The Trade And Welfare Analysis Of The TPP*

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Abstract

This paper studies the effects of Trans-Pacific Partnership (TPP) on trade flows and welfare in a general equilibrium framework following the Eaton and Kortum (2002) model. Using comprehensive data including prices, wages, output, and bilateral trade in manufacturing for 38 countries including ASEAN and OECD members, we estimate each country's various parameters (e.g. openness, competitiveness, state of technology) and conduct calibrations. Our calibration results indicate that the TPP does not always improve all member countries' welfare, while outside countries may gain from positive externalities. It is found that accession to the TPP is not welfare-enhancing to Japan when labor is internally mobile between manufacturing and non-manufacturing, while Japan is better off from the TPP membership under labor immobility. It is also shown that the TPP benefits more countries, including both members and non-members, if Japan joins the TPP.

Key Words: Trade, technology, free trade agreements, welfare, TPP.
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1 Introduction

The Trans-Pacific Partnership (hereafter TPP) initiated with four members, aims to further liberalize the economies of the Asia-Pacific region and these ongoing negotiations include an expanded version of agreements and encompass a larger number of countries.[1] The negotiations have drawn criticism and support from various public groups, yet the welfare consequences remain unclear and uncertain.[2] Nevertheless, it is indisputable that the economic size of the TPP is significantly large if the US and Japan are engaged, and thus it requires a rigorous micro-funded analysis of its impact on countries' welfare and trade, especially including Japan who formally joined the negotiations most recently.

The objective of this paper is to evaluate the welfare and trade effects created by the accession of Japan to the TTP. One of the most common methods used by policy makers and economists to assess a trade policy is a computational general equilibrium (CGE) model which typically adopts the Armington (1969) model (e.g., Brown et al., 1992, Kehoe and Kehoe, 1994). However, this approach has been criticized because of its poor fit to the data and the complexity and difficulty in interpreting the results (see Wylie, 1995, Clausing, 2001, Kehoe, 2002). In this paper, we follow the model of Eaton and Kortum (2002) (hereafter EK), while explicitly introducing tariffs as an economic distance into the model as in Cheong et al. (2013).

The EK model incorporates geographic barriers into a Ricardian model with a continuum of goods in many countries. In this model, bilateral trade is related to distance, importing and exporting countries' GDPs, and comparative and absolute advantages, yielding an equation similar to the gravity model which is one of the most successful empirical trade models. The model also allows us to easily calculate welfare changes from trade using a simple expression of real income which depends on comparative advantage, a country's state of technology and import share. As the model provides theories to capture unobserved technologies (related to absolute and comparative advantages) and geographic barriers, one can estimate the parameters required to solve the equilibrium and implement counterfactual experiments to analyze trade policies. Based on these features, the EK model has been widely used in the literature, especially for the purpose of the assessment of trade policies.[3]

To conduct our analysis using comprehensive data including prices, wages, output, and bilateral trade in manufacturing for 38 OECD and ASEAN countries in year 2005.[4] We first estimate each coun-

[1]The TPP was previously known as the Pacific Three Closer Economic Partnership. New Zealand, Chile, Singapore, and Brunei were the initial members in 2005. In 2012, the US, Australia, Peru, Vietnam, Malaysia, Mexico, and Canada took part in the negotiations for the TPP. In 2013, Japan has also joined.

[2]In Japan, Ministry of Agriculture, Forestry and Fisheries, Ministry of Economy, Trade and Industry and the Cabinet Office separately estimated the effects of the TPP on Japan's GDP, in 2010. After these estimations, the government estimated the effects on GDP, again in March, 2013. For more details, see Cabinet Secretariat (2013).

[3]For example, Caliendo and Parro (2012) follow the EK model to quantify the welfare effects of NAFTA for the member countries (the US, Canada and Mexico) adding the sectoral linkage into the model. Dekle et al., (2007) use the EK model to assess the effect of elimination of current account imbalances on countries' welfare. Ramondo and Rodriguez-Clare (2012) also employ the EK model to measure the welfare gains from trade incorporating multinational production into the model. For a comprehensive survey, see Eaton and Kortum (2012).

[4]We do not include Brunei, Cambodia, Lao PDR, and Myanmar because of a lack of data. Furthermore, we do not include Singapore, as we could not separate trade flows into what is consumed within the country from what is just transferred from the country.

try's heterogeneity such as relative competitiveness, openness, and state of technology, and calibrate the model to see how differences in geographical distance, technology level, wages, or size of the labor force affect trade flows and welfare of countries under the TPP.

In our calibration we consider two different cases: internal mobile and immobile labor between manufacturing and non-manufacturing sectors. Under these two scenarios, we estimate countries' changes in welfare and trade flows which are further decomposed into substitution effects, income effects from changes in prices as well as from changes in nominal expenditures. We then illustrate how these effects are related to the welfare changes in other countries depending on the accession of Japan.

Somewhat surprisingly, our calibrations indicate that some potential TPP member countries' welfare may deteriorate because of a decrease in trade volume and/or a relatively large loss of tariff revenues. According to our results, the welfare and trade volume from member countries increases when Japan joins the TPP in the case of immobile labor where prices decrease much more than wages with a higher demand of Japanese products. However, if the labor is freely mobile where wages are fixed, Japan is worse off as it joins the TPP as trade volume increases.

Another interesting finding from our results is that unlike in a Vinerian world, some outside countries may benefit from positive externalities even if they do not join the TPP.[5] This is attributed to intermediate goods which generate gains in addition to the conventional gains from trade within a general equilibrium framework, by changing the prices (and wages in the case of immobile labor) of all countries trading with the TPP member countries.[6] Because of this effect in a general equilibrium, the TPP benefits both members and non-members, if Japan joins the TPP.

This paper contributes to the literature in several ways. First, to our knowledge, it is one of the few studies which provide rigorous evaluations of the TPP based on a method recently developed in the literature, while using comprehensive data sets which cover many countries. Second, it is also one of the first papers which specifically show that non-member countries may benefit from the positive externailities of member countries' trade liberalization, while indicating potential alternate welfare effects (welfare deterioration or improvement) to member countries, which depend on domestic economic situation (e.g. internal labor mobility).[7] Using the recent data, this paper also provides the estimates of relative price measures, openness, competitiveness and the state of technology of each of 38 countries which represent more than 90% of the world's trade.

The remainder of the paper is structured as follows. Section 2 summarizes the model on which

[5] Viner (1950) indicates that a preferential trade agreement (PTA) generates two different effects on welfare: one from newly created trade between members (trade creation effects) and the other from diverting trade from non- member countries to member countries (trade diversion effects). All else equal, trade diversion harms nonmember countries unambiguously. Cheong et al. (2013) propose a theoretical framework to analyze this positive externality within the EK model and show that outside countries possessing a large nonmanufacturing sector relative to the economy or a high level of technology are more likely to gain upon an establishment of a PTA.

[6] The importance of intermediate goods has been increasing in international trade. Feenstra and Hanson (1996) show that the share of imported intermediate inputs in the US increased from 5.3% to 11.6% between 1972 and 1990. Hummels et al. (2001) find that vertical specialization accounts for 21% of some OECD countries' and emerging markets, and it increased by around 30% between 1970 and 1990.

[7] Unlike in the literature where externality of a PTA is exogenous (e.g. Aghion et al., 2007, Burbidge et al., 1997) the externality in our model is endogenous, which arises as a property in a general equilibrium in the presence of intermediate goods.

our analysis is based. Section 3 describes the data while Section 4 explores the trade-price relationship empirically. Section 5 provides our main empirical results and Section 6 concludes.

2 The Model

This section consists of two parts. The first part explains the theoretical framework and the second part explains the estimation methodology.

2.1 The Theoretical Framework

In this section, we briefly explain the theoretical framework that we follow. The framework is based on Eaton and Kortum (2002).[8]

In our economy, there are N countries and we also denote the set of countries by $N := \{1, \cdots, N\}$. Within each country, there are two sectors of industries, manufacturing and non-manufacturing. We assume that there is a single non-manufactured good that serves as a numeraire and labor is the only input to the non-manufactured good while there is a continuum of manufactured goods, and the set of manufactured goods is $[0, 1]$. Manufactured goods use two inputs; labor and manufactured goods as intermediate goods.

Suppose that country n's efficiency in producing good j, $Z_n(j)$, is the realization of a random variable $\tilde{\mathcal{Z}}_n^j$, which is drawn independently for each j from its country-specific probability distribution, $F_n(z) = \Pr[\mathcal{Z}_n \leq z]$. Each F_n for $n \in N$ is given by the Fréchet distribution, $F_n(z) = \exp(-T_n z^{-\theta})$ where $z \geq 0$, $T_n > 0$ and $\theta > 1$. Then, we can think of T_n as country n's state of technology.

Now we explain how tariffs are incorporated in the model under the Iceberg assumption. We make the usual Samuelson's iceberg assumption in the model: Delivering a unit of each good from country i to country n requires producing a certain amount of the good ($\bar{d}_{ni}$ units) in country i. We denote a geographic barrier including tariffs from country n to country i by d_{ni}. Let t_{ni} denote an ad valorem tariff rate imposed on imports from country i by country n. It gives us $d_{ni} = (1 + t_{ni}) \cdot \bar{d}_{ni}$, where $t_{nn} = 0$ and $d_{nn} = 1$ for all n.

We assume that the law of large numbers holds and thus the country-specific distribution, $F_n(z)$ is also the fraction of goods for which country n's efficiency is below z. Under perfect competition, the price that consumers in country n actually pay for good j is the lowest across all source countries i:

$$p_n(j) = \min\{p_{ni}(j) : i \in N\}. \tag{1}$$

In country n, purchasing a unit of good j from country i costs the unit production cost multiplied by the geographic barrier d_{ni}, which is given by $\left(\frac{c_i}{\mathcal{Z}_i(j)}\right) \cdot d_{ni}$. As $\mathcal{Z}_i(j)$ is randomly drawn independently for each good j, the cost of country n's purchasing any good from country i depends on the realization of the random variable $P_{ni} := \left(\frac{c_i}{\mathcal{Z}_i}\right) \cdot d_{ni}$. Let us fix good j arbitrarily and define the lowest price of good j among P_{ni}'s by $P_n := \min\{P_{ni} : i \in N\}$. Then country n faces country i's price of good j

[8] The technical details and results are proved in Cheong et al. (2013) and also found at: `http://www.shino.info/research.html`.

with a distribution:

$$G_{ni}(p) = 1 - \exp(-T_i(c_i d_{ni})^{-\theta} p^{\theta}). \tag{2}$$

Let $\Phi_n := \sum_{i=1}^{N} T_i(c_i d_{ni})^{-\theta}$. The distribution of the price that country n actually pays for good j is given by

$$G_n(p) = \Pr[P_n \leq p] = 1 - \Pi_{i=1}^{N}[1 - G_{ni}(p)] = 1 - \exp(-\Phi_n p^{\theta}). \tag{3}$$

Notice that as a choice of good j is arbitrary, the distribution of the price for any good satisfies (3). Now, to obtain the price of a composite good in country n denoted by p_n, consider the utility maximization problem for a representative consumer in country n. Let q denote a nonnegative-valued measurable function in $[0, 1]$. A representative consumer in country n purchases a bundle $\{q_n(j)\}_{j\in[0,1]}$ to maximize the utility:

$$U_n = \left[\int_0^1 q_n(j)^{\frac{\sigma-1}{\sigma}} \mathrm{d}j\right]^{\frac{\sigma}{\sigma-1}}, \tag{4}$$

subject to a budget constraint $\int_{j\in[0,1]} p_n(j) q_n(j) \leq X_n$.

As the objective function is the CES utility function, consuming all the goods in $[0, 1]$ by k-times yields a k-times higher utility. Then, we obtain the price index as:

$$p_n = \left[\int_j p_n(j)^{1-\sigma} \mathrm{d}j\right]^{\frac{1}{1-\sigma}}. \tag{5}$$

As each $p_n(j)$ satisfies (3), we obtain

$$p_n = \left[\Gamma\left(\frac{\theta + 1 - \sigma}{\theta}\right)\right]^{1/(1-\sigma)} \Phi_n^{-1/\theta}, \tag{6}$$

where $\Gamma(z) := \int_0^{\infty} t^{z-1} \exp(-t) \mathrm{d}t$ is the Gamma function. This function only exists when $\sigma < 1 + \theta$. In order to have a well-defined price index, we assume this relationship. For the simplicity of notation, write $\gamma = \left[\Gamma\left(\frac{\theta+1-\sigma}{\theta}\right)\right]^{1/(1-\sigma)}$.

Let π_{ni} denote the probability that country i's price turns out to be the lowest for country n. In other words, π_{ni} is the likelihood that country i supplies a particular good to country n. By using the distributions (2) and (3), we can calculate the probability π_{ni}, which is given by

$$\pi_{ni} = \frac{T_i \left(c_i d_{ni}\right)^{-\theta}}{\Phi_n}. \tag{7}$$

Since there is a continuum of goods, this probability is also the fraction of goods that country n buys from country i. Let X_{ni} denote country n's spending on imports of good j from country i and set $X_n := \sum_{i\in N} X_{ni}$. Then, we obtain:

$$\pi_{ni} = \frac{X_{ni}}{X_n}. \tag{8}$$

By (7) and (8), we obtain:

$$\frac{X_{ni}}{X_n} = \frac{T_i \left(c_i d_{ni}\right)^{-\theta}}{\Phi_n}. \tag{9}$$

Let β be the labor share in manufacturing production and assume that this β is common across all countries. We assume that country n for each $n \in N$ is endowed with total labor supply $\bar{L}_n$. We consider two cases regarding labor mobility. In one case, labor is mobile in the sense that workers are free to move between the manufacturing and non-manufacturing sectors within a country (but not between countries) and in the other case, we labor is immobile and labor supply in each industry is fixed. It is assumed that the efficient input cost c_n of a bundle of labor and an intermediate good is chosen to satisfy a cost-minimization problem for producers. Let w_n denote a manufacturing wage and p_n denote a price of a composite intermediate good in country n.

Let Y_n denote country n's GDP and α denote the average demand for final manufactures as a fraction of GDP. Also, let $TR_{ni} := \frac{X_{ni}}{1+t_{ni}}$ denote country n's tariff revenue from country i and $Q_{ni} := \frac{t_{ni}X_{ni}}{1+t_{ni}}$ denote total income earned by country i from country n. Let $TR_n = \sum_i TR_{ni}$ and $Q_n = \sum_i Q_{ni}$. For convenience, we denote $Q_n^r = \sum_i Q_{in}$. Then, Q_n is total manufacturing expenditure excluding tariffs by country n and Q_n^r is total manufacturing income excluding tariffs by country n. Then, total manufacturing expenditures are:

$$X_n = \frac{1-\beta}{\beta} w_n L_n + \alpha Y_n. \tag{10}$$

When we calibrate the model, we consider two cases: mobile and immobile labor. When labor is mobile, we assume that in equilibrium, wages in manufacturing and non-manufacturing are equal within the same country, for otherwise, there would be incentives for workers to move to the industry providing higher wages. When labor is immobile, wages in manufacturing are determined in equilibrium. Here we derive specific formula from (10) in each of the two cases.

Mobile Labor. As the total labor supply and wages in country n are fixed and because labor is the only income-earning factor of production, total income in country n is:

$$Y_n = w_n \bar{L}_n + TR_n. \tag{11}$$

By (10) and (11),

$$w_n L_n = \sum_{i=1}^{N} \frac{\pi_{in}}{1+t_{in}} \left((1-\beta) w_i L_i + \alpha\beta \cdot w_i \bar{L}_i + \alpha\beta TR_i\right). \tag{12}$$

Immobile Labor. Suppose that labor is immobile in the sense that workers cannot move between manufacturing and non-manufacturing sectors. Suppose that non-manufacturing wages are fixed at a certain level and productivity in manufacturing and non-manufacturing determines manufacturing wages w_n for each n. As labor supply in each sector is fixed by assumption, we may assume that non-manufacturing labor income is fixed at Y_n^O. Then, total income in each country is:

$$Y_n = Y_n^O + w_n L_n + TR_n. \tag{13}$$

By (10) and (13),

$$w_n L_n = \sum_{i=1}^{N} \frac{\pi_{in}}{1+t_{in}} \left((1-\beta+\alpha\beta) w_i L_i + \alpha\beta \cdot Y_i^O + \alpha\beta \cdot TR_i\right). \tag{14}$$

Finally, we define an equilibrium in our economy. An *equilibrium* in this economy consists of the followings:

1. *a vector of price indices across countries* $\mathbf{p} = (p_1, \cdots, p_n)$ such that (6) is satisfied for each n;
2. *an* $n \times n$ *matrix of manufacturing expenditures* $\mathbf{X} = (X_{ni})$ such that each X_{ni} satisfies (9) for each n and i; and
3. in a mobile labor case, *a vector of labor supplies* $\mathbf{L} = (L_1, \cdots, L_n)$ such that (12) is satisfied for each n; or
4. in an immobile labor case, *a vector of wages* $\mathbf{w} = (w_1, \cdots, w_n)$ such that (14) is satisfied for each n.

To conduct a welfare analysis, we use a real GDP as an approximate measure of each country's welfare. This measure is taken by following the one used in Eaton and Kortum (2002):

$$W_n = \frac{Y_n}{p_n^{\alpha}}. \tag{15}$$

2.2 Changes in Trade Flows: Substitution and Income Effects

Changes in price indices result in changes in purchasing power even when nominal expenditures remain unchanged. To conduct a more detailed analysis of changes in trade flows, we decompose the total change in trade flows from member countries into the three terms, which use the income effects and substitution effects from classical consumer theory. In other words, to disentangle the various forces within the general equilibrium framework, we apply the notions of income and substitution effects in our setting. Here, we explain briefly how these terms can be derived within the framework presented in Section 2.1.

Let A denote a set of member countries of the TPP. We decompose changes in imports from a set of member countries of the TPP for each country into three components: substitution effects (SUB_n), income effects from changes in price indices (INP_n), and income effects from changes in nominal expenditures (INX_n), that is:

$$\begin{aligned} TOTAL_n \;&:=\; \textstyle\sum_{i \in A \setminus \{n\}} \left(X_{ni}^1 - X_{ni}^0\right) \\ &=\; SUB_n + INP_n + INX_n. \end{aligned} \tag{16}$$

Then, the left-hand side, which is the change in imports from member countries to country n, is the sum of these three effects.

Now we consider the change in the demand for goods from country i when only price indices change and total expenditures are constant. First, let X_n^c denote the compensated manufacturing expenditure at which the optimized utility level is equal to the initial optimized utility level before the TPP. Then, given that the numeraire is expenditure on nonmanufacturing goods, the normalized expenditure before the TPP is $\frac{X_n^0}{p_n^0}$. Thus, X_{ni}^c is given by:

$$X_n^c = \frac{p_n^1}{p_n^0} \cdot X_n^0. \tag{17}$$

The variable X_n^c is the amount of expenditure required to keep utility at the same level after the price index changes to p_n^1 as it was prior to the formation of the TPP. From this, the change in imports from member countries because of the substitution effects is given by:

$$\begin{array}{rcl} SUB_n & = & \sum_{i\in A\backslash\{n\}} \left(X_{ni}^c - X_{ni}^0\right) \\ & = & \frac{X_n^0}{p_n^0} \cdot \sum_{i\in A\backslash\{n\}} \left(p_n^1 \pi_{ni}^1 - p_n^0 \pi_{ni}^0\right). \end{array} \quad (18)$$

On the other hand, changes in demand from member countries because of the income effects from changes of price indices could be calculated as the difference between the total change in demand given changes in price indices holding nominal expenditures constant and the substitution effects of the changes of price indices. Let X_n^u denote demand given changes in price indices holding nominal expenditures constant. After the TPP, the share of demand for goods from country i becomes π_{ni}^1. Thus, X_{ni}^u is given by:

$$X_{ni}^u = \pi_{ni}^1 X_n^0. \quad (19)$$

The variable X_{ni}^u gives us the expenditure on goods from country i when only the demand share changes. From this, the income effects derived solely from the changes in price indices facing country n, INP_n, are given as follows:

$$\begin{array}{rcl} INP_n & = & \sum_{i\in A\backslash\{n\}} \left(X_{ni}^u - X_{ni}^0\right) - SUB_n \\ & = & X_n^0 \left(1 - \frac{p_n^1}{p_n^0}\right) \sum_{i\in A\backslash\{n\}} \pi_{ni}^1. \end{array} \quad (20)$$

Then, we can see that the total effects from changes in price indices are given by:

$$SUB_n + INP_n = \sum_{i\in A\backslash\{n\}} \left(X_{ni}^u - X_{ni}^0\right). \quad (21)$$

Finally, the last term is the change in imports from member countries due to increases in nominal manufacturing expenditures, which is given by:

$$\begin{array}{rcl} INX_n & = & \sum_{i\in A\backslash\{n\}} \left(X_{ni}^1 - X_{ni}^u\right) \\ & = & \left(X_n^1 - X_n^0\right) \sum_{i\in A\backslash\{n\}} \pi_{ni}^1. \end{array} \quad (22)$$

Intuitively, INX_n is the change of expenditure on goods from member countries in country n due to solely the change of its expenditure, INP_n is the change of expenditure on goods from member countries dues to solely the change of domestic prices and SUB_n is the change of imports from member countries due to solely the change of relative prices with other countries.

2.3 Estimation Procedure

Next, we describe how we estimate each parameter. The following description is basically a summary of the methodology presented in Eaton and Kortum (2002). To establish a link between trade flows and price differences between countries, we use π_{ni}. Notice that

$$\frac{\pi_{ni}}{\pi_{ii}} = \frac{X_{ni}/X_n}{X_{ii}/X_i} = \frac{\Phi_i}{\Phi_n} d_{ni}^{-\theta} = \left(\frac{p_i}{p_n} d_{ni}\right)^{-\theta}. \quad (23)$$

The first goal is to obtain θ. To do so, we define a price index D_{ni}. Now, define a relative price by $r_{ni}(j) = \ln p_n(j) - \ln p_i(j)$. Suppose that in the data there are J commodities. Then, let $M_{ni} := \sum_{j \leq J} \frac{p_n(j)/p_i(j)}{J}$. Let $\max 2$ denote the second highest value. Then, we define the price index by:

$$D_{ni} = \ln \frac{\max 2_j \{r_{ni}(j)\}}{M_{ni}}. \tag{24}$$

We measure $\ln \left(\frac{p_i d_{ni}}{p_n} \right)$ by (24). Now consider a figure of the relation between $\ln \left(\frac{X_{ni}/X_n}{X_{ii}/X_i} \right)$ on the vertical axis, which is indeed $-\theta \ln \left(\frac{p_i d_{ni}}{p_n} \right)$ and D_{ni} on the horizontal axis. We obtain the slope of this relation and set this value equal to θ.

The second goal is to present the trade equation to be used for our estimations. We start with (7) and (8). By modifying them, we obtain:

$$\frac{X_{ni}}{X_n} = \frac{T_i}{T_n} \left(\frac{w_i}{w_n} \right)^{-\theta\beta} \left(\frac{p_i}{p_n} \right)^{-\theta(1-\beta)} d_{ni}^{-\theta}, \tag{25}$$

and

$$\frac{p_i}{p_n} = \frac{w_i}{w_n} \left(\frac{T_i}{T_n} \right)^{-1/\theta\beta} \left(\frac{X_i/X_{ii}}{X_n/X_{nn}} \right)^{-1/\theta\beta}. \tag{26}$$

Let $\ln X'_{ni} := \ln X_{ni} - \frac{1-\beta}{\beta} \ln(X_i/X_{ii})$ and $S_i := \frac{1}{\beta} \ln T_i - \theta \ln(w_i)$. Taking logarithms of (25) and substituting (26) into it, we obtain:

$$\ln \frac{X'_{ni}}{X'_{nn}} = -\theta \ln d_{ni} + \frac{1}{\beta} \ln \frac{T_i}{T_n} - \theta \ln \frac{w_i}{w_n} = -\theta \ln d_{ni} + S_i - S_n. \tag{27}$$

Following the gravity model, the distance between countries d_{ni} can be proxied by:

$$\ln d_{ni} = d_k + b + l + e_{ni} + m_n + \delta_{ni}, \tag{28}$$

where $d_k (k = 1, \cdots, 6)$ denotes the effect of the distance between country n and i lying in the k-th interval, b denotes border sharing, e denotes PTA, l denotes shared language, and δ_{ni} denotes the error term. To capture potential reciprocity in geographic barriers, we assume that the error term δ_{ni} consists of two components: δ^1_{ni} and δ^2_{ni}. The country-pair-specific component δ^2_{ni} with variance σ^2_2 affects two-way trade as $\delta^2_{ni} = \delta^2_{in}$, while δ^1_{ni} with variance σ^2_1 affects one-way trade. Imposing this specification and substituting (28) into (27), we obtain the following:

$$\ln \frac{X'_{ni}}{X'_{nn}} = S_i - S_n - \theta m_n - \theta d_k - \theta b - \theta l - \theta e_h + \theta \delta^2_{ni} + \theta \delta^1_{ni}. \tag{29}$$

We consider S_i as a source country's "competitiveness," and θm_n as a destination country's effect (openness). The estimation results of (29) are reported and discussed in Section 4.

3 Data

3.1 The Data Description

Our data cover 38 OECD and ASEAN countries in year 2005. We do not include Brunei, Cambodia, Lao PDR, and Myanmar because of a lack of data. Furthermore, Singapore is excluded because it is difficult to separate trade flows into what is consumed within the country from what is just transferred from the country. First column of Table 1 shows the list of countries.

In order to estimate the comparative advantage parameter, θ, first we need measure countries' prices and import shares in manufactures. Price data are obtained for the year 2005 at BH (basic heading) levels from the International Comparison Program, World Bank. To define manufacturing sectors, we convert BH codes to OECD codes, then OECD codes to COICOP codes, then COICOP codes to CPC codes, then CPC codes to ISIC ver.3, and then ISIC ver.3 to ISIC ver.2. We choose BH codes that are associated with the ISIC codes for manufacturing. Trade data are obtained from UN Comtrade. As bilateral trade data do not provide imports from their own country, X_{ii} which are the diagonal elements of the bilateral trade matrix, we calculate them by subtracting the total manufacturing exports to the ROW from their gross outputs in manufacturing. Data of gross outputs in manufacturing are obtained from INDSTAT database of the United Nations Industrial Development Organization (UNIDO). As INDSTAT data are not available for Canada and Thailand, we use data from the United Nations National Accounts database. The data for China are not available from either INDSTAT or National Accounts database, thus we calculate the value using total GDP and the ratio between total GDP and manufacturing sector output, which are obtained from the National Accounts database. Data on countries' total GDP, which are required to solve for the counterfactual are also obtained from UNIDO.

Next, we need data on manufacturing employment, L_n, wages, w_n, and labor share in costs, β for every country n. The data for manufacturing employment are obtained from Labor STAT of the ILO, which are labeled "Total Employment" in manufacturing. We obtain the data labeled "Total Paid Employment" for India as "Total Employment" was not available. Wage data are obtained from the US Bureau of Labor Statistics (BLS). For the countries whose wage data are not available in the US BLS except for Vietnam, the data are obtained from Labor STAT of the ILO. Wage and employment data for Vietnam are from their government's statistical office.

Our handling of labor share in costs more involved. There are several data sources available, however, none of sources provides a complete data set. We start with National Accounts Official Country Data from the United Nations Statistics Division. We obtain compensation and wages for employees in manufacturing for Australia, India, Japan, Korea, Philippines, Thailand, the UK, and the US. As the data for Canada are available for the year 2004, not the year 2005, we calculate the value using 2004 data adjusted to the inflation rate obtained from the IMF. For other cases, we use government statistics office data.

Data for regional trade agreements (free trade areas and customs unions) are from the World Trade Organization (WTO). Table 2 lists the groups of countries which are engaged in PTAs as of 2005. [9] The data for the tariff rate are obtained from "Tariff Profiles 2006" of the WTO. Tariff Profiles 2006 includes the data of some countries for the year 2005 and the one of other countries for the year 2006. These are the data of the closest year for our analysis. We use a simple average rate under the principle of Most-favored Nation (MFN) treatment for countries who are not engaged in any regional trade agreements. Table 3 shows the sample countries' MFN tariffs in our data.

– Insert Table 1 here –

[9] http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx.

– Insert Table 2 here –

–Insert Table 3 here –

Table 1 provides summary statistics on the imports, income, and labor data for the manufacturing sector in 2005 for the sample countries.[10] The first column shows the share of manufacturing goods in total imports for each country. It varies significantly across countries. More than 90% of the imports by Belgium are manufacturing goods, compared with only 11% by Japan.

The second column reports how much each country imports from the other sample countries as a share of total imports. More than half of the sample countries import around 90% of their manufacturing goods from the other sample countries, and for the other countries, this figure is also substantial. It indicates that even though the sample countries are limited to OECD and ASEAN countries, our results would not be affected significantly by the inclusion of other countries.

The third column shows the relative manufacturing wages of each country compared with that of the US. Most Western European countries pay higher wages than the other countries and many of the Asian countries except Japan and South Korea pay significantly lower wages than the other countries. Eastern European countries such as the Czech Republic, Hungary, and Poland have similar wage levels, and they are higher than those of the Southeast Asian countries, Turkey, the Russian Federation, India, Mexico, Chile, and China, but are lower than those of the remaining countries.

The last column shows the labor share of GDP in the manufacturing industries. Vietnam and Germany have relatively high labor shares of GDP in the manufacturing sector, whereas for China and India, the share is only about 2%. However, the other countries' labor share of GDP is not very different from one another even though it varies across countries.

3.2 Summary of Parameters

The comparative advantage parameter, θ is obtained from the slope of the relationship between D_{ni} and logarithms of normalized import share using a simple method-of-moments estimation, where $\exp(D_{ni})$ shows the price index in destination country n for a buyer who purchases everything from source country i relative to the actual price index in destination country n. Our θ is 8.29, which is very similar to 8.28 from Eaton and Kortum (2002).

To compute α, we use the following method. Let IMP_n denote manufacturing imports, EXP_n denote manufacturing exports, and Y_n denote total GDP for country n. Then, we obtain the following relationship:

$$X_{nn} + IMP_n = (1 - \beta)(X_{nn} + EXP_n) + \alpha Y_n. \tag{30}$$

The left-hand side of the relationship is total expenditure in country n and the right-hand side is the sum of intermediate consumption and the demand for final manufacturing goods. As these two terms need to be balanced, we obtain the above relationship.

Table 4 presents the values of the final manufacturing demand share of GDP, α and labor share in costs, β for sample countries. Some countries (China, Malaysia, and the Philippines) have negative

[10] Spending on manufactures is gross manufacturing production less exports of manufactures plus imports of manufactures. Imports from the other 37 countries exclude imports of manufactures from outside our sample of countries.

values of α as we assume that the world consists of the countries that we consider in this paper and these countries are relatively large exporters compared with importers. In other words, these countries produce a large quantity of manufacturing goods. Vietnam has the highest (0.28) and Chile has the lowest (0.02), except for the countries with negative value. In our calibration, we use the average value of 0.12, which is the same as that of Italy and USA. The average value of β is 0.19, which is the same as that of Portugal. Chile and China have the lowest value (0.04), and Denmark has the highest (0.36) value of β.

– Insert Table 4 here –

4 Estimation

We proceed in the following manner to evaluate how the TPP affects welfare and trade flows. First, we have estimated the trade equation using data on bilateral trade in terms of manufactures. Next, we compute the equilibrium parameters in a baseline world in which countries are engaged in the existing PTAs and impose the current most favored nation (MFN) average duty rates on countries that do not participate in any PTA with our sample countries. We then conduct a counterfactual analysis of the TPP under three scenarios in which several countries join or participate in the negotiation. The average value of β is

4.1 Trade Equation Estimation

The estimation of the trade equation with source effects using (29) is reported in Table 5.

– Insert Table 5 here –

The first six rows of the upper panel show how distance reduces trade volumes between countries. The change in trade flows monotonically decreases as the distances between the country pairs increases. In the next three rows, we see that all of the estimated coefficients of shared border, shared languages, and PTA are positive and statistically significant at the 5% level. A PTA has a slightly larger impact than a shared border or language on intra-bloc trade. The first two columns of the lower panel show the relative competitiveness of each country compared with the other sample countries, which is estimated as the coefficient of S_i in (29), and the last two columns of the lower panel report the relative openness of each country compared with the other sample countries, which is estimated as the coefficient of θm_i in (29), where $\theta = 8.29$.

From the estimates of S_i, the most competitive countries are China, the US, and Japan. Apart from Germany, the competitiveness of European countries is relatively low compared with the US and Japan. South Korea is followed by Italy, France, the UK, and the Netherlands. Malaysia and Thailand are as highly competitive as the Netherlands, and more competitive than Canada, Spain, Sweden and Switzerland, whose competitiveness is slightly higher than average. The competitiveness of Australia and some other Western European countries such as Ireland, Finland, Austria, and Denmark is below average, and most Eastern European countries including Poland, the Czech Republic, and Hungary, as well as Mexico and Chile are even less competitive. Iceland, Greece, and New Zealand are the least competitive countries in our sample. It is worth noting that relative competitiveness is not strongly correlated with the level of development of countries as implied in the Ricardian model because it depends on both absolute advantage measured by the state of technology as well as relative wages. In the next subsection, we estimate the state of technology for each country and identify the main source of its competitiveness.

The most open country in 2005 was China, and it is far more open than the next most open countries, namely Belgium and the US. Japan, the Philippines, Malaysia, and South Korea are relatively open Asian countries, and are more open than most Western European countries apart from Belgium and Germany. At first glance, it may be surprising especially given their low import share shown in Table 1 and lower average MFN tariffs in Table 3. However, it is worth noting that (29) accounts for both the geographical distance and the price index. It implies that at a given level of imports, the more remote a country is from the rest of world, and as the price index in the domestic economy increases, the country's openness increases. Thus, the proximity to other countries and relatively lower exports to the rest of world might be the reason why Western European countries are estimated to be less open relative to some Asian countries. Eastern European countries are among the least open countries. Despite its remoteness from the rest of world, New Zealand is one of the least open countries in the sample, unlike Australia. The least open country is Iceland, followed by Greece and Chile.

4.2 Estimates of States of Technology

In Section 2, S_i is defined by $S_i = (1/\beta)\ln T_i - \theta \ln w_i$. Given the estimate of θ, S_i, and β in our results, we can estimate the state of technology T_i using wage data. We find that most European countries including Germany, Denmark, Austria, Switzerland, Belgium, the UK, France, Finland, and Norway have a higher absolute advantage than the US in terms of technology, whereas the state of technology of the other European countries apart from Greece and Portugal is comparable to that of the US. Other industrial countries such as Australia, Canada, and Japan have slightly lower levels of absolute advantage than the US. A number of Asian countries including China, India, Indonesia, the Philippines, Vietnam, and Thailand have relatively low absolute advantage. Eastern European OECD countries including Poland, the Czech Republic, and Hungary have higher states of technology than Chile and Mexico.

– Insert Table 6 here –

By comparing the results from Table 5 and Table 6, we can also tell whether the high competitiveness of a country comes from a relatively high state of technology or low wages. Given that China has the lowest state of technology amongst the sample countries, the higher competitiveness of China relative to other countries is due to its lower wages. On the one hand, the high competitiveness of Germany and the US is attributed to their absolute advantage, while the source of the low competitiveness of many Western European countries including Denmark, Austria, Switzerland, Finland, and Norway seems to be relatively high wages. On the other hand, as expected, the relatively high competitiveness of East Asian countries such as South Korea, Malaysia, and Thailand is mainly due to their relatively low wages. It can be seen that all Western European countries have higher states of technology than Eastern European countries as well as the Asian countries, excluding South Korea, Mexico, and Chile, and the gap is significant.

5 Calibration

This section calibrates the model. As mentioned in Section 2.1, we provide the results of two cases, mobile and immobile labor, separately. To solve for the variables in equilibrium in the case of mobile labor, (6), (7), and (8) are used to obtain the equilibrium price indices and trade shares given exogenous wages, and then manufacturing employment is obtained from them with (12). In the case of immobile labor, we simultaneously solve (6), (7), (8), and (14) to obtain equilibrium price indices, trade shares, and wages.

5.1 Calibration

Under the two labor mobility assumptions, we compute the equilibrium variables in a baseline world in which countries form currently existing PTAs and impose current MFN average duty rates on countries that do not have a PTA with them.

We are interested in the welfare effects and changes in trade flows after the establishment of the TPP. We consider the situations where the following countries form a PTA: Australia, Canada, Chile, Japan, Malaysia, Mexico, NZ, the US, and Vietnam, and another identical situation where Japan does not join.

The results are presented in Table 7 to Table 10.[11] [12] All numbers for the effects are presented as percentage changes. In each table, countries with an asterisk join the TPP under the scenario concerned.

5.2 Results

– Insert Table 7 here –

– Insert Table 8 here –

– Insert Table 9 here –

– Insert Table 10 here –

– Insert Table 11 here –

[11] Our calibration is obtained from the programs that are developed from the codes at `http://home.uchicago.edu/kortum/papers/tgt/tgtprogs.htm` for our purposes. We thank Samuel Kortum for some clarification of the original programs of Eaton and Kortum (2002).

[12] In the estimation, we have encountered one problem. Our estimation of the economic distance between countries shows that country n's distance to country i is smaller than country n's distance to itself (i.e., $d_{ni} < d_{nn} = 1$) for the following three pairs: n = Belgium and i = the Netherlands; n = China and i = Vietnam; and n = the US and i = Canada. To avoid the problem that a triangle inequality does not hold for these pairs, we assume that these pairs have a distance to their own country plus a tariff rate between the two countries. In other words, we assume that country n's distance to country i is the distance to their own country multiplied by $(1 + t_{ni})$.

Tables 7, 8, 9 and 10 present changes in variables under four different scenarios, respectively: Japan joins or not in the two different labor mobility assumptions. Table 11 illustrate the welfare comparison for each country between the two scenarios where Japan joins or not. "Not" or "Join" indicates that country n's welfare is larger when Japan does not join or joins the TPP in each case of labor mobility, respectively. When we consider the case where Japan does not join the TPP, we take A as a set of countries excluding Japan and compute the substitution effects and the income effects on trade flows. In the tables (from Table 7 to Table 12), member countries are bold-faced.

Our calibrations find that some potential TPP member countries' welfare may deteriorate because of a decrease in trade volume and/or relatively large loss of tariff revenues. More interestingly, we also find that the TPP may generate positive externalities so that some nonmember countries may benefit from the TPP. This is attributed to intermediate goods which generate gains in addition to conventional gains from trade within a general equilibrium framework, by changing the prices (and wages in the case of immobile labor) of all countries trading with the TPP member countries. Because of this effect, the TPP benefits more countries, including both members and non-members if Japan joins the TPP.

In the case of mobile labor, if more countries join the TPP, a decrease in prices for every country becomes larger as shown in Cheong et al. (2013).[13] Prices represent production costs which incorporate tariffs. When tariffs decline, prices decrease under mobile labor as wages are fixed. However, in the case of immobile labor, the effects on prices due to an additional member are ambiguous because wages also change with a decrease in tariffs. Differences between $\frac{p_n^1}{p_n^0}$ in Table 7 and Table 8, and $\frac{p_n^1}{p_n^0}$ in Table 9 and Table 10 demonstrate this. In our calibration, more countries, including nonmembers, gain when Japan joins the TPP regardless of the labor mobility as shown in Table 12.

– Insert Table 12 here –

Effects on Japan

Our calibration results show that Japan may gain or lose depending on their labor mobility when it joins the TPP. In the case of mobile labor, Japan is worse off with accession to the TPP, while its membership to the TPP yields larger welfare in the case of immobile labor. If Japan joins the TPP, Japan loses tariff revenues. In the case of mobile labor, tariff revenues are the relevant factor to determine welfare changes, because as in (15), welfare depends on prices and total production, which is the sum of tariff revenues and labor production in the country by (11). As we can see by comparing $TOTAL_n$ in Tables 7 and 8, when Japan joins the TPP, trade flows from member countries to Japan drastically increase compared to the case where Japan does not join. Thus, it loses more by joining the TPP with losses in tariff revenues for the increased demands from member countries. From our estimation result in Section 4.1 Japan is among the most open countries. It also indicates that losses of tariff revenues in Japan are not negligible.

– Insert Table 13 here –

[13] For a more rigorous analysis, see Cheong et al. (2013)

On the other hand, Japan has a relatively large $\frac{Y_n^O}{Y_n}$ and $\frac{Q_n^r}{X_n}$ as shown in Table 13. In the case of immobile labor, more trade would flow to Japan from member countries as shown in Table 9, especially indicated in $TOTAL_n$. In Table 9, Japan's SUB_n is relatively large among member countries. This implies that member countries demand more from Japan when Japan joins the TPP, whereas if Japan does not join, member countries demand much less from Japan as shown in SUB_n and $TOTAL_n$ in Table 10. Unlike in the case of mobile labor, wages change in the case of immobile labor. As there are more demands on Japanese goods, wages do not go down as much as prices. Despite losses in tariff revenues, increased labor income yields larger welfare to Japan with accession to the TPP in the case of immobile labor.

Effects On Other Member Countries

As reported in Table 11, the US is the only country that gains when Japan joins the TPP in the case of mobile labor. This is attributed to the fact that the US has the highest technological level and nonmanufacturing industry size compared to its economy among the member countries. In the case of immobile labor, member countries whose prices drop more than wages tend to gain. These countries have relatively large substitution effects and smaller income effects due to price changes. Intuitively, upon the establishment of the TPP, the products of these countries become more attractive to other countries, and due to this substitution effect, their wage levels do not drop as much as in other countries. The exceptions are Malaysia and Vietnam in Table 9 or Vietnam in Table 10. Changes in domestic shares are very large for these two countries. This indicates that these countries spend much more on products from member countries and lose tariff revenues once they join the TPP.

On the other hand, New Zealand is the only country that gains when Japan joins the TPP, whereas it does not if Japan does not join the TPP (although the welfare difference is very small). When Japan joins the TPP, New Zealand's wage does not drop as much as the case where Japan does not join. This is also demonstrated in INX_n. This indicates that when Japan joins the TPP, Japan demands more from New Zealand due to income effects from changes in nominal expenditures. As such, because there is more demand for goods from New Zealand, its wage level does not drop. Thus New Zealand gains when Japan joins the TPP.

There are three patterns in Table 11. In the first group (Australia, Canada and Malaysia), countries are better off in both cases of labor mobility and immobility when Japan does not join the TPP. In the second group (Chile, Mexico, and New Zealand), countries are better off in the case of mobile labor when Japan does not join the TPP, while they are better off in the case of immobile labor if Japan joins the TPP. In the last group which only includes the US, the US is better off in the case of mobile labor if Japan joins the TPP, whereas the US is better off in the case of immobile labor if Japan does not join the TPP.

Comparing Table 7 and Table 8, INX_n increases more for all member countries other than the US when Japan joins the TPP. For the US, $TOTAL_n$ is large among member countries, which is brought by higher SUB_n than INX_n. This indicates that when Japan joins the TPP, the US demands more from Japan as member countries due to the substitution effect but total production in the country does not change much in the US between the two cases. This is also shown from $\frac{Y_n^1}{Y_n^0}$, which is large among member countries. The US obtains cheaper Japanese products without harming internal production with Japan's accession to the TPP in the case of mobile labor. In this way, the US is better off if Japan joins the TPP.

In the case of immobile labor, even if Japanese products become cheaper and production cost in Japan becomes lower, wages also adjust to this change. The welfare difference is small for the US for the two cases where Japan does not join/joins the TPP, and we do not see the exceptional situation where only the US is better off when Japan joins the TPP in this case.

Effects On Nonmember Countries

We find that the TPP may generate positive externailities so that some nonmember countries' welfare improve under the TPP. As shown in Cheong et al. (2013) and our calibrations, $\frac{Y_n^O}{Y_n}$ and technological status are relevant factors to welfare changes, and in the case of immobile labor, particularly $\frac{Y_n^O}{Y_n}$ plays an important role. This relationship is also observed in Figure 1 and Figure 2. Nonmanufacturing goods play a role of "seed" in the sense that it creates demands for a manufacturing good, and so this is the important factor, although the fundamental component that makes a difference is slightly different between the two cases. In the case of mobile labor, unlike the immobile labor case, a countrys technological level is also important, because the efficiency of production influences the division of labor between the manufacturing and nonmanufacturing sectors. Without direct effects by technological levels on labor divisions, in the case of immobile labor, as shown in Figure 2, welfare changes are very clearly correlated with sizes of nonmanufacturing sectors.

As shown in Table 12, India, China, Greece and Turkey gain among nonmember countries regardless of Japanese accession to the TPP. According to Table 13, these countries rank very highly for $\frac{Y_n^O}{Y_n}$. The ratio, $\frac{Y_n^O}{Y_n}$ of Russian Federation is also relatively high, even higher than Greece. However, as its technological status is relatively low as shown in Table 6, the TPP does not increase its welfare in the case of immobile labor.

– Insert Figure 1 here –

– Insert Figure 2 here –

In the case of mobile labor, once the TPP is formed, domestic prices decrease and member countries' prices decreases more compared to nonmember countries. Thus, in general, nonmember countries' demand for member countries's goods increases due to both the substitution effects and income effects as a result of changes in prices. These are shown as positive values for INP_n and SUB_n in Tables 7 and 8. At the same time, as prices decreases in general, the income effects from changes in expenditures are negative as shown in Table 7 and Table 8. If a country possesses a relatively high technological status, it implies that a smaller amount of labor is used to produce the same product and quantity, and thus the negative income effects due to changes in expenditure is smaller. As presented in the two tables, Hungary's $\frac{L_n^1}{L_n^0}$ is much smaller than that of Sweden and so Hungary's INX_n is much larger than that of Sweden.

In the case of immobile labor, the effect is more complicated because wages change, not labor. In terms of changes in wages and labor in the model, wages change more indirectly through a weighted average in changes of production costs across all the countries as in (10), while labor in the manufacturing sector changes more directly through the changes in demand for each country's goods as in (6). That is a reason why a technological status becomes less relevant than the size of the nonmanufacturing sector to each economy in the case of immobile labor.

As stated in Section 5.2, if more countries join the TPP, the welfare effects are generally larger in the mobile case. Tables 7 and 8 show that some European countries (who are nonmembers) gain when Japan joins the TPP while they do not if Japan does not join. As for the effect of the TPP on trade flows, for every country INP_n the effect is larger if the Japan joins the TPP as shown in Tables 7 and 8. In our calibrations, Japanese accession to the TPP yields higher welfare for all countries, except for Hungary, in the mobile labor case while it is not true for the immobile labor case.

Unlike other countries, Hungary is better off if Japan does not join the TPP in both cases. As shown in Table 7, INX_n is relatively small for Hungary compared to other nonmembers, which indicates that Hungary's total expenditure on the goods from the member countries decreases substantially. INX_n of Korea and the Russian Federation is similar to that of Hungary. However, if Japan is out of the TPP, Hungary's INX_n is not that small while the other two countries's INX_n are still very low. Furthermore, as shown in Table 13, these two countries' $\frac{TR_n}{X_n}$ is larger compared to that of Hungary, and they have higher $\sum_{i \in A} \hat{\pi}_{ni}$, which indicates that their respective import shares from the TPP member countries including Japan (relative to imports from nonmember countries) are larger than that of Hungary. Thus, if Japan joins the TPP, trade with Japan may yield bigger positive externalities for these two countries.

6 Concluding Remarks

The TPP would be one of the largest economic integration agreements in terms of economic size, and its welfare and trade effects on not only members but nonmember countries should be carefully studied. In this regard, this paper analyzes the trade and welfare effects of the TPP under several scenarios using the comprehensive data of 38 OECD and ASEAN countries in the year 2005.

We follow the EK's general equilibrium model in which we explicitly introduce the tariffs as economic barriers, and decompose the trade effects into three components which arise from different sources. Our study particularly focuses on a Japanese accession to the TPP to see whether it yields different outcomes for Japan and other countries.

Our calibrations show that some potential TPP member countries' (including Japan) welfare and trade volume may decrease with accession to the TPP. According to our results, in the case of immobile labor, Japanese welfare and trade volume from member countries increase with its accession to the TPP as prices decrease much more than wages with a higher demand for Japanese products. However, if the labor is freely mobile where wages are fixed, Japan is worse off as it joins the TPP while trade volume increases.

We also provide evidence that some outside countries may benefit from positive externality even if they do not join the TPP as the TPP changes the prices (and wages in the case of immobile labor) of all countries trading with the TPP member countries. Because of this effect in a general equilibrium, the

TPP benefits more of countries, including both members and non-members if Japan joins the TPP.

In our model, some aspects, however, are not incorporated such as sectoral linkages as in Caliendo and Parro (2012). This may be considered as a future research. Nevertheless, we believe that this paper provides a benchmark analysis of the TPP effects.

APPENDIX: TABLES

Country	Imports as % of mfg. spending	Imports from sample as % all imports	Mfg. wage (US = 1)	Mfg. labor's % share of GDP
Australia	27.45	84.34	0.97	9.13
Austria	56.67	91.63	1.24	16.79
Belgium	93.38	93.93	1.24	13.76
Canada	47.65	95.07	0.90	10.83
Chile	18.88	71.21	0.08	3.41
China	60.28	60.21	0.02	2.17
Czech Rep.	52.72	89.68	0.24	14.55
Denmark	53.23	91.07	1.31	13.34
Finland	37.81	88.46	1.13	14.77
France	33.10	91.99	1.09	11.82
Germany	36.24	90.20	1.28	21.57
Greece	42.44	89.55	0.49	5.56
Hungary	55.76	87.85	0.22	8.54
Iceland	54.20	93.81	0.87	6.37
India	15.54	74.40	0.03	2.11
Indonesia	34.30	62.40	0.03	6.86
Ireland	83.83	94.12	1.11	8.57
Israel	40.82	89.62	0.47	7.64
Italy	24.05	86.93	0.93	13.20
Japan	10.96	84.08	0.86	13.66
Malaysia	51.40	67.52	0.15	13.37
Mexico	68.05	91.01	0.12	4.58
Netherlands	76.38	88.77	1.17	10.93
New Zealand	31.27	90.49	0.56	9.13
Norway	45.67	94.59	1.41	7.41
Phillipines	84.30	79.11	0.04	6.87
Poland	37.42	91.10	0.19	8.72
Portugal	45.18	95.69	0.31	8.90
Korea, Rep.	20.07	84.54	0.51	16.84
Russian Fed	21.66	83.01	0.06	5.74
Spain	33.01	92.35	0.69	10.23
Sweden	44.23	92.76	1.15	11.80
Switzerland	59.06	91.54	1.21	13.53
Thailand	39.32	79.33	0.06	10.42
Turkey	29.57	85.12	0.15	6.64
UK	39.94	26.17	1.07	11.20
USA	22.43	297.13	1.00	8.12
Vietnam	37.63	72.40	0.04	23.66

Table 1: TRADE, LABOR, AND INCOME DATA

Group 1	Australia & New Zealand
Group 2	Canada & Chile
Group 3	Canada & Israel
Group 4	Chile & Mexico
Group 5	[Austria, Belgium, Denmark, Finland, France, Czech Republic, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, UK] & each of [Chile, Iceland, Israel, Mexico, Norway, Switzerland, Turkey]
Group 6	[Chile, Israel, Mexico, Turkey], & each of [Iceland, Norway, Switzerland]
Group 7	Turkey & Israel
Group 8	US & Chile
Group 9	US & Israel
Group 10	US & Canada & Mexico
Group 11	US & Australia

Table 2: Existing PTAs

[a] "[A, B, C] & each of [D, E]" means that Countries A, B and C have a PTA with Country D, and again, the three countries have a PTA with Country E.

	MFN Applied		MFN Applied
Australia	3.9	**Japan**	2.8
Austria	3.9	**Malaysia**	7.9
Belgium	3.9	**Mexico**	13.3
Canada	3.7	**Netherlands**	3.9
Chile	6	**NZ**	3.2
China	9	**Norway**	3.9
Czech Rep.	3.9	**Philippines**	5.8
Denmark	3.9	**Poland**	3.9
Finland	3.9	**Portugal**	3.9
France	3.9	**Korea, Rep.**	6.6
Germany	3.9	**Russian Fed.**	11.1
Greece	3.9	**Spain**	3.9
Hungary	3.9	**Sweden**	3.9
Iceland	2.4	**Switzerland**	2.1
India	10.1	**Thailand**	8.2
Indonesia	6.8	**Turkey**	4.7
Ireland	3.9	**UK**	3.9
Israel	4.9	**USA**	3.3
Italy	3.9	**Vietnam**	15.7

Table 3: TARIFF (MFN APPLIED, SIMPLE AVERAGE)

Country	α's	β's
Australia	0.17	0.25
Austria	0.20	0.33
Belgium	0.09	0.21
Canada	0.14	0.23
Chile	0.02	0.05
China	-0.14	0.05
Czech Rep.	0.13	0.16
Denmark	0.16	0.36
Finland	0.10	0.23
France	0.15	0.23
Germany	0.15	0.33
Greece	0.19	0.22
Hungary	0.09	0.11
Iceland	0.24	0.22
India	0.04	0.04
Indonesia	0.05	0.18
Ireland	-0.20	0.13
Israel	0.10	0.18
Italy	0.12	0.23
Japan	0.08	0.23
Malaysia	-0.07	0.11
Mexico	0.05	0.15
Netherlands	0.13	0.25
New Zealand	0.20	0.19
Norway	0.15	0.27
Phillipines	-0.06	0.13
Poland	0.13	0.14
Portugal	0.18	0.19
Korea, Rep.	0.07	0.16
Russian Fed	0.10	0.12
Spain	0.17	0.20
Sweden	0.05	0.21
Switzerland	0.11	0.26
Thailand	0.07	0.10
Turkey	0.13	0.14
UK	0.15	0.32
USA	0.12	0.21
Vietnam	0.28	0.24

Table 4: SUMMARY OF α's and β's

Variable	est.		s.e.	
Distance 1	0.68		0.07	
Distance 2	0.89		0.05	
Distance 3	0.99		0.04	
Distance 4	0.18		0.04	
Distance 5	0.59		0.02	
Distance 6	0.73		0.02	
Shared border	0.14		0.05	
Shared language	0.17		0.04	
PTA	0.25		0.04	
	Source Country		Destination Country	
Country	est.	s.e.	est.	s.e.
Australia	0.06	0.05	0.07	0.08
Austria	0.15	0.05	0.21	0.08
Belgium	0.23	0.05	1.26	0.08
Canada	0.22	0.05	0.28	0.08
Chile	0.69	0.06	0.87	0.1
China	1.34	0.05	1.86	0.08
Czech Rep.	0.39	0.05	0.46	0.08
Denmark	0.23	0.05	0.18	0.08
Finland	0.11	0.05	0.26	0.08
France	0.53	0.05	0.19	0.08
Germany	0.97	0.05	0.81	0.08
Greece	0.09	0.05	0.23	0.08
Hungary	0.48	0.05	0.58	0.08
Iceland	0.13	0.05	0.04	0.08
India	0.19	0.05	0.15	0.09
Indonesia	0.12	0.05	0.17	0.08
Ireland	0.08	0.05	0.53	0.08
Israel	0.62	0.05	0.74	0.08
Italy	0.55	0.05	0.11	0.08
Japan	1.22	0.05	0.71	0.08
Malaysia	0.34	0.05	0.58	0.08
Mexico	0.29	0.05	0.09	0.09
Netherlands	0.35	0.05	0.95	0.08
New Zealand	0.78	0.05	0.66	0.09
Norway	0.57	0.05	0.64	0.08
Philippines	0.2	0.05	0.67	0.08
Poland	0.33	0.05	0.63	0.08
Portugal	0.6	0.05	0.77	0.08
Korea, Rep.	0.84	0.05	0.51	0.08
Russian Fed.	0.03	0.05	0.43	0.09
Spain	0.17	0.05	0.09	0.08
Sweden	0.15	0.05	0.04	0.08
Switzerland	0.13	0.05	0.11	0.08
Thailand	0.32	0.05	0.35	0.08
Turkey	0.32	0.05	0.59	0.08
UK	0.47	0.05	0.39	0.08
US	1.32	0.05	1.24	0.08
Vietnam	0.37	0.05	0.37	0.08
Total sum of squares	1406		Error variance:	
Sum of squared residuals	124.64		Two-way ($\theta^2\sigma_2^2$)	0.089
Number of observations	1406		One-way ($\theta^2\sigma_1^2$)	0.023

Table 5: TRADE EQUATION ESTIMATION

	State of Technology		State of Technology
Australia	0.74	**Japan**	0.83
Austria	1.38	**Malaysia**	0.05
Belgium	1.33	**Mexico**	0.04
Canada	0.74	**Netherlands**	1.21
Chile	0.02	**New Zealand**	0.25
China	0.00	**Norway**	1.18
Czech Rep.	0.07	**Philippines**	0.01
Denmark	1.42	**Poland**	0.08
Finland	1.16	**Portugal**	0.17
France	1.21	**Rep. of Korea**	0.33
Germany	1.43	**Russian Fed.**	0.01
Greece	0.25	**Spain**	0.56
Hungary	0.07	**Sweden**	1.06
Iceland	0.49	**Switzerland**	1.36
India	0.01	**Thailand**	0.01
Indonesia	0.00	**Turkey**	0.06
Ireland	0.98	**United Kingdom**	1.24
Israel	0.22	**USA**	1.00
Italy	1.02	**Vietnam**	0.01

Table 6: STATE OF TECHNOLOGY

Country $= n$	INX_n	INP_n	SUB_n	$TOTAL_n$	$\frac{p_n^1}{p_n^0}$	$\frac{L_n^1}{L_n^0}$	$\frac{\pi_{nn}^1}{\pi_{nn}^0}$	$\frac{Y_n^1}{Y_n^0}$	$\frac{W_n^1}{W_n^0}$
Australia	1.22	2.01	11.11	**14.34**	0.982	1.015	0.972	0.996	**0.998**
Austria	-11.88	0.88	4.79	**-6.20**	0.992	0.876	0.987	0.999	**1.000**
Belgium	-12.01	0.89	4.68	**-6.45**	0.992	0.877	0.987	0.999	**1.000**
Canada	-4.19	1.46	3.17	**0.44**	0.986	0.953	0.978	0.997	**0.999**
Chile	-0.03	2.26	13.97	**16.20**	0.981	1.001	0.969	0.997	**0.999**
China	-11.11	1.08	2.96	**-7.07**	0.990	0.837	0.983	0.997	**0.998**
Czech Rep.	-12.00	0.89	4.73	**-6.38**	0.992	0.876	0.987	0.999	**1.000**
Denmark	-11.70	0.89	4.73	**-6.08**	0.992	0.877	0.987	0.999	**1.000**
Finland	-11.77	0.91	4.53	**-6.32**	0.991	0.877	0.986	0.999	**1.000**
France	-10.79	0.86	5.06	**-4.87**	0.992	0.877	0.987	1.000	**1.001**
Germany	-11.61	0.87	4.94	**-5.80**	0.992	0.876	0.987	0.999	**1.000**
Greece	-9.88	0.91	4.56	**-4.42**	0.991	0.879	0.986	1.000	**1.001**
Hungary	-13.41	0.91	4.55	**-7.95**	0.991	0.857	0.986	0.995	**0.996**
Iceland	-10.54	0.94	3.47	**-6.13**	0.991	0.885	0.986	0.999	**1.000**
India	-10.60	1.06	3.74	**-5.80**	0.990	0.829	0.984	0.998	**0.999**
Indonesia	-12.51	1.21	4.44	**-6.87**	0.989	0.855	0.982	0.996	**0.997**
Ireland	-11.49	0.91	4.21	**-6.37**	0.991	0.879	0.986	0.999	**1.000**
Israel	-10.27	0.94	3.43	**-5.90**	0.991	0.885	0.986	1.000	**1.001**
Italy	-10.85	0.87	4.91	**-5.07**	0.992	0.877	0.987	1.000	**1.001**
Japan	3.22	2.04	24.87	**30.13**	0.984	1.033	0.974	0.997	**0.999**
Malaysia	32.67	6.31	44.60	**83.58**	0.958	1.242	0.934	0.964	**0.969**
Mexico	8.61	4.35	21.39	**34.34**	0.965	1.097	0.945	0.994	**0.998**
Netherlands	-11.58	0.89	4.73	**-5.96**	0.992	0.877	0.987	0.999	**1.000**
New Zealand	12.20	2.64	14.60	**29.44**	0.977	1.125	0.964	0.992	**0.995**
Norway	-10.65	0.90	4.63	**-5.13**	0.991	0.878	0.986	0.999	**1.001**
Philippines	-12.93	1.17	3.36	**-8.39**	0.989	0.861	0.982	0.993	**0.995**
Poland	-12.84	0.90	4.69	**-7.26**	0.992	0.857	0.986	0.997	**0.998**
Portugal	-10.96	0.90	4.50	**-5.55**	0.991	0.878	0.986	0.999	**1.000**
Rep. of Korea	-13.43	1.07	3.37	**-8.99**	0.990	0.854	0.984	0.994	**0.995**
Russian Fed.	-14.71	0.93	4.18	**-9.60**	0.991	0.813	0.986	0.995	**0.996**
Spain	-10.48	0.89	4.78	**-4.82**	0.992	0.879	0.987	1.000	**1.001**
Sweden	-11.42	0.91	4.64	**-5.87**	0.991	0.877	0.986	0.999	**1.000**
Switzerland	-11.43	0.87	4.89	**-5.67**	0.992	0.880	0.987	1.000	**1.001**
Thailand	-14.79	1.20	4.25	**-9.34**	0.989	0.843	0.982	0.990	**0.991**
Turkey	-10.32	0.90	4.46	**-4.96**	0.991	0.876	0.986	0.999	**1.001**
United Kingdom	-10.57	0.88	4.49	**-5.21**	0.992	0.878	0.987	1.000	**1.001**
USA	-4.20	1.56	13.53	**10.89**	0.986	0.948	0.978	0.999	**1.000**
Vietnam	104.54	15.26	70.48	**190.28**	0.918	1.607	0.872	0.883	**0.892**

Table 7: IN THE CASE OF MOBILE LABOR WHEN JAPAN JOINS

Country $= n$	INX_n	INP_n	SUB_n	$TOTAL_n$	$\frac{p_n^1}{p_n^0}$	$\frac{L_n^1}{L_n^0}$	$\frac{\pi_{nn}^1}{\pi_{nn}^0}$	$\frac{Y_n^1}{Y_n^0}$	$\frac{W_n^1}{W_n^0}$
Australia	-2.10	0.70	7.32	**5.92**	0.994	0.976	0.990	0.998	**0.999**
Austria	-9.08	0.29	2.50	**-6.29**	0.997	0.903	0.995	0.999	**0.999**
Belgium	-9.19	0.29	2.38	**-6.52**	0.997	0.904	0.995	0.999	**0.999**
Canada	-5.08	0.47	1.39	**-3.22**	0.995	0.941	0.993	0.999	**0.999**
Chile	-3.82	0.70	7.32	**4.19**	0.994	0.953	0.990	0.999	**0.999**
China	-10.40	0.36	2.63	**-7.41**	0.997	0.846	0.994	0.997	**0.998**
Czech Rep.	-9.21	0.29	2.48	**-6.44**	0.997	0.902	0.995	0.999	**0.999**
Denmark	-8.97	0.29	2.43	**-6.25**	0.997	0.903	0.995	0.999	**0.999**
Finland	-9.14	0.30	2.41	**-6.43**	0.997	0.902	0.995	0.999	**0.999**
France	-8.05	0.28	2.47	**-5.30**	0.997	0.905	0.996	1.000	**1.000**
Germany	-8.77	0.28	2.49	**-6.00**	0.997	0.904	0.996	0.999	**1.000**
Greece	-7.65	0.30	2.42	**-4.94**	0.997	0.904	0.995	1.000	**1.000**
Hungary	-10.85	0.30	2.42	**-8.13**	0.997	0.881	0.995	0.996	**0.997**
Iceland	-8.21	0.31	1.64	**-6.27**	0.997	0.908	0.995	0.999	**1.000**
India	-9.45	0.37	2.50	**-6.59**	0.996	0.845	0.994	0.998	**0.998**
Indonesia	-11.24	0.46	3.69	**-7.09**	0.996	0.868	0.993	0.996	**0.997**
Ireland	-8.91	0.30	2.08	**-6.53**	0.997	0.903	0.995	0.999	**0.999**
Israel	-8.01	0.31	1.65	**-6.05**	0.997	0.908	0.995	0.999	**1.000**
Italy	-8.18	0.29	2.45	**-5.44**	0.997	0.905	0.996	1.000	**1.000**
Japan	-8.11	0.33	2.90	**-4.87**	0.997	0.901	0.995	0.999	**1.000**
Malaysia	21.01	4.15	56.54	**81.69**	0.974	1.146	0.959	0.974	**0.978**
Mexico	-2.85	1.16	10.43	**8.74**	0.990	0.966	0.983	0.998	**0.999**
Netherlands	-8.87	0.29	2.42	**-6.16**	0.997	0.903	0.995	0.999	**1.000**
New Zealand	8.33	1.41	16.07	**25.81**	0.988	1.085	0.981	0.995	**0.996**
Norway	-8.22	0.30	2.39	**-5.53**	0.997	0.903	0.995	0.999	**1.000**
Philippines	-11.93	0.42	3.02	**-8.49**	0.996	0.870	0.994	0.994	**0.994**
Poland	-10.32	0.29	2.46	**-7.56**	0.997	0.882	0.995	0.997	**0.998**
Portugal	-8.42	0.30	2.24	**-5.88**	0.997	0.904	0.995	0.999	**1.000**
Rep. of Korea	-12.35	0.35	3.02	**-8.97**	0.997	0.864	0.995	0.995	**0.995**
Russian Fed.	-12.76	0.31	2.30	**-10.15**	0.997	0.834	0.995	0.995	**0.996**
Spain	-7.96	0.29	2.33	**-5.34**	0.997	0.905	0.995	1.000	**1.000**
Sweden	-8.84	0.30	2.44	**-6.10**	0.997	0.903	0.995	0.999	**1.000**
Switzerland	-8.50	0.28	2.42	**-5.79**	0.997	0.908	0.996	1.000	**1.000**
Thailand	-13.74	0.44	4.05	**-9.25**	0.996	0.853	0.993	0.990	**0.991**
Turkey	-8.06	0.30	2.40	**-5.37**	0.997	0.901	0.995	0.999	**1.000**
United Kingdom	-8.04	0.29	2.17	**-5.58**	0.997	0.905	0.996	1.000	**1.000**
USA	-4.90	0.44	6.18	**1.72**	0.996	0.934	0.993	0.999	**1.000**
Vietnam	62.73	11.80	114.54	**189.08**	0.948	1.301	0.918	0.916	**0.922**

Table 8: IN THE CASE OF MOBILE LABOR WHEN JAPAN DOES NOT JOIN

Country $= n$	INX_n	INP_n	SUB_n	$TOTAL_n$	$\frac{p_n^1}{p_n^0}$	$\frac{w_n^1}{w_n^0}$	$\frac{\pi_{nn}^1}{\pi_{nn}^0}$	$\frac{Y_n^1}{Y_n^0}$	$\frac{W_n^1}{W_n^0}$
Australia	-6.20	11.69	-2.78	**2.71**	0.893	0.931	0.934	0.992	**1.002**
Austria	-9.45	10.09	-11.66	**-11.03**	0.897	0.897	1.001	0.971	**0.983**
Belgium	-9.65	10.09	-11.62	**-11.18**	0.898	0.897	1.000	0.962	**0.974**
Canada	-7.60	10.68	-8.69	**-5.61**	0.895	0.914	0.968	0.987	**0.998**
Chile	-5.85	12.16	-1.37	**4.94**	0.890	0.932	0.930	0.994	**1.005**
China	-8.36	10.03	-12.09	**-10.42**	0.898	0.873	1.045	0.993	**1.004**
Czech Rep.	-9.58	10.09	-11.67	**-11.16**	0.897	0.897	1.001	0.967	**0.978**
Denmark	-9.37	10.09	-11.64	**-10.92**	0.897	0.897	1.001	0.974	**0.986**
Finland	-9.49	10.09	-11.69	**-11.09**	0.897	0.897	1.001	0.971	**0.983**
France	-8.55	10.10	-11.52	**-9.96**	0.898	0.898	0.999	0.986	**0.998**
Germany	-9.18	10.09	-11.63	**-10.72**	0.898	0.898	1.000	0.977	**0.989**
Greece	-8.07	10.09	-11.65	**-9.63**	0.897	0.897	1.000	0.990	**1.002**
Hungary	-9.96	10.09	-11.75	**-11.62**	0.897	0.889	1.015	0.976	**0.985**
Iceland	-9.10	10.10	-11.48	**-10.48**	0.898	0.898	0.999	0.979	**0.991**
India	-7.42	10.11	-12.18	**-9.49**	0.897	0.876	1.039	0.995	**1.006**
Indonesia	-9.87	10.14	-11.78	**-11.51**	0.897	0.880	1.030	0.985	**0.995**
Ireland	-9.42	10.09	-11.58	**-10.91**	0.898	0.897	1.001	0.973	**0.985**
Israel	-8.88	10.10	-11.52	**-10.30**	0.898	0.898	0.999	0.982	**0.995**
Italy	-8.64	10.10	-11.57	**-10.11**	0.897	0.898	0.999	0.985	**0.998**
Japan	-6.70	12.88	9.70	**15.88**	0.895	0.934	0.934	0.993	**1.003**
Malaysia	-0.12	18.67	26.63	**45.18**	0.872	1.003	0.798	1.001	**0.974**
Mexico	-4.04	14.87	7.33	**18.16**	0.878	0.958	0.870	0.997	**1.006**
Netherlands	-9.28	10.09	-11.64	**-10.83**	0.897	0.897	1.001	0.976	**0.988**
New Zealand	-3.46	12.65	0.98	**10.17**	0.889	0.967	0.874	0.995	**1.000**
Norway	-8.60	10.09	-11.66	**-10.16**	0.897	0.897	1.001	0.986	**0.998**
Philippines	-10.64	10.10	-11.80	**-12.35**	0.897	0.882	1.028	0.974	**0.981**
Poland	-9.44	10.09	-11.84	**-11.18**	0.897	0.890	1.013	0.983	**0.993**
Portugal	-8.91	10.10	-11.57	**-10.37**	0.898	0.897	1.001	0.983	**0.995**
Rep. of Korea	-10.26	10.04	-12.53	**-12.75**	0.897	0.884	1.024	0.976	**0.984**
Russian Fed.	-9.46	10.09	-12.54	**-11.91**	0.897	0.874	1.042	0.990	**0.999**
Spain	-8.47	10.10	-11.53	**-9.89**	0.898	0.898	1.000	0.987	**0.999**
Sweden	-9.22	10.09	-11.64	**-10.77**	0.897	0.897	1.001	0.978	**0.990**
Switzerland	-9.22	10.10	-11.56	**-10.68**	0.898	0.899	0.997	0.973	**0.985**
Thailand	-11.24	10.11	-11.95	**-13.08**	0.897	0.875	1.040	0.972	**0.976**
Turkey	-8.27	10.08	-11.74	**-9.93**	0.897	0.896	1.002	0.989	**1.001**
United Kingdom	-8.54	10.09	-11.58	**-10.03**	0.898	0.898	1.000	0.986	**0.999**
USA	-6.81	11.32	-2.95	**1.56**	0.896	0.913	0.970	0.994	**1.006**
Vietnam	15.02	30.01	54.70	**99.74**	0.838	1.093	0.653	1.042	**0.914**

Table 9: IN THE CASE OF IMMOBILE LABOR WHEN JAPAN JOINS

Country $= n$	INX_n	INP_n	SUB_n	$TOTAL_n$	$\frac{p_n^1}{p_n^0}$	$\frac{w_n^1}{w_n^0}$	$\frac{\pi_{nn}^1}{\pi_{nn}^0}$	$\frac{Y_n^1}{Y_n^0}$	$\frac{W_n^1}{W_n^0}$
Australia	-7.14	11.03	-5.56	**-1.67**	0.895	0.918	0.962	0.991	**1.002**
Austria	-9.43	10.19	-11.10	**-10.35**	0.897	0.898	0.999	0.971	**0.983**
Belgium	-9.62	10.19	-11.10	**-10.53**	0.897	0.898	0.998	0.963	**0.974**
Canada	-8.07	10.36	-9.88	**-7.59**	0.897	0.907	0.982	0.986	**0.998**
Chile	-7.01	11.02	-6.21	**-2.20**	0.895	0.913	0.969	0.993	**1.005**
China	-8.26	10.20	-11.52	**-9.59**	0.897	0.876	1.038	0.993	**1.004**
Czech Rep.	-9.55	10.19	-11.12	**-10.48**	0.897	0.898	0.999	0.967	**0.979**
Denmark	-9.34	10.19	-11.10	**-10.25**	0.897	0.898	0.998	0.974	**0.986**
Finland	-9.45	10.19	-11.16	**-10.42**	0.897	0.898	0.999	0.972	**0.983**
France	-8.54	10.19	-11.02	**-9.37**	0.897	0.899	0.997	0.986	**0.999**
Germany	-9.17	10.19	-11.06	**-10.04**	0.897	0.898	0.998	0.978	**0.990**
Greece	-8.04	10.19	-11.12	**-8.97**	0.897	0.898	0.998	0.990	**1.002**
Hungary	-9.93	10.19	-11.22	**-10.97**	0.897	0.890	1.013	0.976	**0.985**
Iceland	-9.01	10.17	-11.16	**-9.99**	0.897	0.899	0.996	0.979	**0.991**
India	-7.36	10.21	-11.79	**-8.94**	0.896	0.877	1.035	0.995	**1.006**
Indonesia	-9.75	10.25	-11.36	**-10.86**	0.896	0.882	1.025	0.986	**0.995**
Ireland	-9.36	10.18	-11.15	**-10.33**	0.897	0.898	0.999	0.974	**0.985**
Israel	-8.79	10.17	-11.20	**-9.82**	0.897	0.899	0.996	0.982	**0.995**
Italy	-8.62	10.19	-11.07	**-9.51**	0.897	0.899	0.997	0.985	**0.998**
Japan	-8.26	10.21	-11.28	**-9.33**	0.897	0.898	0.998	0.989	**1.001**
Malaysia	-4.21	19.07	37.72	**52.58**	0.878	0.974	0.847	0.993	**0.975**
Mexico	-6.96	11.77	-2.82	**1.98**	0.892	0.915	0.959	0.993	**1.005**
Netherlands	-9.25	10.19	-11.10	**-10.16**	0.897	0.898	0.998	0.976	**0.988**
New Zealand	-4.87	12.61	3.04	**10.78**	0.891	0.953	0.898	0.993	**1.000**
Norway	-8.57	10.19	-11.13	**-9.51**	0.897	0.898	0.998	0.986	**0.999**
Philippines	-10.49	10.23	-11.31	**-11.57**	0.897	0.884	1.022	0.974	**0.981**
Poland	-9.42	10.19	-11.29	**-10.52**	0.897	0.891	1.011	0.983	**0.993**
Portugal	-8.86	10.18	-11.11	**-9.79**	0.897	0.898	0.998	0.983	**0.995**
Rep. of Korea	-10.19	10.22	-11.78	**-11.76**	0.896	0.886	1.019	0.977	**0.985**
Russian Fed.	-9.44	10.19	-12.02	**-11.27**	0.896	0.875	1.039	0.990	**0.999**
Spain	-8.44	10.19	-11.07	**-9.32**	0.897	0.899	0.997	0.987	**1.000**
Sweden	-9.18	10.19	-11.12	**-10.12**	0.897	0.898	0.999	0.978	**0.990**
Switzerland	-9.20	10.19	-11.06	**-10.08**	0.897	0.900	0.995	0.973	**0.986**
Thailand	-11.13	10.26	-11.33	**-12.20**	0.896	0.878	1.034	0.973	**0.977**
Turkey	-8.25	10.19	-11.19	**-9.25**	0.897	0.897	1.000	0.989	**1.001**
United Kingdom	-8.51	10.18	-11.11	**-9.44**	0.897	0.899	0.998	0.986	**0.999**
USA	-6.98	10.56	-7.89	**-4.32**	0.897	0.905	0.986	0.994	**1.006**
Vietnam	1.85	32.32	92.34	**126.51**	0.856	1.016	0.761	1.007	**0.912**

Table 10: IN THE CASE OF IMMOBILE LABOR WHEN JAPAN DOES NOT JOIN

	Mobile	Immobile		Mobile	Immobile
Australia	Not	Not	Iceland	Join	Not
Canada	Not	Not	India	Join	Not
Chile	Not	Join	Indonesia	Join	Not
Japan	Not	Join	Ireland	Join	Not
Malaysia	Not	Not	Israel	Join	Not
Mexico	Not	Join	Italy	Join	Not
New Zealand	Not	Join	Netherlands	Join	Not
USA	Join	Not	Norway	Join	Not
Vietnam	Not	Join	Philippines	Join	Not
Austria	Join	Not	Poland	Join	Not
Belgium	Join	Not	Portugal	Join	Not
China	Join	Not	Rep. of Korea	Join	Not
Czech Rep.	Join	Not	Russian Fed.	Join	Not
Denmark	Join	Not	Spain	Join	Not
Finland	Join	Not	Sweden	Join	Not
France	Join	Not	Switzerland	Join	Not
Germany	Join	Not	Thailand	Join	Not
Greece	Join	Not	Turkey	Join	Not
Hungary	Not	Not	United Kingdom	Join	Not

Table 11: COMPARISON WHEN JAPAN JOINS AND DOES NOT JOINS THE TPP

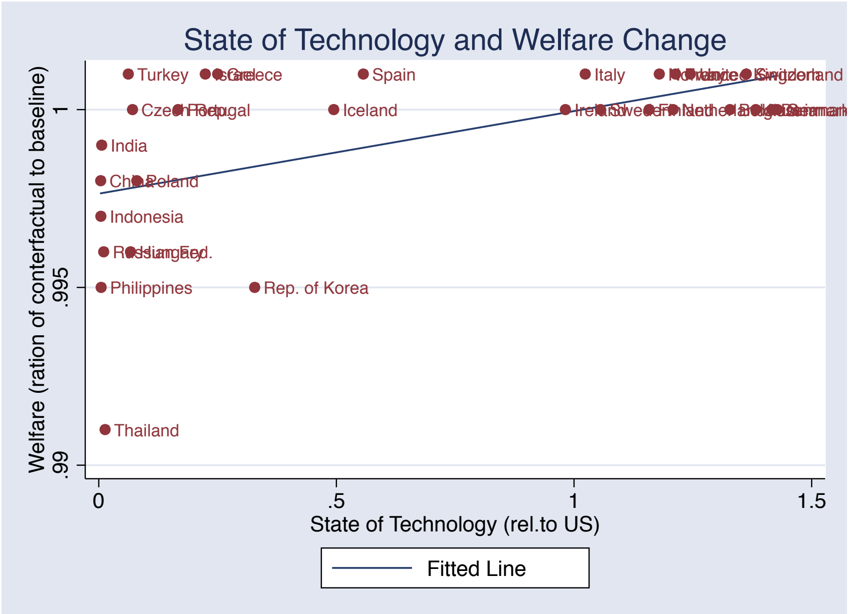

Figure 1: WELFARE CHANGES AND STATE OF TECHNOLOGY:MOBILE LABOR

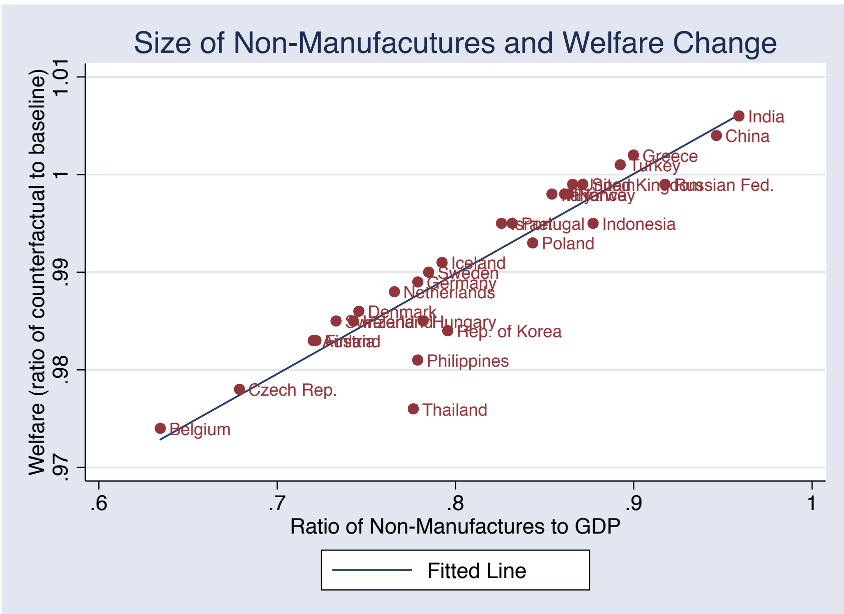

Figure 2: WELFARE CHANGES AND SIZE OF NON-MANUFACTURES:IMMOBILE LABOR

Mobile In	Mobile Out	Immobile In	Immobile Out
(USA)	**USA**	**(USA)**	**(USA)**
Japan	**Japan**	**(Mexico)**	**(Mexico)**
Chile	**Chile**	**(Chile)**	**(Chile)**
Canada	**Canada**	**(Japan)**	**(Australia)**
Australia	**Mexico**	**(Australia)**	**(Japan)**
Mexico	**Australia**	**(New Zealand)**	**New Zealand**
New Zealand	**New Zealand**	**Canada**	**Canada**
Malaysia	**Malaysia**	**Malaysia**	**Malaysia**
Vietnam	**Vietnam**	**Vietnam**	**Vietnam**
(Greece)	Greece	(India)	(India)
(Israel)	France	(China)	(China)
(France)	Spain	(Greece)	(Greece)
(Spain)	Switzerland	(Turkey)	(Turkey)
(United Kingdom)	United Kingdom	Spain	Spain
(Switzerland)	Italy	Russian Fed.	Russian Fed.
(Italy)	Israel	United Kingdom	United Kingdom
(Turkey)	Norway	France	Norway
(Norway)	Turkey	Norway	France
(Iceland)	Iceland	Italy	Italy
(Portugal)	Portugal	Portugal	Portugal
(Germany)	Germany	Indonesia	Indonesia
(Sweden)	Sweden	Israel	Israel
(Netherlands)	Netherlands	Poland	Poland
(Denmark)	Denmark	Iceland	Iceland
Austria	Austria	Sweden	Sweden
Ireland	Ireland	Germany	Germany
Finland	Finland	Netherlands	Netherlands
Czech Rep.	Czech Rep.	Denmark	Denmark
Belgium	Belgium	Switzerland	Switzerland
India	India	Ireland	Ireland
China	Poland	Hungary	Hungary
Poland	China	Rep. of Korea	Rep. of Korea
Indonesia	Indonesia	Austria	Austria
Hungary	Hungary	Finland	Finland
Russian Fed.	Russian Fed.	Philippines	Philippines
Rep. of Korea	Rep. of Korea	Czech Rep.	Czech Rep.
Philippines	Philippines	Thailand	Thailand
Thailand	Thailand	Belgium	Belgium

Table 12: WELFARE GAIN AND LOSS: DESCENDING ORDERS

[a.] "Mobile/Immobile In" and "Mobile/Immobile Out" mean a scenario where Japan joins and does not join the TPP in the case of mobile or immobile labor, respectively.

[b.] Countries in blankets gain.

n	$\frac{Y_n^O}{Y_n}$	n	$\frac{Q_n^r}{X_n}$	n	$\frac{TR_n}{X_n}$	n	$\sum_{i \in A} \hat{\pi}_{ni}$
India	0.96	**India**	0.73	**Vietnam**	0.121	**Canada**	0.59
China	0.95	**China**	0.80	**Russian Fed.**	0.082	**Mexico**	0.46
USA	0.93	**USA**	0.86	**India**	0.081	**Rep. of Korea**	0.44
Mexico	0.92	**Mexico**	0.90	**China**	0.077	**New Zealand**	0.43
Chile	0.92	**Chile**	0.92	**Thailand**	0.069	**Australia**	0.43
Russian Fed.	0.92	**Russian Fed.**	0.92	**Malaysia**	0.067	**Philippines**	0.43
Greece	0.90	**Greece**	0.96	**Indonesia**	0.056	**China**	0.42
Turkey	0.89	**Turkey**	0.98	**Philippines**	0.053	**Indonesia**	0.41
Australia	0.89	**Australia**	0.98	**Rep. of Korea**	0.047	**Thailand**	0.41
Japan	0.89	**Japan**	0.98	**Hungary**	0.035	**Chile**	0.39
Indonesia	0.88	**Indonesia**	1.00	**Poland**	0.033	**Vietnam**	0.37
Spain	0.87	**Spain**	1.01	**New Zealand**	0.025	**India**	0.36
United Kingdom	0.87	**United Kingdom**	1.02	**Mexico**	0.024	**Malaysia**	0.34
Norway	0.86	**Norway**	1.02	**Australia**	0.022	**USA**	0.34
France	0.86	**France**	1.02	**Japan**	0.015	**Israel**	0.30
Italy	0.85	**Italy**	1.03	**USA**	0.015	**Iceland**	0.29
Canada	0.85	**Canada**	1.04	**Canada**	0.015	**Russian Fed.**	0.28
Poland	0.84	**Poland**	1.05	**Chile**	0.014	**Japan**	0.27
New Zealand	0.84	**New Zealand**	1.05	**Turkey**	0.014	**United Kingdom**	0.24
Portugal	0.83	**Portugal**	1.06	**Ireland**	0.011	**Turkey**	0.24
Israel	0.83	**Israel**	1.06	**Finland**	0.011	**Ireland**	0.23
Rep. of Korea	0.80	**Rep. of Korea**	1.09	**Greece**	0.011	**Spain**	0.23
Iceland	0.79	**Iceland**	1.09	**Sweden**	0.011	**Greece**	0.23
Sweden	0.78	**Sweden**	1.09	**Norway**	0.011	**Finland**	0.23
Hungary	0.78	**Hungary**	1.09	**Portugal**	0.010	**Portugal**	0.23
Germany	0.78	**Germany**	1.10	**Czech Rep.**	0.010	**Sweden**	0.23
Philippines	0.78	**Philippines**	1.10	**Belgium**	0.010	**Germany**	0.23
Thailand	0.78	**Thailand**	1.10	**Netherlands**	0.010	**Italy**	0.23
Netherlands	0.77	**Netherlands**	1.10	**Denmark**	0.010	**Norway**	0.22
Denmark	0.75	**Denmark**	1.11	**Austria**	0.010	**Hungary**	0.22
Ireland	0.74	**Ireland**	1.11	**United Kingdom**	0.010	**Poland**	0.22
Switzerland	0.73	**Switzerland**	1.12	**Spain**	0.010	**Denmark**	0.21
Finland	0.72	**Finland**	1.12	**Israel**	0.010	**Austria**	0.21
Austria	0.72	**Austria**	1.12	**Italy**	0.009	**Czech Rep.**	0.20
Malaysia	0.71	**Malaysia**	1.13	**Germany**	0.009	**Netherlands**	0.20
Czech Rep.	0.68	**Czech Rep.**	1.14	**Iceland**	0.008	**Belgium**	0.20
Belgium	0.63	**Belgium**	1.15	**France**	0.008	**France**	0.20
Vietnam	0.55	**Vietnam**	1.16	**Switzerland**	0.005	**Switzerland**	0.18

Table 13: BASIC VARIABLES

[a] $\hat{\pi}_{ni}$ denotes an import share of country i in country n.

[b] Only Q_n^r/X_n is aligned in an ascending order while other variables are aligned in a descending order.

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