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International Migration and Trade Agreements:  
the new role of PTAs

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Gianluca Orefice

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## INTERNATIONAL MIGRATION AND TRADE AGREEMENTS: THE NEW ROLE OF PTAs

Gianluca Orefice

### NON-TECHNICAL SUMMARY

In the last two decades developed countries experienced a huge increase in the inflows of migrants. At the same time, the role of Preferential Trade Agreements (PTAs) became crucial (the number of PTAs passed from 70 in 1990 to more than 300 in 2010) and their contents started to go beyond the traditional issue on tariff reduction. Recent PTAs contain a wide range of provisions from Antidumping to Environmental related provisions, from GATS to Social related matters. More interestingly for the purpose of this paper, PTAs contain also migration related provisions. Thus, this paper aims to study the relation between migrants' inflow and PTAs (and their contents) focusing on 29 OECD destination countries over the period 1998-2008.

PTAs might play a twofold role in stimulating bilateral migration flows. On one hand, PTAs may reduce the information cost attached to a (potential) migration flow by increasing the information about a certain destination country: all the other determinants of migration being constant, potential migrants will choose a destination country on the basis of the information held about all candidate countries. In increasing the amount of information, PTAs could drive migration choice towards PTA members. On the other hand, PTAs may foster (deter) international bilateral migration by including provisions which could favour (deter) migration flows. Visa and asylum provision is often included in recent PTAs and stimulates partner countries to exchange information and draft legislation on migration topic. Also GATS related provisions are included in recent PTAs and basically guarantee the free exchange of services providers (workers) among member countries (not only short term migration). For example the Singapore-Australia Trade Agreement (2003) – chapter 11, article 4- regulates long term migration (up to 14 years) for intra-corporate transferee. Finally labour market related provision aims to integrate the labour markets of signatory countries and could favour bilateral migration.

By using a gravity model approach (Anderson and vanWincoop 2003; Anderson 2011) this paper studies the effect of PTA and its content on both the value of bilateral migration flows and its extensive margins. It adds on the existing literature by considering for the first time (up to my knowledge) Preferential Trade Agreements as a determinant of bilateral migration flows. I find overwhelming evidence of a pro-migration effect of PTAs: mutual PTA

stimulates international migration flows among member countries by almost 17.5 per cent. Also the content of PTAs matter in affecting bilateral migration flows: the inclusion of visa and asylum or labour market related provision further boosts bilateral migration flows. On the contrary, the inclusion provision replicating GATS deters bilateral migration flows. The extensive margin of migration (i.e. the probability of having positive bilateral migration flows) is affected only by the contents of PTAs and not by the presence of a PTA itself.

The paper also shows the marginal role of PTAs in stimulating bilateral trade in goods (which is supposed to be actual aim for PTAs) compared with the role they have on stimulating bilateral migration flows. One possible interpretation is that trade in goods is already widely liberalized and the role for PTAs is marginal while international migration is still hardly constrained and PTAs might really help in managing bilateral flows. It implies that governments can use PTAs rather than bilateral migration agreements to increase the inflows of foreign workers (in case of population ageing or shortage in labour supply); this would be particularly interesting in case of negative attitudes towards migration among voters in developed countries (Mayda 2008 shows that people are in general more pro-trade than pro-migration).

#### **ABSTRACT**

This paper investigates empirically the role of Preferential Trade Agreements (PTAs) as determinants of migration inflows for 29 OECD countries in the period 1998-2008. By increasing information about signatory countries, PTAs are expected to drive migration flows towards member countries. Building on the empirical literature on the determinants of migration, I estimate a modified gravity model on migration flows providing evidence of a strong positive effect of PTAs on bilateral migration flows. I also consider the content of PTAs as a further determinant of migration, finding that visa-and-asylum and labour market related provisions, when included in PTAs, stimulate bilateral migration flows. Finally, by comparing the average effects of PTAs on migration flows and on trade, I show that PTAs stimulate bilateral migration flows more than trade in final goods. PTAs might be used by government to increase inflows of immigrant workers in the case of labour shortages or population ageing.

*JEL Classification:* F22, F13, F53, F16

*Key Words:* International Migration, Trade Policy, Preferential Trade Agreements



## MIGRATION INTERNATIONALE ET ACCORDS COMMERCIAUX : LE NOUVEAU RÔLE DES ACCORDS COMMERCIAUX PRÉFÉRENTIELS

Gianluca Orefice

### RÉSUMÉ NON TECHNIQUE

Dans les deux dernières décennies, les pays développés ont connu une forte croissance des flux migratoires. Durant cette période, les accords commerciaux préférentiels (ACP) se sont multipliés (de 70 accords en 1990 à plus de 300 en 2010) tandis que leur contenu a dépassé la traditionnelle question de la réduction tarifaire. Ces nouveaux ACP contiennent un large éventail de dispositions allant de l'antidumping à l'environnement, de l'ouverture des services (GATS) aux affaires sociales. La migration internationale fait également l'objet de dispositions dans certains de ces accords commerciaux. Ce travail vise à étudier la relation entre les ACP (et leurs contenus) et les flux migratoires sur 29 pays de destination de l'OCDE et la période 1998-2008.

Les ACP peuvent stimuler les flux migratoires bilatéraux de deux manières. D'une part, les ACP peuvent réduire le coût de l'information attachée à un flux migratoire (potentiel) en augmentant l'information sur un pays de destination : tous les autres déterminants de la migration étant constants, les migrants potentiels choisiront un pays de destination sur la base de l'information qu'ils possèdent sur les différents pays de destination possible. Ainsi, en augmentant la quantité d'informations, les ACP peuvent influencer les choix de migration en faveur des pays partenaires de l'accord commercial. D'autre part, les ACP peuvent favoriser (décourager) la migration internationale bilatérale en incluant des dispositions en faveur (ou défaveur) des flux migratoires. Des dispositions concernant les visas et le droit d'asile sont souvent incluses dans les accords commerciaux préférentiels récents, ce qui amène les pays partenaires à échanger des informations sur les questions migratoires. Par ailleurs, des dispositions relevant du GATS sont incluses dans les ACP, et garantissent essentiellement la libre circulation des prestataires de services entre pays signataires (et pas seulement les migrations à court terme); ainsi, l'accord Singapour-Australie (2003) – chapitre 11, article 4 – régleme les migrations à long terme (jusqu'à 14 ans) pour les échanges intra-firme. Enfin, les dispositions relatives au marché du travail, incluses dans certains ACP, pourront favoriser la migration bilatérale.

En utilisant le modèle de gravité (Anderson et van Wincoop 2003 ; Anderson 2011) on étudie ici l'effet des ACP et de leurs contenus à la fois sur la taille de flux migratoires bilatéraux

(marges intensives) et sur la probabilité d'avoir des flux migratoires bilatéraux positifs (marges extensives). Ce travail complète la littérature existante en examinant les accords commerciaux préférentiels en tant que déterminants des flux migratoires bilatéraux. Nous trouvons un effet positif des ACP sur la taille des flux migratoires (marges intensives): partager un ACP augmente la taille des flux migratoires entre pays membres de près de 17,5 %. Le contenu des accords commerciaux préférentiels est également important : l'inclusion, dans un accord, de dispositions concernant les visas et le droit d'asile ou le marché du travail renforce encore les flux migratoires bilatéraux. Au contraire, l'inclusion des dispositions du GATS dans les accords commerciaux préférentiels bilatéraux dissuade les flux migratoires. En outre, nous constatons que seul le contenu des ACP (et non pas le ACP lui-même) a une incidence sur les marges extensive de la migration : des dispositions concernant les visas et le droit d'asile et le marché du travail augmentent la probabilité d'avoir des flux migratoires bilatéraux positifs (marges extensives).

Ce travail montre par ailleurs le rôle marginal des ACP dans la stimulation du commerce bilatéral de marchandises (censée être leur objectif), comparé à leur impact sur les flux migratoires bilatéraux. Une interprétation possible est que le commerce de marchandises est déjà largement libéralisé, tandis que les flux migratoires sont encore contraints. Les accords commerciaux préférentiels pourraient améliorer significativement la gestion des flux migratoires bilatéraux. Si les gouvernements souhaitent augmenter les entrées de travailleurs étrangers (pour faire face au vieillissement de la population ou à la pénurie d'offre de travail), les accords commerciaux préférentiels constituent un outil plus facile à mettre en œuvre que les accords migratoires bilatéraux, la population étant généralement plus favorable au commerce qu'aux migrations.

## RÉSUMÉ COURT

Ce travail vise à étudier la relation entre les accords commerciaux préférentiels (et leur contenu) et les entrées de migrants dans 29 pays de destination de l'OCDE sur la période 1998-2008. En utilisant le modèle de gravité (Anderson 2011), il, examine l'effet des ACP sur le nombre de flux migratoires bilatéraux et sur leurs tailles. Nous trouvons un effet positif des accords commerciaux préférentiels sur les flux migratoires : partager un ACP stimule les flux migratoires entre pays membres de près de 17,5 %. Nous considérons également le contenu des ACP comme un déterminant de la migration, estimant que les dispositions sur les visas, le droit d'asile et l'accès au marché du travail (lorsqu'ils sont inclus dans les ACP) stimulent les flux migratoires bilatéraux. Enfin, en comparant les effets des ACP sur les flux migratoires et sur le commerce, nous montrons que les accords commerciaux préférentiels bilatéraux stimulent davantage les flux migratoires que le commerce de marchandises

*Classification JEL* : F22, F13, F53, F16

*Mots-clefs* : Migration Internationale, Politique Commerciale, Accords Commerciaux Préférentiels

## INTERNATIONAL MIGRATION AND TRADE AGREEMENTS: THE NEW ROLE OF PTAS

Gianluca Orefice\*

### INTRODUCTION

Towards the end of the 20th century, the developed countries have experienced a huge increase in migrant inflows. According to the International Organization for Migration (IOM) estimates, the number of international migrants doubled between 2000 and 2010 from 150m. to 214m.<sup>1</sup> The United Nations (UN) Department of Economic and Social Affairs estimates a 1.8 per cent annual rate of change in worldwide migrant stock in the same period. At the same time, the international trading system has experienced a dramatic increase in the number of Preferential Trade Agreements (PTAs): the World Trade Report (2011) shows the number of PTAs worldwide increased from 70 in 1990 to more than 300 in 2010.

Figure 1 shows a positive relation between migration flows and the increasing number of countries involved in Preferential Trade Agreements (PTAs). This positive correlation contrasts with traditional factor content trade theory. In a Heckscher and Ohlin framework PTAs substitute for migration flows: by stimulating trade in goods, PTAs are expected to favour convergence in factor prices among countries reducing the incentive to migrate.<sup>2</sup> However, there is no empirical support for this argument, while there is overwhelming evidence of the complementarity between trade and migration flows (Bandyopandhyay et al., 2008; Head and Ries, 1998; Rauch and Trindade, 2002; Wagner et al., 2002). It has been shown that immigrants stimulate trade by reducing trade costs (by providing information on foreign country), or by increasing the demand for goods from their countries of origin (Felbermayr and Toubal 2012). The positive link between Preferential Trade Agreements and bilateral migration flows is even clearer in figure 2; where bilateral average flow of migrants is plotted before and after the signature of a PTA. Figure 2 clearly shows the jump in the average value of migrants' flows after the signature of a PTA.

This paper supports the idea that PTAs might play a twofold role in stimulating bilateral migration flows. First, they might reduce the cost of migration by increasing the information

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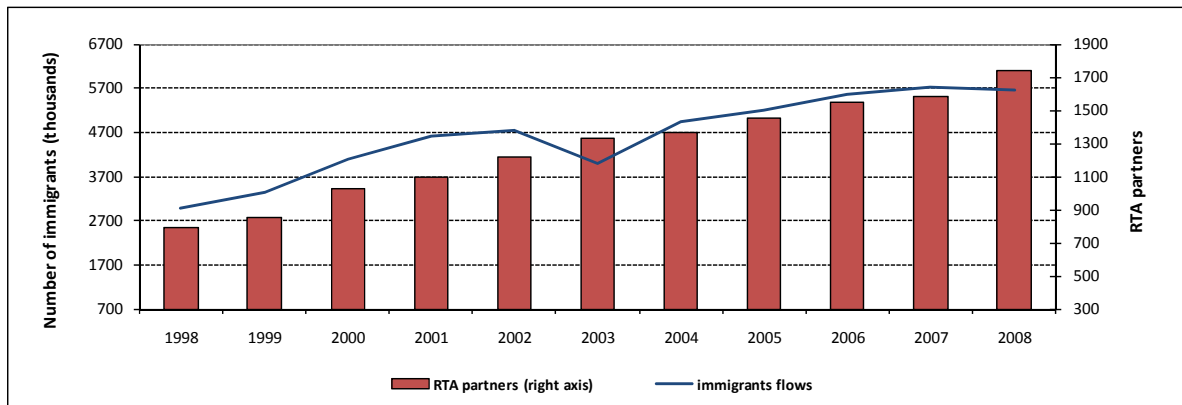
\* CEPII, rue de Grenelle 113, 75007 Paris (France). Tel : (33) 1 53 68 55 71. Email : [gianluca.orefice@cepii.fr](mailto:gianluca.orefice@cepii.fr). Thanks to Matthieu Crozet, Lionel Fontagne and Farid Toubal for very useful comments and suggestions. The author was affiliated to the World Trade Organization Economic Research Division in the very early stages of this project. The views expressed in this article are those of the author and do not reflect the institution. The usual disclaimers apply.

<sup>1</sup> It includes also south-south migration.

<sup>2</sup> This argument was used to justify the creation of NAFTA and EU enlargement towards the Eastern European countries. However, the neoclassical notion of substitutability between migration and trade is not valid if the assumption of identical technologies across countries is relaxed (Markusen, 1983; Schiff, 2006).

about the potential destination country. Second, they further stimulate migration flows by including migration related provisions. International relations based on PTAs increase the information on potential destination countries, reducing the transaction costs attached to the (potential) migration flows. This additional information can be in the form of improved diplomatic relations and increased familiarity among signatory countries.<sup>3</sup> That is, all other determinants of migration being constant, a potential migrant will choose a destination country on the basis of the information held about all candidate countries. In increasing the amount of information, PTAs could drive migration choice towards PTA members.

**Figure 1. Increasing trend in migration flows and number of PTAs member countries**



Source: WTO and OECD dataset.

The second channel through which PTAs can affect migration relates to the increasing depth of trade agreements. Horn et al. (2010) show that more recent PTAs include provisions beyond those considered traditionally by the trade liberalization literature. Recent PTAs include provisions related to the regulation of international migration of workers, such as visa and asylum, or provisions replicating (or even going beyond) the multilateral Mode IV of the General Agreement on Trade in Services (GATS) (Horn et al. 2010; Panizzon, 2010; Nielson, 2003). Panizzon (2010) shows that bilateral trade agreements (mostly replicating GATS Mode IV liberalization at the bilateral level) are adopting migration governance instruments such as skill-testing, institutionalized recruitment and migrant return guarantees.

As an example, Canada-Chile (1996) Free Trade Agreement<sup>4</sup>, mostly thought for trade in goods and services liberalization, includes temporary migration related provisions which ease the movement of workers between signatory countries: services suppliers are allowed to enter in both markets without worrying quotas on the restriction of the number of potential suppliers. Other trade agreements include also provisions allowing long term migration

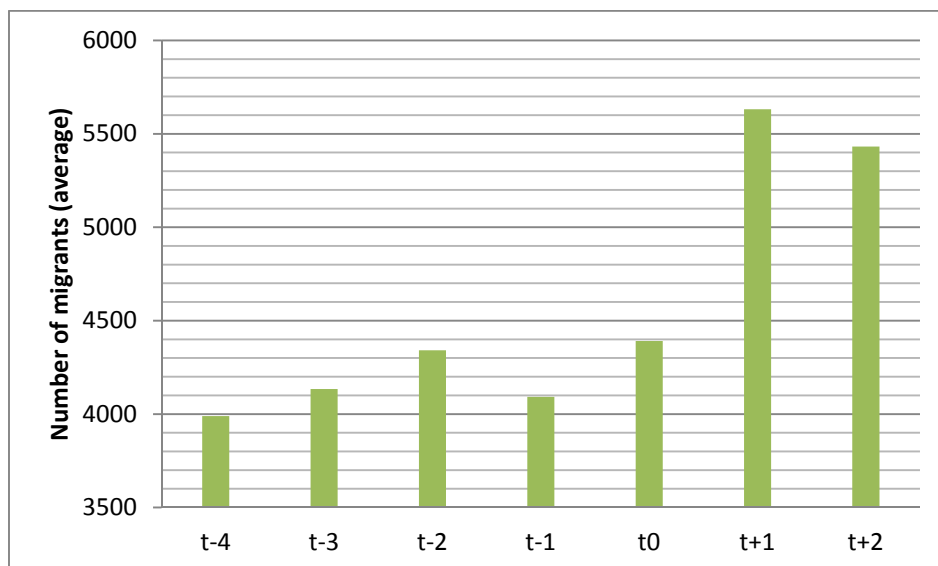
<sup>3</sup> It operates as the diasporas externalities (Beine et al. 2010) where the information provided by existing communities of migrants in destination countries attracts new immigrants' flows.

<sup>4</sup> See chapter K of the agreement, in particular Annexes K-03.



between signatory countries; for example the Singapore-Australia Trade Agreement (2003)<sup>5</sup> allows the free movement of workers (intra-corporate) up to a total term of 14 years.

**Figure 2. Average value of bilateral migration flows (cleaned from idiosyncratic error term)<sup>6</sup>, before and after the signature of a PTA (time=t0)**



Source: Author's calculation on OECD data.

Former cases suggest that PTAs are increasingly being used to regulate international migration flows favouring the free movement of workers among signatory countries. As highlighted by Horn et al. (2010) a frequently used instrument to regulate migration flows through PTAs is by including migration related provisions. For example, visa and asylum provision could affect bilateral migration flows by smoothing the procedures for migration to

<sup>5</sup> Chapter 11, article 4 regulates long term migration among member countries for intra-corporate transferee. For Singapore, short term entry can be extended for an initial extra-period of two years which may be extended for periods up to three years at a time for a total term not exceeding 14 years. In the case of Australia the initial extension is up to four years and then for four years at a time, for a total term not exceeding 14 years.

<sup>6</sup> Values on vertical axis have been computed as:

$$\frac{1}{S} \sum_{ij}^{S} est\_mig_{ijt}$$

where S is the set of country pairs which have signed a PTA in the time period 1998-2008 and  $est\_mig_{ijt}$  is the fit of the following regression (the aim is to keep the original series of migration flows  $-mig_{ijt}$  cleaned from the error component):

$$mig_{ijt} = \phi_t + \phi_{it} + \phi_{jt} + \phi_{ij} + \varepsilon_{ijt}$$

Horizontal axis reports the time period before and after the signature of a PTA (time t0 is the signature year).

a member country. PTAs' provisions replicating GATS Mode IV scheme, by allowing the free movement of some professionals between member countries, could favour temporary migration and, eventually favour long term stay in destination country through migrants' participation to business networks.<sup>7</sup>

According to the former channels, PTAs might affect the probability of having positive bilateral migration flows (extensive margins) and/or their values (intensive margins). By studying the two former channels this paper adds to the empirical literature on the determinants of migration flows which highlights the importance of "push" and "pull" factors affecting migration decision of potential migrants. Among the "pull" factors (destination country specific variables attracting new immigrants) average income and employment rate have been shown as strongly affecting migration flows (Hatton 2005; Mayda 2010). "Push" factors (origin country specific variables pushing individual to leave the country) are mainly income dispersion and poverty in origin countries. Other two broad categories of variables affecting migration flows are: (i) the travel cost of migration (usually approximated by distance); (ii) the information cost of migration and the cultural similarity between origin and destination country (Mayda, 2010; Gross and Schmitt 2003; Berthelemy et al. 2009). This paper adds to the former existing literature by finding a role of PTAs in affecting the volume of bilateral migration flows. To my knowledge, it is the first study that considers PTAs as a determinant of migration flows.

Using yearly data on immigrant inflows for 29 OECD countries between 1998 and 2008, I investigate empirically the role of PTAs as a determinant of bilateral migration flows by estimating a modified gravity model of migration (Anderson, 2011; Karemera et al., 2000). Endogeneity and zero flows issues are addressed following Baier and Bergstrand (2007) and Silva and Tenreyro (2006) respectively.<sup>8</sup> Thus, the main paper's contribution to the literature is the analysis of a new potential determinant of migration flows.

The results of my analysis show a positive effect of PTAs on bilateral migration flows among PTA member countries. Being signatory of a PTA agreement stimulates migration flows among member countries almost by 17.5 per cent (according to my preferred specification<sup>9</sup>); this effect increases up to 28 per cent if the PTA includes visa and asylum provision. Given the big impact of PTAs on migrant flows, I also compare their effects on migration with the effect on trade in goods. I find that PTAs have a higher effect on migration than on trade in goods (i.e. PTAs have a strong positive effect on migration and a weak effect on trade in goods). This result suggests that trade is worldwide already liberalized so that PTAs play only

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<sup>7</sup> Provisions replicating GATS, by regulating the movement of persons engaged in the conduct of trade and investment, allows the temporary entry of the 'natural persons of a party' into the territory of the other party. These persons can include: business visitors, installers and service providers (with unspecified levels of education), intra-corporate transferees or contract service suppliers. See, e.g., the ASEAN-Australia-New Zealand or the US-Singapore agreement

<sup>8</sup> I use an Instrumental Variables (IV) approach to strengthen the endogeneity problem solution proposed by Baier and Bergstrand (2007).

<sup>9</sup> OLS estimation with country pair fixed effects.

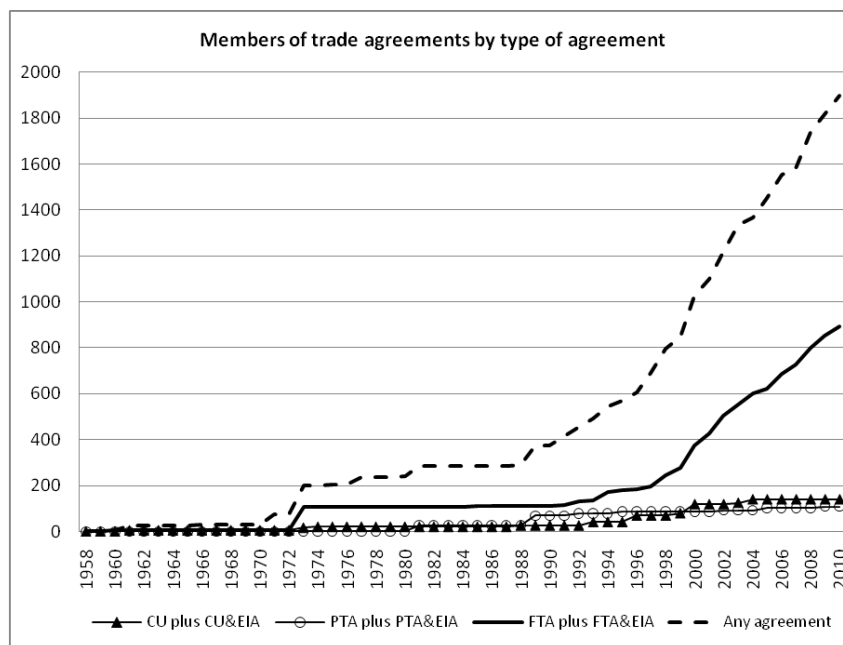
a marginal role. However, the role of PTAs in stimulating migration flows is very important since these flows are constrained strongly by institutional barriers.

The paper is organized as follows. Section 1 aims of clarifying what this paper intends for Preferential Trade Agreements. Section 2 derives a structural gravity model for migration and provides a brief review of the empirical literature on the determinants of migration flows. Section 3 describes the data used in the paper and Section 4 presents the empirical model and discusses the main econometric issues. Section 5 presents the results on the role of PTAs on both bilateral migration flows and the extensive margins of migration (section 5.1). Section 5.2 compares the effects of PTAs on migration and trade flows. Final section concludes the paper.

## 1. PREFERENTIAL TRADE AGREEMENTS AND THEIR CONTENTS

Trade liberalization is a long lasting process started approximately after the Second World War with the trade integration between Belgium, Luxembourg and Netherlands. Today, mostly all countries worldwide have at least one trade agreement in force (World Trade Report 2011). Figure 3 shows the huge increase in the number of countries having at least one trade agreement in force (countries with more than one agreement are double-counted in the total count reported in figure 3). Trade liberalization is certainly a crucial phenomenon in international trade.

**Figure 3. Number of countries having a trade agreement, by type of agreement**



Source: WTO, Regional Trade Agreement database. Note: Custom Union (CU), Preferential Trade Agreement (PTA), Free Trade Agreement (FTA), Economic Integration Agreement (EIA).

The classification of all existing types of trade agreements varies according with the number of signatory countries and with the degree of integration they guarantee. A simple Preferential Trade Agreement (PTA) involves only two countries, while a Regional Trade Agreement (RTA) involves more than two countries. The two former trade agreements are constrained by international rules agreed under the WTO, but they deviate from the principle of equal treatment and by the “most-favored nation principle”.

PTAs (and RTAs) may also differ on the contents they cover and on the degree of integration they guarantee. In terms of the degree of liberalization they guarantee, bilateral (or multilateral) agreements may simply liberalize trade in goods (Free Trade Agreement, FTA), or also trade in services (Economic Integration Agreement, EIA) or further provide a free factors movement among signatory countries (Custom Unions, CU). PTAs and RTAs may also go beyond traditional trade related provisions by including a broad range of provisions. Horn et al. (2010) identifies 52 groups of provisions generally included in more recent trade agreements (RTAs or PTAs). Authors divide those provisions into two groups: (i) the first group, called WTO-plus, contains provisions already under WTO commitment; (ii) the second group, called WTO-extra, contains provisions going beyond the traditional WTO commitment. Figure 4 shows provisions included in WTO-plus and WTO-X group (such as free trade agreement on goods and services, anti-dumping provisions, TRIMS, TRIPS and GATS related provisions).<sup>10</sup>

**Figure 4. Grouping of provisions as in Horn et al (2010)**

WTO+ AREAS	WTO-X AREAS	
PTA Industrial goods	Anti-Corruption	Health
PTA Agricultural goods	Competition Policy	Human Rights
Customs Administration	Environmental Laws	Illegal Immigration
Export Taxes	IPR	Illicit Drugs
SPS Measures	Investment Measures	Industrial Cooperation
State Trading Enterprises	Labour Market Regulation	Information Society
Technical Barriers to Trade	Movement of Capital	Mining
Countervailing Measures	Consumer Protection	Money Laundering
Antidumping	Data Protection	Nuclear Safety
State Aid	Agriculture	Political Dialogue
Public Procurement	Approximation of Legislation	Public Administration
TRIMS Measures	Audiovisual	Regional Cooperation
GATS	Civil Protection	Research and Technology
TRIPS	Innovation Policies	SMEs
	Cultural Cooperation	Social Matters
	Economic Policy Dialogue	Statistics
	Education and Training	Taxation
	Energy	Terrorism
	Financial Assistance	Visa and Asylum

<sup>10</sup> See Horn et al. (2010) for further details.

Among the classification of provisions by Horn et al. (2010), some relate with migration flows: (i) visa and asylum, (ii) labour market and (iii) provisions replicating GATS. The latter concerns (among other modes of services supply) the liberalization of flows of workers delivering services across countries (Mode IV).<sup>11</sup> Visa and asylum provisions relate to the exchange of information, drafting legislation and training among members in the area of visa and asylum for migrants. Finally, labour market provision aims to regulate and integrate the labour market of signatory countries. In the sample analyzed by Horn et al. (2010), which covers only EU and USA agreements, visa and asylum provision is included in EC-Israel, EC-Former Yugoslav Republic of Macedonia and EC-Albania; USA agreements do not include visa and asylum provision at all. Provisions replicating GATS are included in 4 out of 14 EU agreements and in 13 out of 14 USA agreements. Finally, labour market related provision has been included only in two EU agreements but in all the USA agreements mapped.

Provisions replicating the GATS, by including also Mode IV related provisions, allow the temporary entry to partner country for some selected professionals<sup>12</sup>, and thus the possibility for temporary migrants to experience the foreign country and/or to join local workers' network which might ease their (potential) long term stay into the destination country. However, this type of provision covers only few professional categories and, thus, may play a marginal role in affecting the mass of migration flows (it could also act as a skill selection migration policy). Visa and asylum might stimulate migration flows among member countries by reducing the bureaucratic cost for obtaining a visa. Finally provision concerning the integration of labour market could favour bilateral migration flows making easier the access to the labour market of the partner country. The inclusion of the former provisions in a PTA approximates for the role of PTAs' depth on migration flows; but as highlighted in the next section, the signature of a PTA has itself a role in reducing the cost of migration and might positively affect migration flows.

This paper uses a complete list of PTAs and RTAs to compute a dummy variable activating when a country pair has at least one trade agreement in force; no matter whether the agreement is bilateral (proper PTA) or multilateral (RTA), given the purpose of the paper I just need a dummy variable indicating whether a trade agreement exists within a country-pair. Thus, in what follows I will use the term "PTA" to indicate the existence of a trade agreement in force between migrants' destination and origin country (PTA or RTA).

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<sup>11</sup> The GATS defines four ways in which a service can be traded ("modes of supply"): (i) Mode 1 - services supplied from one country to another ("cross-border supply"), (ii) Mode 2 - consumers from one country making use of a service in another country ("consumption abroad"), (iii) Mode 3 - a company from one country setting up subsidiaries or branches to provide services in another country ("commercial presence"), (iv) Mode 4 - individuals travelling from their own country to supply services in another ("movement of natural persons").

<sup>12</sup> Temporary entry in some agreement can be extended up to 14 years (Australia-Singapore 2003).

## 2. A GRAVITY MODEL FOR MIGRATION

Former section showed how the content of PTAs could affect bilateral migration flows; but PTAs by increasing information on potential destination country reduce the bilateral migration cost affecting migration flows. This section derives a structural gravity equation for bilateral migration flows<sup>13</sup> to highlight the role of migration cost and better qualify the channel through which PTAs might stimulate bilateral migration flows.

Economic theory suggests that migration choice depends on individual maximization of well-being. Potential migrants compare among all feasible alternatives and choose a destination country by analyzing a set of source and host country specific factors with their own characteristics (education, age, spoken languages, etc.). Traditional models of migration decision assign a crucial role to migration costs and the financial opportunities in the destination country (compared to opportunities in the origin country) as major determinants of the migration decision (Harris and Todaro, 1970; Borjas, 1989). Using this theoretical approach, empirical studies on the determinants of migration flows (Karemera et al., 2000; Mayda 2010) highlight the following economic determinants of migration: (i) income and employment rate in destination country as “pull” factors (expectations of future standards of living); (ii) income and income inequality in origin countries as “push” factors; (iii) bilateral migration costs (cost of travel and information about potential destination country); (iv) existence in destination countries of migrant networks, which reduce the cost of migration (by easing the integration of new immigrants in the destination country). Former determinants of migration can be derived from a gravity style model as follows.

Let  $w_i$  be the wage in destination country  $i$  and  $c_{ij}$  the bilateral cost of migration from country  $j$  to county  $i$ . Thus the net wage in destination country for potential migrant is  $(w_i/c_{ij})$ . Migrant’s utility function is composed by an observable country pair specific term (net wage,  $w_i/c_{ij}$ ) and by an idiosyncratic individual ( $h$ ) specific term  $e_{ijh}$  (it includes all individual specific variables affecting the utility from migration decision). Assuming that the potential migrant in his origin country receives a wage  $w_j$ , he migrates if:

$$[1] \quad (w_i/c_{ij})e_{ijh} > w_j$$

Assuming that the potential migrant has a logarithmic utility, equation [1] can be written as:

$$[2] \quad \ln(w_i) - \ln(c_{ij}) + \ln(e_{ijh}) > \ln(w_j)$$

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<sup>13</sup> I strictly follow Anderson (2011).

The idiosyncratic component  $\ln(e_{ijh})$  is assumed to be distributed as type-1 extreme value (Gumbel distribution); thus the probability of migration  $p(u_{ij})$ <sup>14</sup> to country  $i$  is given by the multinomial logit form (McFadden 1974). At the aggregate level, given the former structure, the number of migrants from country  $j$  to country  $i$  depends on the total origin country population ( $N_j$ ) and on the probability to migrate ( $p(u_{ij})$ ) which, as said before, follows a multinomial logit distribution (where  $u_{ij}$  is the observable component of the migrant's logarithmic utility):

$$[3] \quad M_{ij} = p(u_{ij})N_j$$

The probability to migrate under multinomial logit distribution is

$$[4] \quad p(u_{ij}) = \frac{e^{u_{ij}}}{\sum_k e^{u_{kj}}}$$

Intuitively, the probability to migrate from country  $j$  to country  $i$  depends on the utility associated with the specific  $ij$  migration decision, compared with all the other options of destination countries ( $k$ ). Thus, the number of migrant workers from country  $j$  to country  $i$  can be expressed as:

$$[5] \quad M_{ij} = \frac{e^{u_{ij}}}{\sum_k e^{u_{kj}}} N_j = \frac{w_i/c_{ij}}{\sum_k w_k/c_{kj}} N_j$$

To identify the equilibrium wage ( $w_k$ ) to substitute in [5], labor market clearance equation is needed: the total foreign born labor supply in destination country  $i$  is  $L_i = \sum_j M_{ij}$ . Thus the

labor market clearance equation is:

$$[6] \quad L_i = \sum_j M_{ij} = \sum_j \left( \frac{w_i/c_{ij}}{\sum_k w_k/c_{kj}} N_j \right) = w_i \sum_j \left( \frac{1}{c_{ij} w_j} N_j \right)$$

<sup>14</sup>  $P(\text{migrate}) = P(\ln(e_{ijh}) > \ln(w_j) - \ln(w_i) + \ln(c_{ij}))$

Where  $W_j = \sum_k w_k / c_{kj}$  is the sum of net wage across all potential destinations for migrant workers in  $j$ . Notice that the total world labour supply is  $N = \sum_j N_j = \sum_i L_i$ . Thus the equilibrium wage is:

$$[7] \quad w_i = \frac{L_i}{\sum_j \left( \frac{1}{c_{ij} W_j} N_j \right)} = \frac{L_i}{\Omega_i N}$$

Where  $\Omega_i = \sum_j \left( \frac{1}{c_{ij} W_j} \frac{N_j}{N} \right)$  can be considered as an index of how appealing is to migrate into country  $i$ ; substituting equilibrium wage in equation [5] the structural gravity equation for migration is:

$$[8] \quad M_{ij} = \frac{L_i N_j}{N} \frac{1/c_{ij}}{\Omega_i W_j}$$

The first ratio in equation [8] represents the endowment of migrants in country  $i$  in a frictionless world; the second ratio in equation [8] represents the cost of migration. In this framework  $\Omega_i$  can be interpreted as how costly is to enter destination country (in what follows, according to Anderson 2011, I will refer to this term as *inward migration resistance term*), it can be thought as immigration policy restrictiveness or alternatively as a term of attractiveness of the destination country (the higher the index the lower the attractiveness). On the other hand,  $W_j$  represents the *outward migration resistance term*. By comparing equation [8] with the standard gravity model for trade in goods,  $\Omega_i$  and  $W_j$  are analogous to inward and outward multilateral price resistance terms.<sup>15</sup>

The structural gravity equation [8] allows focusing on the role of bilateral migration cost  $c_{ij}$ . This term is country pair specific, so it does not include traditional “push” and “pull” factors of migration flows,<sup>16</sup> but considers the cost of migration related to geographic distance or

<sup>15</sup> See section 5 in Anderson (2011).

<sup>16</sup> Pull and Push factors of migration flows, as considered in the existing literature, can be easily thought to be part of  $\Omega_i$  and  $W_j$  since they are respectively destination and origin country specific.



common culture between country  $i$  and  $j$ . More importantly, it also relates with the information cost of migration. The idea is that, been push and pull factors equal across some destination countries, potential migrant will choose the destination country with lower information cost (the one he knows better or he is more familiar with). PTAs are supposed to reduce bilateral information cost by increasing the familiarity among signatory countries or by including some provisions which make migration easier.

Many authors already focused on the role of “push” and “pull” determinants of migration; in particular income and standards of living in destination countries and poverty and inequalities in origin countries have been highlighted as main determinants of bilateral migration flows (Faini and Venturini, 1993; Hatton, 2005; Mayda, 2010). Also the travel cost of migration received great attention in literature and geographical distance has been shown as the main variable deterring migration flows (Mayda, 2010).

More recently, some authors focused on the role of cultural proximity between origin and destination countries as a migration cost reducing factor (it relates to the information cost of migration). To approximate for cultural proximity, common language and colonial relationship dummies have been largely used (Mayda 2010). Also the localization of past migration flows –stock of immigrants from the same origin country- has been successfully used to approximate for cultural proximity (Gross and Schmitt, 2003; Beine et al., 2009; Pedersen, et al. 2008). All former studies agree on giving a positive role of cultural proximity on bilateral migration flows.

This paper (to the best of my knowledge) represents the first attempt to consider PTAs as a factor reducing migration costs and thus boosting bilateral migration flows.

### 3. DATA DESCRIPTION

The data in this paper are merged from different sources. Data on international migration are combined with macroeconomic information on the origin and destination countries, and information on PTAs. Data on bilateral migration flows come from the OECD International Migration Statistics (IMS) dataset and cover 29 destination OECD countries<sup>17</sup> and a sample of 207 origin countries, for the period 1998-2008. The dataset includes zero flows for some country pairs.<sup>18</sup>

The main variable is the existence of a trade agreement between migrant’s origin and destination countries. This variable is computed starting from the list of active PTAs and RTAs provided by the WTO, it is equal to 1 in the case of a PTA (or RTA) in force between the origin and destination country and zero otherwise. In the empirical estimations, I use

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<sup>17</sup> Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Greece, Germany Hungary, Ireland, Italy, Japan, Republic of Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States

<sup>18</sup> Thus I will use also a poisson estimation to strengthen my results (Silva and Tenreyro 2006).

dummy variables to indicate whether the PTA includes legally enforceable provisions replicating the scheme of GATS<sup>19</sup>, or labour market related or visas and asylum provision. To compute these three dummy variables I use WTO data on the content of PTAs. This dataset represents a comprehensive mapping and coding of 96 PTAs signed in the period 1958-2010.<sup>20</sup> It includes 33 EU and 11 USA agreements, and 52 PTAs for the ASEAN countries, China, India, Japan and Mercosur. Tables A.1 – A.3 report the list of PTAs including visa-asylum, labour market and GATS provision respectively. Note that most agreements with visa-asylum provisions apply to the Asian countries (or have at least one member country in the Asian region), and PTAs that include the GATS provisions relate mostly to European and North American countries.

The rest of the data are from standard sources. Geographic variables (such as distance, common border, language, and colony) are from Mayer and Zignago's (2011) dataset; macroeconomic variables for origin and destination countries (income, GDP, population) are from the World Bank World Development Indicators. Data on stock of migrants by country of origin are from Docquier et al. (2007).

Summary statistics for all the regressors in the empirical model are reported in Table A.4 comparison of A.4(b) and A.4(c) shows that average flows of immigrants between countries that are common signatories to a PTA are higher than flows between countries with no common PTA. Table 1, which presents a correlation matrix, confirms the expectation of a strong positive correlation between migration flows, cultural clustering (stock of migrants in 1991) and income in destination countries.

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<sup>19</sup> The dataset I use does not specify whether the provision replicating GATS scheme refers to mode IV or not, thus I simply use a dummy variable indicating whether the PTA includes a GATS replicating provision in general.

<sup>20</sup> This dataset is an extension of Horn et al. (2010) and it is available here: [http://www.wto.org/english/res\\_e/publications\\_e/wtr11\\_dataset\\_e.htm](http://www.wto.org/english/res_e/publications_e/wtr11_dataset_e.htm). More details on this dataset are provided by Orefice and Rocha (2011).

**Table 1. Correlation matrix**

	Bilateral immigrants flows (in thousands)	Population (destination countries)	Population (origin countries)	Per capita GDP destination countries	Per capita GDP origin countries	Stock of migrants in 1991	Difference in per capita GDP	Squared difference in per capita GDP
Bilateral immigrants flows (in th.)	-							
Population (destination countries)	0,3138	-						
Population (origin countries)	0,0948	-0,0512	-					
Per capita GDP destination countries	0,0490	0,0776	-0,0376	-				
Per capita GDP origin countries	-0,0610	-0,0796	0,0152	-0,0878	-			
Stock of migrants in 1991	0,7218	0,3179	0,0787	0,0561	0,00554	-		
Difference in per capita GDP	0,0566	0,0970	0,0275	0,3100	-0,6172	-0,0259	-	
Squared difference in per capita GDP	0,0494	0,0999	0,0407	0,3413	-0,5447	-0,0250	0,9478	-

#### 4. EMPIRICAL MODEL

Taking the log-linearized form of equation [8] (and including the time dimension subscript in the time varying variables) yields to the basic migration gravity model:

$$[9] \quad \ln(M)_{ijt} = \ln(L_{it}) + \ln(N_{jt}) - \ln(N_t) - [\ln(c_{ijt}) + \ln(\Omega_{it}) + \ln(W_{jt})]$$

Where the subscripts  $i, j$  and  $t$  correspond to destination, origin and year respectively;  $M_{ijt}$  is the migration flow between countries  $i$  and  $j$  at time  $t$ ;  $L_{it}$  and  $N_{jt}$  are the population size respectively in destination and origin country ( $N_t$  is the world's population size kept by year fixed effects in what follows);  $c_{ijt}$  is the bilateral cost of migration while  $\Omega_{it}$  and  $W_{jt}$  are respectively the inward and outward country specific migration resistance term. The bilateral cost of migration  $c_{ijt}$  includes both the time invariant-bilateral specific costs (i.e. distance and other geographic factors) and the time variant component of costs which relate mainly on information cost of migration. The former component is (potentially) affected by PTAs and their contents. To investigate the impact of PTAs on migration flows, I use the structural gravity model for migration in equation [9] and I include a PTA dummy as the main explanatory variable.

Moreover, I keep the effect of the depth of PTAs ( $Depth\_PTA_{ijt}$ ) by including, in turn, three dummy variables<sup>21</sup>. The first dummy is equal to one if a provision on visa and asylum is included in the PTA, the second dummy takes into account the presence of a provision replicating the GATS provision. The third dummy is equal to one if the PTA includes a provision on labour market. A set  $X_{ijt}$  of control variables is included to control for the determinants of migration already highlighted in former studies. The vector  $X_{ijt}$  of control variables includes: per capita GDP in both destination and origin country; the difference in per capita GDP<sup>22</sup> and its squared value. Income levels in origin and destination countries represent respectively the financial incentive and the attractiveness of the migration choice and also contribute to approximate for the inward ( $\Omega_{it}$ ) and outward ( $W_{it}$ ) migration resistance terms.

The difference in per capita GDP and its squared value, control respectively for differences in factor endowments and increasing specialization among countries (Hatton 2005). Another channel driving the localization of international migrants is cultural clustering in the destination country (Beine et al., 2009; Gross and Schmitt, 2003), measured here as the stock

<sup>21</sup> The three dummy variables could not be all included in the same regression because of multi-collinearity problem.

<sup>22</sup> Computed as the absolute difference in (log) per capita GDP

of migrants in the destination country from each origin country in 1991. An important control variable is bilateral trade flows (log of imports); PTAs might affect immigration flows by enhancing bilateral trade.<sup>23</sup> By including trade flows among control variables in the regression, I can isolate the pure ‘attraction’ effect of PTAs on bilateral migration flows. Thus, the baseline empirical equation is:

$$[10] \ln(M)_{ijt} = \alpha + \beta_0 \ln(L_{it}) + \beta_1 \ln(N_{jt}) + \beta_2 PTA_{ijt} + \beta_3 Depth\_PTA_{ijt} + \beta_4 X_{ijt} + \varphi_t + \varphi_i + \varphi_j + \varphi_{ij} + \varphi_{it} + \varphi_{jt} + \varepsilon_{ijt}$$

Country pair fixed effects ( $\varphi_{ji}$ ) control for all country pair specific variables affecting migration flows and in particular for the time invariant component of  $c_{ijt}$  such as distance, common language, border and colony<sup>24</sup>. Destination ( $\varphi_i$ ) and origin ( $\varphi_j$ ) country fixed effects control for unobserved country specific effects which are additive and time-invariant. In particular destination country fixed effects control for features of the destination country’s immigration policy (entry-restrictive regulations). Year fixed effects control for macroeconomic trends common to all countries in the sample (world total population as suggested by equation [9]). Finally country-time fixed effects ( $\varphi_{it}$  and  $\varphi_{jt}$ ) properly absorb inward ( $\Omega_{it}$ ) and outward ( $W_{jt}$ ) country specific migration resistance term<sup>25</sup>.

The first econometric issue is the problem of reversal causality related to income variables. It reflects the fact that immigrants’ flows could affect the income levels in both the destination and origin countries. Indeed immigrant inflows are likely to decrease wages in destination countries (if they substitute for native workers) and increase wages in origin countries. Empirical evidence in the labour economics literature (Friedberg and Hunt, 1995; Borjas, 2003) shows a negative but small effect on destination country income and a positive effect

<sup>23</sup> As mentioned in the introduction, trade between origin and destination country could reduce wage disparities, reducing the incentive to migrate. On the other hand, trade could increase familiarity between the two countries stimulating migration through increased information about the destination country. Existing empirical evidence shows that trade flows do not significantly explain migration flows (Aguilar et al. 2007).

<sup>24</sup> To explicitly include geographic specific sources of migration among the set of control variables I further estimate a model without country pair fixed effects (columns (1) and (6) in tables 2-3). This specification also allowed me to include two dummy variables among the set of controls  $X_{ijt}$ : (i) the first equal to one if both origin and destination country belongs to European Custom Union; and the other (ii) equal to one if both countries belong to the Schengen Area.

<sup>25</sup> Because of dummy inflation problem I use country-period fixed effects. The time horizon has been divided into three periods. Nevertheless inward and outward country specific cost are likely to be mostly time invariant since they approximate for how costly is to enter the destination country or leave origin country (being this factors policy related, they do not change frequently over time). Other country-year specific variables affecting push and pull factors are directly included in the regression (i.e. per capita GDP in origin and destination countries). I could not include country-period fixed effects in Poisson estimations because of huge incidental parameter problem.

on origin country income (Mishra, 2007). Although incomes in both origin and destination countries are not crucial variables for this study, I follow Mayda (2010) and address this issue by including in my estimations lagged values of per capita GDP.

A second important econometric issue is endogeneity related to the PTA variable due to omitted variable and reversal causality problems. The omitted variable problem relates to the absence of a variable to control for bilateral migration policies; country pair fixed effects solve this problem (the idea is that these policies are expected not to change over time). The reversal causality problem is related to the possibility that PTAs are signed in response to migration pressure. However, the decision to select into PTAs might be influenced by levels of bilateral migration flows and not by recent changes in migration flows (as it is the case after the inclusion of country pair fixed effects in the estimation); the inclusion of country pair fixed effects ( $\phi_{ij}$ ) mostly resolves the reversal causality problem.<sup>26</sup> To address any residual endogeneity problem, I estimate the model including a one year lagged PTA dummy, which further reduces the simultaneity bias. As a robustness check I estimate an instrumental variable model to further control for the endogeneity problem (see Appendix B for further details on the Instrumental Variables estimation). Starting from the idea of a ‘domino effect’ in establishing a PTA (Baldwin and Jaimovich, 2010; Chen and Joshi, 2010), I use the total number of PTAs signed by both origin and destination country with the rest of the world (minus 1 if origin and destination countries are part of the same PTA) to instrument the PTA dummy. The idea is that the probability that two countries join in a common PTA is positively affected by the number of PTAs that each potential partner has with the rest of the world in order to avoid a likely trade diversion effect.<sup>27</sup> This domino effect has been shown to be strongly correlated with bilateral PTAs (Baldwin and Jaimovich, 2010) and can be considered uncorrelated with migration flow. The instrumental variable is thus valid and relevant for my purposes<sup>28</sup>.

The last econometric issue is the zero migration flows problem. As highlighted in the trade literature (Silva and Tenreyro, 2006; Helpman et al., 2008), the log specification in presence of zero flows produces biased estimations (by dropping zero flows). To avoid this bias I use the log of migrant flows plus 1.<sup>29</sup> As a robustness check I also estimate a Poisson model to follow Silva and Tenreyro (2006) in solving the zero flows problem.

<sup>26</sup> For further details on how country pair fixed effects solve the reversal causality problem in a gravity style model see Baier and Bergstrand (2007).

<sup>27</sup> Chen and Joshi (2010) in a three-country theoretical model highlight the importance of third-country effects in the formation of new PTAs. They examine how the incentives of a country pair to enter a mutual free trade agreement (FTA) vary depending on whether the two countries already have an existing FTA with the third country.

<sup>28</sup> The identification assumption here is that the numbers of PTAs by origin and destination country do not directly affect bilateral migration flows (i.e. not diversion effect in migration patterns). To secure this assumption I estimate the diversion effect of PTAs in terms of migration flows. Results (available under request) show that having a PTA in common does not divert migrant flows from any third country.

<sup>29</sup> For all but very small numbers  $\log(x+1) \approx \log(x)$

Even controlling for bilateral trade flows in equation [10], it is difficult to disentangle the pure effect of PTAs from the trade led effect of PTAs on migration (PTAs might affect migrants' flows through their effect on trade). For this reason, I use a Propensity Score Matching (PSM) approach, to obtain coefficients of PTA in equation [10] cleaned of its trade enhancing effect. The PSM approach consists of three steps. In the first I estimate the probability that a country pair has a positive trade flow, using a traditional gravity model (mostly following Baier and Bergstrand, 2007). With the former estimated probability I use the one-to-one approach<sup>30</sup> to match country pairs with trade flows with those without trade flows (control group). I run equation [10] on a sub-sample of country pairs, with and without trade flows, having similar estimated probability to trade. The final sub-sample of country pairs includes couple of countries that differ only in having or not a PTA in common (since they are selected on the basis of a similar probability to have positive trade flow), thus the PTA can be considered as a random variable not related with trade flows among countries<sup>31</sup>. Thus, the estimated coefficients of PTA on bilateral migration flows can be interpreted as a pure 'attraction effect'. Further details on the PSM approach are provided in appendix C.

## 5. RESULTS

Table 2 shows results for the OLS estimations of equation [10], while table 3 shows results for the Poisson estimation (to control further for zero migration flows problem). Columns 1 and 2 in both tables show results for a simple specification of equation [10] in which only PTA dummy has been included (column 1 does not include country pair fixed effects but country pair specific geographic variables and two dummy variables controlling for EU Custom Union and Schengen Area<sup>32</sup>). Similarly columns 6 and 7 show results for a specification including one year lagged PTA dummy (to control further for reversal causality problem).

In all former specifications (except for those in columns 6) PTA has a strong positive and significant coefficient; meaning that, all other determinants being constant, having a PTA in common stimulates bilateral migration flows. In particular, according to my preferred specification (OLS with country pair fixed effects, table 2 column 2) having a PTA in common stimulates bilateral migration flows by 17.5 per cent ( $e^{0.162}-1=0.175$ ).

<sup>30</sup> See Dehejia and Wahba (2002) for further details on the Propensity Score Matching approach

<sup>31</sup> The Propensity Score Matching aims to replicate a natural experiment of PTA variable (Dehejia and Wahba, 2002).

<sup>32</sup> Columns (1) and (6) in tables 2-3 do not include country pair specific fixed effects. Thus I could include country pair specific geographic variables which have been shown as important determinants of migration flows (geographic distance is an important source of migration cost, while common language and colony favour migration flows). In these specifications I also include two dummy variables: (i) the first equal to one if both origin and destination belong to European Custom Union; and the other (ii) equal to one if origin and destination country belong to Schengen Area. Since the two former dummy variables are mainly time invariant, they were not included in country pair fixed effect estimations.

**Table 2 Bilateral migration flows and PTAs. OLS estimations**

	Dependent variable: immigrants flows in mil. (ln)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
PTA	0.158*	0.162***	0.101*	0.300***	0.078					
	(0.086)	(0.053)	(0.055)	(0.067)	(0.062)					
Visa provision			0.159***							
			(0.049)							
GATS provision				-0.258***						
				(0.060)						
Labour Market provision					0.144**					
					(0.059)					
PTA <sub>t-1</sub>						-0.024	0.257***	0.180***	0.344***	0.133**
						(0.088)	(0.062)	(0.063)	(0.070)	(0.066)
Visa provision <sub>t-1</sub>								0.223***		
								(0.054)		
GATS provision <sub>t-1</sub>									-0.249***	
									(0.065)	
Labour Market provision <sub>t-1</sub>										0.311***
										(0.071)
N. of observation	5810	7369	7369	7369	7369	5810	7369	7369	7369	7369
R-sq	0.774	0.930	0.938	0.938	0.938	0.774	0.926	0.938	0.938	0.938

Note: robust standard errors in parentheses. All regressions include year, destination-, origin-country, destination-period and origin-period fixed effects. Country pair fixed effects (within estimator) included in specifications (2), (3), (4), (5), (7), (8), (9), (10). All regressions include: population and per capita GDP in origin and destination country (in ln), bilateral import flows (in ln), the difference in per capita GDP between origin and destination country and its squared value. Specifications in columns (1) and (6) also include Eu Custom Union, Schengen Area dummies and country pair specific control variables: distance, stock of migrants in 1991, common border, language and colonial relationship. Constant not shown but included. \*\*\*p<0,01; \*\*p<0,05; \*p<0,1.



**Table 3 Bilateral migration flows and PTAs. Poisson estimations**

	Dependent variable: immigrants flows in mil.									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
PTA	0.271*** (0.098)	0.353*** (0.097)	0.371*** (0.093)	0.436*** (0.001)	0.217*** (0.001)					
Visa provision			-0.049 (0.073)							
GATS provision				-0.174*** (0.001)						
Labour Market provision					0.234** (0.001)					
PTA <sub>t-1</sub>						0.016 (0.093)	0.278** (0.125)	0.215*** (0.001)	0.326*** (0.001)	0.190*** (0.001)
Visa provision <sub>t-1</sub>								0.205*** (0.001)		
GATS provision <sub>t-1</sub>									-0.121*** (0.001)	
Labour Market provision <sub>t-1</sub>										0.162*** (0.001)
N. of observation	5810	6846 <sup>a</sup>	6846 <sup>a</sup>	6846 <sup>a</sup>	6846 <sup>a</sup>	5810	6846 <sup>a</sup>	6846 <sup>a</sup>	6846 <sup>a</sup>	6846 <sup>a</sup>
Pseudo R2	0.941					0.940				
Wald chi2		0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000

Note: standard errors in parentheses. All regressions include year, destination-, origin-country fixed effects. Country pair fixed effects (within estimator) included in specifications (2), (3), (4), (5), (7), (8), (9), (10). All regressions include: population and per capita GDP in origin and destination country (in ln), bilateral import flows (in ln), the difference in per capita GDP between origin and destination country and its squared value. Specifications in columns (1) and (6) also include Eu Custom Union, Schengen Area dummies and country pair specific control variables: distance, stock of migrants in 1991, common border, language and colonial relationship. Constant not shown but included. \*\*\*p<0,01; \*\*p<0,05; \*p<0,1. a 45 observation dropped because of only one observation per group, 478 observation dropped because of all zero outcomes.

To control further for reverse causality, I estimate an instrumental variable model where the ‘problematic’ variable (PTA dummy) is instrumented using the number of PTAs signed by both origin and destination country (with the rest of the world). Results of the instrumental variable estimation are presented in Table B.1;<sup>33</sup> the PTA dummy has a strong positive and significant effect on migration flows (see appendix B for a discussion on the validity and relevance of the instrument used here).

I further control for the trade led effect on migration flows. It might be that PTAs affect migration flows through trade flows;<sup>34</sup> thus I need to make PTA dummy mainly unrelated with trade in goods. I do this using the PSM approach (see appendix C for further details). In the first stage I simply estimate the probability of positive trade (log of imports) flows using the traditional gravity model.<sup>35</sup> Then I create a sub-sample of country pairs which includes: (i) non-trading country pairs (control group) and (ii) trading country pairs having similar estimated probability to trade than country pairs in the control group. PTA dummy is now random and unrelated with trade since country pairs in this so built sub-sample may trade or not, but they all have similar estimated probability to trade each other. Finally I estimate equation [10] using this sub-sample. Results for the PSM approach are presented in Table C.1-C.2 and largely confirm the positive effect of PTA dummy on migration flows.

Columns (3) and (8) in (tables 2 and 3) show results for the estimation of equation [10] which includes also visa-asylum provision dummy as explanatory variable.<sup>36</sup> The coefficients of PTA and visa-asylum provision are positive and significant in both OLS and Poisson estimation. It means that PTAs have a positive effect on bilateral migration flows with a higher effect if visa-asylum provision is included in the agreement: when a visa-asylum provision is included in the PTA, it stimulates migration flows by 28 per cent. When the *Depth\_PTA* dummy refers to GATS (columns (4) and (9) in both table 2 and 3), results suggest that the inclusion of a provision replicating GATS in the PTA deters migration flows; but since the coefficient associated with the PTA dummy remains positive and significant (and higher than that on GATS dummy), having a PTA in common still has a positive (but small) effect. The negative coefficient associated with GATS provision dummy can be explained considering that GATS dummy in my dataset does not refer uniquely to mode IV (my dummy indicates simply whether a GATS provision is included in to agreement). It follows that my GATS dummy might take into account also liberalization of foreign direct

<sup>33</sup> More in depth discussion of the validity and relevance of instrumental variables is provided in Appendix B.

<sup>34</sup> Since the seminal work of Head and Ries (1998), many economists have provided empirical evidence that larger bilateral migration flows are associated with larger trade flows (Wagner et al. 2002; Rauch and Trindade 2002; Bandyopadhyay et al. 2008).

<sup>35</sup> The gravity equation includes time and country fixed effects, geographic variables (border, language, colony distance) and per capita GDP in both origin and destination country. Results in Table C.3

<sup>36</sup> This dummy variable takes the value 1 if the PTA includes a provision on visa and asylum which is legally enforceable.

investment (mode 3) deterring migration flows coherently with a standard factor contents trade theory.<sup>37</sup>

Finally, the inclusion of labour market related provision in PTAs (columns (5) and (10) in both table 2 and 3) has a strong and positive effect on bilateral migration flows. This positive effect adds on the existing positive effect of the PTA dummy itself. Former results provide overwhelming evidence of the positive effect of PTAs on bilateral migration flows; but the contents of PTAs matter. Visa-asylum and labour market related provisions have a further positive effect on bilateral migration flows, while the inclusion of GATS related provision almost offset the positive effect of PTA dummy.

However, if PTAs do reduce the fixed cost of migration (by increasing information about potential destination country) and if their contents make easier/harder (depending on the provision included) the decision to migrate, I expect also a role for PTAs and their contents on the probability of having positive migration flows between countries (*extensive margin* in migration flows). In the next section I re-estimate equation [10] where the dependent variable is now a dummy equal to 1 if there are positive migration flows between countries (zero otherwise).

### 5.1. PTAs and the extensive margins of migration flows

The above has provided evidence of the positive effect of PTAs on migration flows. However, I would expect PTAs to reduce the fixed costs of migration and, thus, affect also the probability of positive migration flows between countries (the extensive margins of migration flows). The econometric model is the same as in equation [10], but dependent variable is a dummy variable that is equal to 1 if positive migration flow occurs between the origin and destination country and zero otherwise. The control variables are the same as in the previous estimations: population (log) and per capita GDP (log) in origin and destination countries, stock of immigrants in destination country in 1991, import flows (log), difference in GDP and its squared value. I include the same set of fixed effects as in equation [10].

Since the dependent variable is dichotomous, I first estimate a non linear probit model without country pair fixed effects. Then I include country pair fixed effects and run a fixed effects OLS model (linear probability model). I cannot use a country pair fixed effects non linear model for two reasons: (i) incidental parameter problem arises due to the high number of fixed effects; (ii) there would be a huge reduction in the number of observations if the non-linear fixed effects model were used (with consequent reduction in the degrees of freedom).<sup>38</sup>

<sup>37</sup> GATS by stimulating FDI in the poor country, increases the capital labor ratio there and thus increases the return o labor deterring migration from poor country.

<sup>38</sup> In some cases country pair fixed effects perfectly predict the output variable (because it is time invariant in most cases) and non-linear models do not use this information to compute the estimator.

Thus I mainly rely on a simple OLS fixed effects model for my analysis<sup>39</sup> because it uses all the information and does not suffer from any incidental parameter problem (however non linear probit model is used to strengthen my results).

Table 4 shows the results for these estimations. The PTA dummy has a positive and significant coefficient in both the probit and OLS estimations (columns 1 and 5), meaning that signing a mutual PTA increases the probability of positive migration flows between the countries. According to my preferred estimation (OLS fixed effects models in columns 5), a PTA increases the probability of a positive migration flow by 3 per cent. To further control for the endogeneity bias I also estimated an instrumental variables model using the same instrument discussed in section 4 (details in appendix B). Result for the IV estimation in table B.1 confirms the former result.

After including the visa and asylum dummy in the regression (columns (2) and (6)); the PTA coefficient becomes null while visa and asylum has a strong positive effect on the extensive margins of migration (both probit and OLS model). This means that the extensive margins of migration are affected mostly by the inclusion of migration specific provisions (visa and asylum); this result differs from the former on the intensive margins where migration flows were positively affected by both PTA and its content. I obtain similar results after the inclusion of the labour market related provision dummy (columns (4) and (8)); the PTA dummy loses its significance while the inclusion of labour market provision in PTAs strongly increases the probability of having positive migration flows. The inclusion of a provision replicating GATS (columns (3) and (7)) scheme affects negatively the probability of having positive migration flows only in the probit estimation.

As a difference with results on migration flows in the former section, results on the extensive margins suggest that the depth of PTAs, more than the PTA itself, reduces the fixed cost associated with a new potential bilateral migration flow.

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<sup>39</sup> The major limitation of a linear probability model (OLS in binary outcome estimation) is that the fitted values will not necessarily be in the [0,1] interval. Nevertheless, it provides a reasonable direct estimate of the sample-average marginal effect in the probability that the outcome variable assumes the value 1. The second limitation of a linear probability model is the likely heteroschedasticity, so robust standard errors are used here.

**Table 4 PTAs and the extensive margins of migration flows**

<i>Dependent variable:</i>	Dummy =1 if positive migrants flows							
	Probit				OLS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PTA	0.382** (0.162)	0.208 (0.166)	0.713*** (0.208)	0.116 (0.175)	0.031** (0.015)	0.015 (0.016)	0.033** (0.016)	-0.001 (0.015)
Visa provision		0.680*** (0.157)				0.043*** (0.012)		
GATS provision			-0.543** (0.210)				-0.003 (0.017)	
Labour Market provision				0.672** (0.210)				0.057*** (0.016)
N. of observation	3843 <sup>a</sup>	3843 <sup>a</sup>	3843 <sup>a</sup>	3843 <sup>a</sup>	7369	7369	7369	7369
Pseudo R-sq	0.546	0.550	0.548	0.549				
Adjusted R-sq					0.724	0.725	0.724	0.725

Note: robust standard errors in parentheses. All regressions include year, destination, origin country, destination-period, origin-period fixed effects. Columns (5) (6) (7) and (8) includes also country pair fixed effects (within estimator). Control variables included in all regressions are: population (log) in origin and destination countries, per capita gdp (log) in origin and destination countries, stock of immigrants in 1991, import flows (ln), difference in GDP and its squared value. Estimations in columns (1) (2) (3) and (4) include also distance, common border, common language and colony as control variables. \*\*\*p<0,01; \*\*p<0,05; \*p<0,1. <sup>a</sup> Number of observations strongly reduced because dependent variable is perfectly predicted by fixed effects

## 5.2. Do PTAs stimulates migration more than trade in goods?

The strong positive effect of PTAs on migration flows and the idea that PTAs are mainly signed to boost trade, suggest a further step of this analysis. In this section I compare the PTAs' effect on migration with that on trade in goods. To this end, the empirical specification is the same as in equation [10], with the dependent variable being in turn immigrant flows (in log) and bilateral trade (as log of imports). Country pair fixed effects are included in the estimated equation to control for country pair and time invariant variables affecting both trade and migration. Country-period fixed effects have been included to control for both multilateral price resistance term in trade model (Anderson and van Wincoop, 2003) and for inward/outward migration resistance term.<sup>40</sup> I also exclude bilateral imports from the set of control variables since this is now one of the dependent variables. The results are reported in Table 5.

To compare the effect of PTAs on two different dependent variables requires two main expedients in the econometric approach. First, I use exactly the same sample of observations to estimate the two equations (one on migration and the other on trade flows), second, I include the same set of control variables and fixed effects. Here the same problems of zero (trade and migration) flows and simultaneity apply; I solve them as described in section 4 by estimating an OLS model on  $\log(y+1)$  and a Poisson regression (Silva and Tenreyro, 2006). I use the lagged PTA variable to reduce the simultaneity bias (already reduced by the inclusion of country pairs fixed effects).<sup>41</sup>

Table 5 shows the results for the above empirical question. Columns (1), (3), (5) and (7) show results for the migration estimations; columns (2), (4), (6) and (8) show the trade equation results. PTAs have a strong significant positive effect on migration flows and a small-null effect on trade flows (positive in Poisson and null in OLS estimations). It follows that PTAs have a stronger positive effect on migration flows than on trade flows. As a robustness check of this result, I simply replicate the estimation for a recent time horizon taking the years from 2002 to 2008. Table 6 shows the results for this robustness check confirming the former conclusion. One possible interpretation of this result is that trade is already widely liberalized so that PTAs have a marginal effect on trade in goods. On the other hand, barriers to international migration are still high and PTAs have a strong impact on flows among member countries.

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<sup>40</sup> The inclusion of proper country-year fixed effect would reduce too much the degree of freedom (dummy inflation problem). Country-period fixed effects do not included in Poisson estimations because of incidental parameter problem.

<sup>41</sup> See Section 4 and Baier and Bergstrand (2007) for a detailed discussion of how country pair fixed effects reduce the simultaneity problem.

**Table 5 PTAs and bilateral migration/trade. A comparison**

Dependent variable:	OLS				Poisson			
	immigrants (ln) (1)	imports (ln) (2)	immigrants (ln) (3)	imports (ln) (4)	immigrants (5)	imports (6)	immigrants (7)	imports (8)
PTA	0.172*** (0.001)	-0.037 (0.051)			0.354*** (0.001)	0.043*** (0.000)		
PTA <sub>t-1</sub>			0.256*** (0.000)	0.048 (0.034)			0.283*** (0.001)	0.039*** (0.000)
N. of observation	7252	7252	7252	7252	6789 <sup>a</sup>	6789 <sup>a</sup>	6789 <sup>a</sup>	6789 <sup>a</sup>
R-sq	0.936	0.969	0.936	0.969				
Wald chi2 (p-value)					0.000	0.000	0.000	0.000

Note: standard errors in parentheses. Control variables included in all regressions are: population (log) in origin and destination countries, per capita gdp (log) in origin and destination countries, difference in GDP and its squared value. All regressions include year, destination, origin country and country pair fixed effects (within estimator). OLS regressions include also county-period fixed effects. \*\*\*p<0,01; \*\*p<0,05; \*p<0,1. <sup>a</sup> 48 observation dropped because of only one observation per group, 415 observation dropped because of all zero outcomes. <sup>b</sup> 38 observation dropped because of only one observation per group.

**Table 6 PTAs and bilateral migration/trade. A comparison. Time period 2002-2008**

Dependent variable:	OLS				Poisson			
	immigrants (ln) (1)	imports (ln) (2)	immigrants (ln) (3)	imports (ln) (4)	immigrants (5)	imports (6)	immigrants (7)	imports (8)
PTA	0.108 (0.348)	-0.024 (0.060)			0.238*** (0.001)	0.001*** (0.000)		
PTA <sub>t-1</sub>			0.212*** (0.068)	0.084** (0.040)			0.155*** (0.001)	0.013*** (0.000)
N. of observation	5236	5236	5236	5236	4860 <sup>a</sup>	5165 <sup>b</sup>	4860 <sup>a</sup>	5165 <sup>b</sup>
R-sq within	0.947	0.976	0.947	0.972				
Wald chi2 (p-value)					0.000	0.000	0.000	0.000

Note: standard errors in parentheses. Control variables included in all regressions are: population (log) in origin and destination countries, per capita gdp (log) in origin and destination countries, difference in GDP and its squared value. All regressions include year, destination, origin country and country pair fixed effects (within estimator). OLS regressions include also county-period fixed effects. \*\*\*p<0,01; \*\*p<0,05; \*p<0,1. <sup>a</sup> 48 observation dropped because of only one observation per group, 415 observation dropped because of all zero outcomes. <sup>b</sup> 38 observation dropped because of only one observation per group.



## CONCLUSION

In this paper I empirically investigated the role of PTAs (and their content) as a determinant of international bilateral migration flows. PTAs are supposed to increase information about potential destination countries and hence decrease the cost of migration associated with this potential migrant flow. I found overwhelming evidence of a pro-migration effect of PTAs. In particular, a mutual PTA stimulates international migration flows among member countries by almost 17.5 per cent. This constitutes a novel contribution to the literature on the determinants of migration flows, and also represents a useful hint for researchers on migration related topics looking for an instrumental variable for migration.<sup>42</sup>

Also the contents of PTAs matter in affecting bilateral migration flows: the inclusion of visa-and-asylum and labour market related provision within a trade agreement further stimulates bilateral migration flows.

These findings confirm the twofold role of PTAs in boosting migration flows. Migration related provisions directly stimulate migrant flows by making easier (for example) to obtain a permit to stay in the destination country; on the other hand the presence of a PTA itself, by increasing the information about member countries, further stimulates bilateral migration flows. To support the idea that PTAs reduce the information cost of migration (fixed cost) I found a positive effect of PTAs also on the extensive margins of migration: having a PTA in common increases the probability of positive bilateral migration flow by 3 per cent. But, once the content of PTAs is included in the extensive margins regressions (visa-asylum and labour market related provision dummies) PTA dummy loses its significance, meaning that it is mainly the content of PTAs (more than the signature of a PTA itself) which increases the probability of having a positive migration flow.

Given the strong impact of PTAs on bilateral migration flows, I finally compared the former effect with the trade creation effect of PTAs. I found evidence that PTAs stimulate migration flows more than trade flows (PTAs have a robust positive effect on migration flows and a weak effect on trade flows). This result is coherent with the idea that trade is already liberalized while migration is not, giving PTAs a crucial role in stimulating migration more than trade in goods.

As a possible policy implication, results suggest that if governments are constrained from increasing migration inflows (e.g. because of negative attitudes towards migration amongst the electorate), they could use PTAs to boost immigration in case of labour market shortages (Mayda 2008 shows that people are more pro-trade than pro-migration).

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<sup>42</sup> Valid and relevant instrumental variable for migration flows is a relevant issue in migration related literature, and PTAs might represent a good candidate.

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**ANNEX A: SUMMARY STATISTICS AND CONTENTS OF PTAS****Table A.1 List of PTAs containing visa and asylum provision**

<b>Agreement</b>	<b>Date</b>
ASEAN-Australia-New Zealand	01/01/10
Australia-Singapore	28/07/03
Chile-Korea	01/04/04
China-New Zealand	10/10/08
China-Peru	01/03/10
China-Singapore	01/01/09
EAEC	08/10/97
EC Enlargement (25)	01/05/04
EC Treaty	01/01/58
India-Singapore	01/08/05
Japan-Indonesia	01/07/08
Japan-Malaysia	13/07/06
Japan-Philippines	11/12/08
Japan-Switzerland	01/09/09
Japan-Thailand	01/11/07
Japan-Viet Nam	01/10/09
Korea, Republic of-India	01/01/10
Korea, Republic of-Singapore	02/03/06

*Source: World Trade Report (2011)*

**Table A.2 List of PTAs containing Labour market provision**

<b>Agreement</b>	<b>Date</b>
Canada-Peru	01/08/2009
Chile-China	01/10/2006
China-New Zealand	01/01/2008
EC Treaty	01/01/1958
CAFTA-DR	01/03/2006
EAEC	08/10/1997
EC Enlargement (12)	01/01/1986
EC Enlargement (25)	01/05/2004
EC Enlargement (27)	01/01/2007
EC-CARIFORUM	01/11/2008
GCC	01/01/2003
NAFTA	01/01/1994
US-Australia	01/01/2005
US-Bahrain	01/08/2006
US-Chile	01/01/2004
US-Jordan	17/12/2001
US-Morocco	01/01/2006
US-Oman	01/02/2009
US-Peru	01/02/2009
US-Singapore	01/01/2004

*Source: World Trade Report (2011)*

**Table A.3 List of PTAs containing GATS provision**

<b>Agreement</b>	<b>Date of entry in force</b>
AESAN-India	01/01/10
ASEAN-Australia-New Zealand	01/01/10
ASEAN-Korea	01/01/10
Australia-New Zealand (ANZCERTA)	01/01/83
Australia-Singapore	28/07/03
Australia-Thailand	01/01/05
CAFTA-DR	01/03/06
Canada-Peru	01/08/09
CEFTA	01/05/07
CEZ	20/05/04
Chile-Australia	06/03/09
Chile-Japan	03/09/07
Chile-Korea	01/04/04
China-Hong Kong	01/01/04
China-New Zealand	10/10/08
China-Peru	01/03/10
China-Singapore	01/01/09
EAEC	08/10/97
EC Enlargement (12)	01/01/86
EC Enlargement (15)	01/01/95
EC Treaty	01/01/58
EC-Algeria	01/09/05
EC-CARIFORUM	01/11/08
EC-Chile	01/02/03
EC-Mexico	01/07/00
EC-Overseas Territories	01/01/71
ECOWAS	24/07/93
EFTA-Korea	01/09/06
India-Singapore	01/08/05
Japan-ASEAN	01/12/08
Japan-Indonesia	01/07/08
Japan-Malaysia	13/07/06
Japan-Mexico	01/04/05
Japan-Philippines	11/12/08
Japan-Singapore	30/11/02
Japan-Switzerland	01/09/09
Japan-Thailand	01/11/07
Japan-Viet Nam	01/10/09
Korea, Republic of-India	01/01/10
Korea, Republic of-Singapore	02/03/06
MERCOSUR	29/11/91
NAFTA	01/01/94
Southern African Development Community	01/09/00
US-Australia	01/01/05
US-Bahrain	01/08/06
US-Chile	01/01/04
US-Jordan	17/12/01
US-Morocco	01/01/06
US-Oman	01/02/09
US-Peru	01/02/09
US-Singapore	01/01/04

*Source: World Trade Report (2011)*

**Table A.4 Summary Statistics**

(a) complete sample				
<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Bilateral immigrants flows (in thousands)	2,815	10,740	0	218,8
Population (destination countries)	3,10*10 <sup>7</sup>	4,15*10 <sup>7</sup>	424700	2,98*10 <sup>8</sup>
Population (origin countries)	2,02*10 <sup>7</sup>	5,48*10 <sup>7</sup>	40130	1,31*10 <sup>9</sup>
Per capita GDP destination countries	19663,36	11163,95	3715,79	54629,02
Per capita GDP origin countries	10045,94	10468,64	250,92	54629,02
Difference in per capita GDP	1,417	0,989	0,000	4,964
Squared difference in per capita GDP	2,988	3,502	0,000	24,647
Stock of migrants in 1991	14891,29	96969,04	0	2655997

(b) sample of county pairs with no PTA in force				
<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Bilateral immigrants flows (in thousands)	2,299	8,127	0	111,9
Population (destination countries)	2,98*10 <sup>7</sup>	4,32*10 <sup>7</sup>	424700	2,98*10 <sup>8</sup>
Population (origin countries)	1,59*10 <sup>7</sup>	6,75*10 <sup>7</sup>	40130	1,31*10 <sup>9</sup>
Per capita GDP destination countries	19232,42	11047,03	3715,79	54629,02
Per capita GDP origin countries	6455,72	7498,96	250,92	48904
Difference in per capita GDP	1,657	0,956	0,000	4,964
Squared difference in per capita GDP	3,662	3,671	0,000	24,647
Stock of migrants in 1991	6332,73	29502,86	0	460358

(c) sample of country pairs with PTA in force				
<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Bilateral immigrants flows (in thousands)	3,289	12,660	0	218,8
Population (destination countries)	3,25*10 <sup>7</sup>	3,93*10 <sup>7</sup>	424700	2,98*10 <sup>8</sup>
Population (origin countries)	2,54*10 <sup>7</sup>	3,19*10 <sup>7</sup>	274000	2,98*10 <sup>8</sup>
Per capita GDP destination countries	20202,23	11286,44	3715,79	54629,02
Per capita GDP origin countries	14305,17	11810,08	533,09	54629,02
Difference in per capita GDP	1,132	0,952	0,000	4,629
Squared difference in per capita GDP	2,188	3,106	0,000	21,433
Stock of migrants in 1991	26477,97	143958,2	0	2655997



**ANNEX B: INSTRUMENTAL VARIABLES ESTIMATIONS**

This section addresses any residual endogeneity problem with the PTA dummy (after the inclusion of country pair fixed effects and the use of lagged PTA dummy in the main part of the text)<sup>43</sup>. To this end I estimate an Instrumental Variables model. The idea for the instrumental variables comes from the domino effect in PTAs formation highlighted by Baldwin and Jaimovich (2010). They show that the probability that two countries join in a common PTA is positively affected by the number of PTAs that each potential partner has with the rest of the world (in order to avoid trade diversion effect). Following this idea, I use the total number of PTAs signed by origin and destination country (minus the number of PTAs they have in common) to instrument PTA dummy<sup>44</sup>. Coefficient associated to the first stage regression result (table B.1), being positively related with the instrumented variable, shows the relevance of IV. F-stat and Shea Partial R-sq prove the relevance of the instrument. The validity of IV passes mainly through a qualitative description of its exogeneity. Here the identification assumption is that the number of PTAs signed by origin/destination countries with the rest of the world affects bilateral migration flows only through its effect on the PTA formation between origin and destination country (i.e. the number of PTAs that countries have with the rest of the world is unrelated with bilateral specific migration flows). In fact, there are not reasons of why bilateral migration flows might affect the total number of PTAs that origin (destination) country has with the rest of the world. Moreover, the total number of PTAs by both origin and destination country with the rest of the world does not affect bilateral specific (*ij*) migration flows, unless a kind of diversion effect applies; I test also for this diversion effect on migration flows finding a null coefficient (results available under request). Table B.1 shows results for both first and second stage regression.

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<sup>43</sup> Country pair fixed effects and lagged PTA widely address the endogeneity problem (Baier and Bergstrand 2007). IV estimation here represents just a further check and this is why I put this section in the appendix.

<sup>44</sup> As a further check I also use the total number of PTAs signed by origin and destination countries separately (ending up with an over-identified model). Results (available under request) do not change.

**Table B.1 Bilateral migration flows and PTAs. 2SLS regression results**

Dependent variable: RTA	First Stage	Second Stage	
	RTA	Immigrants flows	Dummy positive migrants flows
Domino Effect	0.0366*** (0.000)	-	
PTA (instrumented)		0.247*** (0.053)	0.064*** (0.016)
N. observations	8215	8215	8215
F-stat (p-value)	0.000	-	-
Angrist-Pischke test of excluded instruments (F-stat)	9673	-	-
Anderson identification test (H0=underidentified)	0.000	-	-
Centered R-sq	-	0.250	0.179

Note: standard errors in parentheses. All regressions include year, destination, origin country, destination-period, origin-period and country pair fixed effects (within estimator). \*\*\*p<0,01; \*\*p<0,05; \*p<0,1. I could not include other control variables (as in former OLS, Poisson) in this IV estimation because they would not satisfy the validity condition.

## ANNEX C: PROPENSITY SCORE MATCHING ESTIMATION

In the main part of the text (section 4) I mentioned the econometric issue of isolating the pure PTAs attraction effect from their trade led effect on migration. It could be the case that PTAs, by stimulating trade, can increase migration flows (empirical literature provides evidence on the positive link between trade and migration). To clean from the former effect I use a Propensity Score Matching approach. The idea is to estimate the equation [10] on a sample of country pairs having the same “propensity” to have positive trade flows. By selecting a sub sample of country pairs with and without trade flows, but similar in their probability to trade (according to other exogenous covariates), PTA can be considered as a random (experimental) variable and its effect on migration flows does not pass through trade flows<sup>45</sup> (keeping only the pure attraction effect). Thus, the first step consists of estimating the country pair specific probability of having positive trade flows using a traditional gravity model (Anderson van Wincoop 2002). Results of the gravity style model are presented in table C.3. Then I match country pairs having positive trade flows with those without trade flows (control group) on the base of the former estimated probability (propensity score). Finally I restrict the sample to only matched country pairs (with distance to their matched control group observation lower than the 75 percentile) to get observations with similar probability to have positive trade flows. In this way PTA dummy in the sub-sample of country pairs can be considered as

<sup>45</sup> See Dehejia and Wahba (2002)

exogenous (experimental) variable and its coefficient keeps the pure attraction effect. Second stage results in table C.1 and C.2 widely confirm what shown and discussed in the main text.

**Table C.1 Propensity Score Matching estimation (second stage)**

<i>Dependent variable:</i>	Immigrants flows in mil. (ln in OLS)							
	OLS				Poisson			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PTA	0.145* (0.074)	0.021 (0.077)	0.328*** (0.094)	0.005 (0.0841)	0.250*** (0.002)	0.219*** (0.002)	0.301*** (0.002)	0.176*** (0.002)
Visa provision		0.308*** (0.074)				0.088*** (0.002)		
GATS provision			-0.368*** (0.090)				-0.107*** (0.002)	
Labour Market provision				0.263*** (0.086)				0.183*** (0.002)
N. of observation	4301	4301	4301	4301	3986 <sup>a</sup>	3986 <sup>a</sup>	3986 <sup>a</sup>	3986 <sup>a</sup>
Wald Chi2					0.000	0.000	0.000	0.000
Adjusted R-sq	0.891	0.891	0.891	0.891				

Note: robust standard errors in parentheses. All regressions include year, destination, origin country and country pair fixed effects. Columns (1) - (4) include also country-period fixed effects. Control variables included in all regressions are: population (log) in origin and destination countries, per capita gdp (log) in origin and destination countries, stock of immigrants in 1991, import flows (ln), difference in GDP and its squared value. \*\*\*p<0,01; \*\*p<0,05; \*p<0,1. a 51 observation dropped because of only one observation per group, 264 observation dropped because of all zero outcomes.

**Table C.2 Propensity Score Matching estimation (second stage). PTA lagged**

<i>Dependent variable:</i>	Immigrants flows in mil. (ln in OLS)							
	OLS				Poisson			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PTA <sub>t-1</sub>	0,360*** (0,087)	0,226** (0,089)	0,494*** (0,098)	0,168* (0,090)	0,205*** (0,002)	0,170*** (0,002)	0,219*** (0,002)	0,164*** (0,002)
Visa provision <sub>t-1</sub>		0,391*** (0,083)				0,127*** (0,000)		
GATS provision <sub>t-1</sub>			-0,399*** (0,101)				-0,030*** (0,002)	
Labour Market provision <sub>t-1</sub>				0,538*** (0,112)				0,122*** (0,002)
N. of observation	4301	4301	4301	4301	3986 <sup>a</sup>	3986 <sup>a</sup>	3986 <sup>a</sup>	3986 <sup>a</sup>
Wald Chi2					0.000	0.000	0.000	0.000
Adjusted R-sq	0.891	0.891	0.891	0.891				

Note: robust standard errors in parentheses. All regressions include year, destination, origin country and country pair fixed effects. Columns (1) - (4) include also country-period fixed effects. Control variables included in all regressions are: population (log) in origin and destination countries, per capita gdp (log) in origin and destination countries, stock of immigrants in 1991, import flows (ln), difference in GDP and its squared value. \*\*\*p<0,01; \*\*p<0,05; \*p<0,1. a 51 observation dropped because of only one observation per group, 264 observation dropped because of all zero outcomes.

**Table C.3 Propensity Score Matching estimation (first stage)**

Probit Model	
Dependent variable: dummy if imports>0	(1)
Log per capita GDP (destination)	4.888*** (1.097)
Log per capita GDP (origin)	-0.169 (0.554)
Border	-1.811*** (0.530)
Language	0.721*** (0.231)
Colony	0.351 (0.354)
Distance	-0.755*** (0.240)
N. of observation	6880
Pseudo R-sp	0.633

Note: robust standard errors in parentheses.  
Regression includes year, destination and origin country. \*\*\*p<0,01; \*\*p<0,05; \*p<0,1.

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