**	0.267***	0.631***	0.633***	0.416***	0.903***	0.808***	0.906***
	(0.0918)	(0.0783)	(0.0811)	(0.0886)	(0.107)	(0.0973)	(0.0665)	(0.0754)	(0.0736)	(0.0280)	(0.0470)	(0.0378)
lgdpw95	0.156	0.0487	0.0746	0.0516	0.278***	-0.198*	0.469***	-0.0289	0.589***	0.00506	0.0695	-0.0286
	(0.109)	(0.0519)	(0.102)	(0.0934)	(0.0994)	(0.107)	(0.142)	(0.100)	(0.145)	(0.0697)	(0.0507)	(0.0681)
lreer	0.420***	0.0549	0.323***	0.377**	0.0766	0.312*	0.0792	0.191**	-0.116	0.0434	0.110**	-0.0471
	(0.122)	(0.0667)	(0.116)	(0.163)	(0.149)	(0.176)	(0.102)	(0.0745)	(0.104)	(0.0607)	(0.0480)	(0.0629)
lduty	1.252**	-0.496	1.778***	0.209	-1.594	1.748	0.442	-1.366	1.523	-1.609**	-0.00971	-1.903**
	(0.566)	(0.307)	(0.602)	(1.263)	(1.167)	(1.367)	(1.364)	(0.982)	(1.388)	(0.741)	(0.578)	(0.724)
lib	0.133*	0.0186	0.100	0.201***	0.127**	0.137*	0.0861	0.114**	-0.0274	0.0826**	0.0381	0.0627*
	(0.0774)	(0.0357)	(0.0777)	(0.0738)	(0.0623)	(0.0705)	(0.0626)	(0.0502)	(0.0582)	(0.0335)	(0.0249)	(0.0325)
Constant	-3.972	0.495	-12.97**	5.198	-2.984	-7.224	-13.36	7.348	-32.45***	8.714**	-1.907	8.732**
	(5.607)	(2.860)	(6.235)	(5.884)	(5.493)	(6.308)	(9.180)	(6.628)	(9.452)	(4.291)	(3.374)	(4.335)
Observations	66	66	66	103	103	103	149	149	149	101	101	101
R-squared	0.928	0.908	0.852	0.587	0.388	0.314	0.726	0.701	0.364	0.983	0.948	0.954
Number of wb	3	3	3	6	6	6	8	8	8	5	5	5

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1