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Gianluca Orefice[1]

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JEL: F22, F13, F53, F16
Keywords: International Migration, Trade Policy, Migration Policy, PTAs

Author

[1] CEPII, rue de Grenelle 113, 75007 Paris (France). Tel : (33) 1 53 68 55 71.
Email: gianluca.orefice@cepii.fr

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Gianluca Orefice[a]
(CEPII, Paris)

Abstract

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[a]Gianluca Orefice: CEPII, rue de Grenelle 113, 75007 Paris (France). Tel : (33) 1 53 68 55 71. Email : gianluca.orefice@cepii.fr. Thanks to participants at UNIDO-University of Bari conference. I'm grateful to Matthieu Crozet, Lionel Fontagne, Farid Toubal and Lorenzo Rotunno 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.

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[1]. 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 Hecksher 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.[2] 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 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.[3] That is, all other determinants of migration being constant, a potential migrant will choose a destination country on the basis of the information

[1] It includes also south-south migration.

[2] 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).

[3] It operates as the diaspora externalities (Beine et al. 2010) where the information provided by existing communities of migrants in destination countries attracts new immigrants flows.

held about all candidate countries. In increasing the amount of information, PTAs could drive migration choice towards PTA members.

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[4], mostly thought for trade in goods and services liberalization, includes temporary migration related provisions which easy 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 between signatory countries; for example the Singapore-Australia Trade Agreement (2003)[5] allows the free movement of workers (intra-corporate) up to a total term of 14 years.

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 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.[6] According to the former channels, PTAs might affect the probability of having positive bilateral migration flows (*extensive margins*) and/or the number of individual migrating (*intensive margins*). By studying the two former channels this paper adds to the empirical literature on the determinants of migration flows which

[4] See chapter K of the agreement, in particular Annexes K-03.

[5] 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.

[6] 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 unspecificed levels of education), intra-corporate transferees or contract service suppliers. See, e.g., the ASEAN-Australia-New Zealand or the US-Singapore agreement.

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.[7] 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[8]); this effect increases up to 28 per cent if the PTA includes visa and asylum provision. Moreover, PTAs including labour market related provisions stimulate bilateral migration flows by 15 per cent. These results suggest the policy implication of the paper. Governments having their hands tied on migration policy (because of negative attitudes towards immigrants among voters) might use PTAs to liberalize migration flows in case of labour shortage, enjoying the fact that voters are more pro-trade than pro-migration (Mayda 2008).

The paper is organized as follows. Section 2 aims of clarifying what this paper intends for PTAs and their contents. Section 3 derives a structural gravity model for migration and provides a brief review of the empirical literature on the determinants of migration flows. Section 4 describes the data used in the paper and Section 5 presents the empirical model and discusses the main econometric issues. Section 6 presents the results on the role of PTAs on both bilateral migration flows and the extensive margins of migration (section 6.1). Section 6.2 compares the effects of PTAs on migration and trade flows. Final section concludes the paper.

[7] I use an Instrumental Variables (IV) approach to strengthen the endogeneity problem solution proposed by Baier and Bergstrand (2007).

[8] OLS estimation with country pair fixed effects.

2. 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 therefore a crucial phenomenon in international trade. 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. [9]

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).[10] 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 analysed by Horn et al. (2010), which covers a sample of

[9] See Horn et al. (2010) for further details on the grouping of provisions.

[10] 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").

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 GATS, by including also Mode IV related provisions, allow the temporary entry to partner country for some selected professionals[11], and thus the possibility for temporary migrants to experience the foreign country and/or to join local worker networks 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 (or RTA) 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 in force 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).

3. 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[12] 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

[11] Temporary entry in some agreement can be extended up to 14 years (Australia-Singapore 2003).
[12] I strictly follow Anderson (2011).

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; Hatton 2005; 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 of travel (related to geographic distance or common language); (iv) existence in destination countries of migrant networks, which reduce the information cost of migration (by easing the integration of new immigrants in the destination country). Former determinants of migration can be better understood through the lens of 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] $(w_i/c_{ij})e_{ijh} > w_j$

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

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

The idiosyncratic component $\ln(e_{ijh})$ is assumed to be distributed as type-1 extreme value (Gumbel distribution); thus the probability of migration $p(u_{ij})$[13] 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):

[13] $\mathrm{P}(migrate) = \mathrm{P}\left(\ln(e_{ijh}) > \ln(w_j) - \ln(w_i) + \ln(c_{ij})\right)$

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

The probability to migrate under multinomial logit distribution is:

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

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

To indentify 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] $$L_i=\sum_j M_{ij}=\sum_j\left(\frac{w_i/c_{ij}}{\sum_k w_k/c_{kj}}N_j\right)=w_i\sum_j\left(\frac{1}{c_{ij}W_j}N_j\right)$$

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

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:

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

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 Ω_i can be interpreted as how costly is to enter destination country (in what follows 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, Ω_i and W_j are analogous to inward and outward multilateral price resistance terms.[14]

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,[15] but considers the cost of migration related to geographic distance or 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-origin couple, potential migrant in origin country will choose the destination with the 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. Thus the effect of a PTA and its content is supposed to pass through c_{ij}.

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. 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

[14] See section 5 in Anderson (2011).

[15] Pull and Push factors of migration flows, as considered in the existing literature, can be easily thought to be part of Ω_i and W_j since they are respectively destination and origin country specific.

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). Common language and colonial relationship dummies have been largely used to approximate for cultural proximity (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.

4 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[16] and a sample of 207 origin countries, for the period 1998-2008. Thus this paper focuses only on south-north and north-north total migration flows[17]. The dataset includes zero flows for some country pairs.[18] 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 dummy variables to indicate whether the PTA includes legally enforceable provisions on labour market issue, on visa-and-asylum, or replicating the scheme of GATS.[19] 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.[20] It includes 33 EU and 11 USA agreements, and 52 PTAs for the ASEAN countries, China, India, Japan and Mercosur. Tables 1 - 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.

[16] 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

[17] Lack in data availability prevents to study south-south and north-south migration flows; for the same reason it was not possible to focus on skilled migration only (information about the skill level of migrants is available only for stock measures in 1991 and 2000 – Docquier et al. 2007).

[18] Thus I will use also a poisson estimation to strengthen my results (Silva and Tenreyro 2006).

[19] 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.

[20] 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. More details on this dataset are provided by Orefice and Rocha (2011).

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 4a,b,c. Comparison of 4b and 4c 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 5, 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.

5 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:

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

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 Ω_{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 to 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[21]. 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 agreement. 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

[21] The three dummy variables could not be all together included in the same regression because of multi-collinearity (high correlation among them).

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[22] 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 (Ω_{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). An important control variable is bilateral trade flows (log of imports); PTAs might affect immigration flows by enhancing bilateral trade.[23] 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:

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

Country pair fixed effects (φ_{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, colony and the stock of migrants in 1991 (as proxy for cultural proximity)[24]. Destination (φ_i) and origin (φ_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-period fixed effects (φ_{it} and φ_{jt}) properly absorb inward (Ω_{it}) and outward (W_{jt}) country specific migration resistance term[25].

[22] Computed as the absolute difference in (log) per capita GDP

[23] 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 (Aguiar et al. 2007).

[24] To explicitly include geographic specific sources of migration and the stock of migrants in 1991 among the set of control variables I further estimate a model without country pair fixed effects (columns (1) and (6) in tables 6-7). This specification also allowed me to include two –almost time invariant - 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.

[25] I use country-period instead of country-year fixed effects because I preferred to properly include per capita GDP in origin and destination country in the set of control variables (per capita GDP is the main determinants of migration according to the existing literature). Further, the inclusion of country-year fixed effect would imply a dummy inflation problem in estimations. Thus, the time horizon has been divided into three periods and country-period fixed effects included. 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). However, 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.

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 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 (it is plausible that these policies do not 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 (φ_{ij}) mostly resolves the reversal causality problem.[26] 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 A1 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.[27] 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[28].

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

[27] 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.

[28] 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 (not reported here for reasons of space) are available under request and show that having a PTA in common does not divert migrant flows from any third country.

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.[29] As a robustness check I also estimate a Poisson model to follow Silva and Tenreyro (2006) in solving the zero flows problem.

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 throught their effect on trade in goods). 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[30] 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 (similar according to one-to-one approach). 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[31]. 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 A2.

6. Results

Table 6 shows results for the OLS estimations of equation [10], while table 7 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, bilateral specific stock of migrants in 1991 and two dummy variables controlling for EU Custom Union and Schengen Area[32]). Similarly columns 6

[29] For all but very small numbers $\log(x+1) \approx \log(x)$

[30] See Dehejia and Wahba (2002) for further details on the Propensity Score Matching approach

[31] The Propensity Score Matching aims to replicate a natural experiment of PTA (Dehejia and Wahba, 2002).

[32] Columns (1) and (6) in tables 6-7 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 bilateral specific stock of migrants in 1991 as a proxy for cultural proximity and 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.

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 6 column 2) having a PTA in common stimulates bilateral migration flows by 17.5 per cent ($e^{0.162}$-1=0.175). 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 A1.1;[33] the PTA dummy has a strong positive and significant effect on migration flows (see appendix A1 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;[34] thus I need to make PTA dummy mainly unrelated with trade in goods. I do this using the PSM approach described in the former section (see Appendix A.2 for further details). In the first stage I simply estimate the probability of positive trade (log of imports) flows using the traditional gravity model.[35] Then I create a sub-sample of country pairs including: (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 can be considered 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 Tables A2.1 and A2.2 and largely confirm the positive effect of PTA dummy on migration flows.

Columns (3) and (8) in both table 6 and 7 show results for the estimation of equation [10] which includes also visa-asylum provision dummy as explanatory variable.[36] 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*

[33] More in depth discussion of the validity and relevance of instrumental variables is provided in Appendix A1.

[34] 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).

[35] 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.

[36] This dummy variable takes the value 1 if the PTA includes a provision on visa and asylum which is legally enforceable.

dummy refers to GATS (columns (4) and (9) in both table 6 and 7), 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 (thus 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 investment (mode 3) deterring migration flows coherently with a standard factor contents trade theory.[37] Finally, the inclusion of labour market related provision in PTAs (columns (5) and (10) in both table 6 and 7) 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 offsets the positive effect of PTA dummy.

To strengthen former evidence on the positive effect of PTAs and (their contents) I also run a falsification "placebo" test, using *PTA* and *Depth_PTA* dummies five years lagged and anticipated (dummy at t-5 and t+5 respectively) to explain migration flows.[38] The new built explanatory dummies, being *de facto* fictitious, are expected to be unrelated with migration flows. Results reported in appendix table A3.1 confirm the intuition: five years lagged and anticipated dummy variables have no effect on migration flows.

Finally, 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).

6.1 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

[37] 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.

[38] All other control variables and fixed effects included as in former estimations.

[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, 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).[39] Thus I mainly rely on a simple OLS fixed effects model for my analysis[40] because it uses all the information and does not suffer from any incidental parameter problem (however non linear probit model can be considered a robustness check).

Table 8 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 5 (details in Appendix A1). Result for the IV estimation in table A1.1 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

[39] 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.

[40] 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.

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 contents of PTAs, more than the PTA itself, reduces the fixed cost associated with a new potential bilateral migration flow.

6.2 Does PTA stimulate 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.[41] 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 9.

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 in section 5 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).[42]

Table 9 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 10 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

[41] As explained in section 5 (footnote 24); 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.

[42] See Section 5 and Baier and Bergstrand (2007) for a detailed discussion of how country pair fixed effects reduce the simultaneity problem.

on trade in goods.[43] On the other hand, barriers to international migration are still high and PTAs have a strong impact on flows among member countries.

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 new 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. 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).

[43] Trade in goods here has a peculiar meaning, it concerns rich OECD countries' imports from both rich and poor countries. This may be an explanation of the null effect of PTA on trade in goods.

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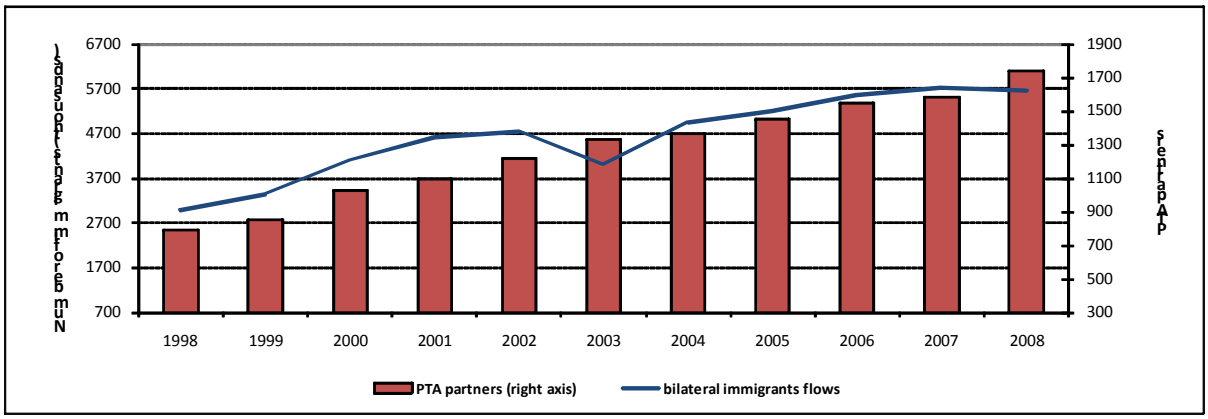
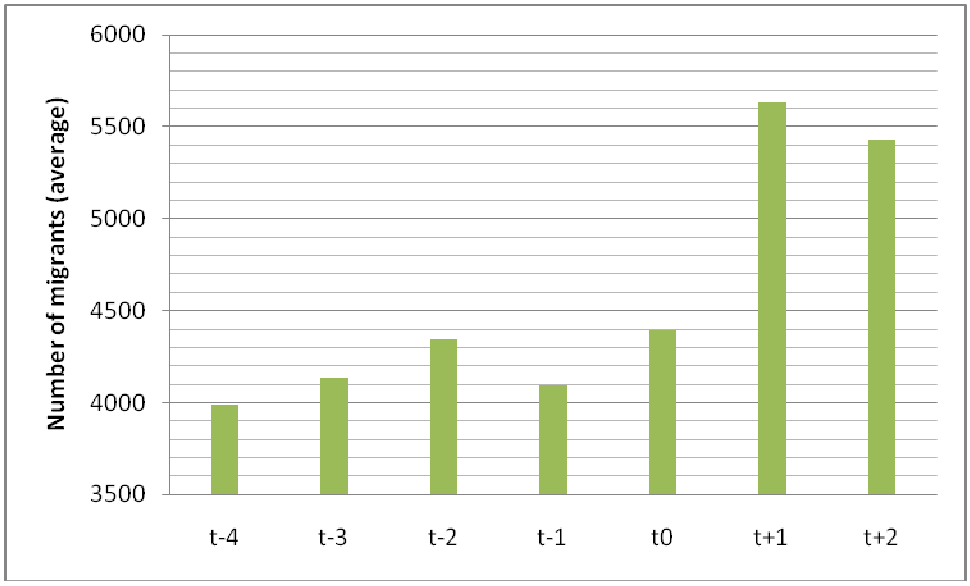
Tables and Figures

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



Source: WTO and OECD dataset.

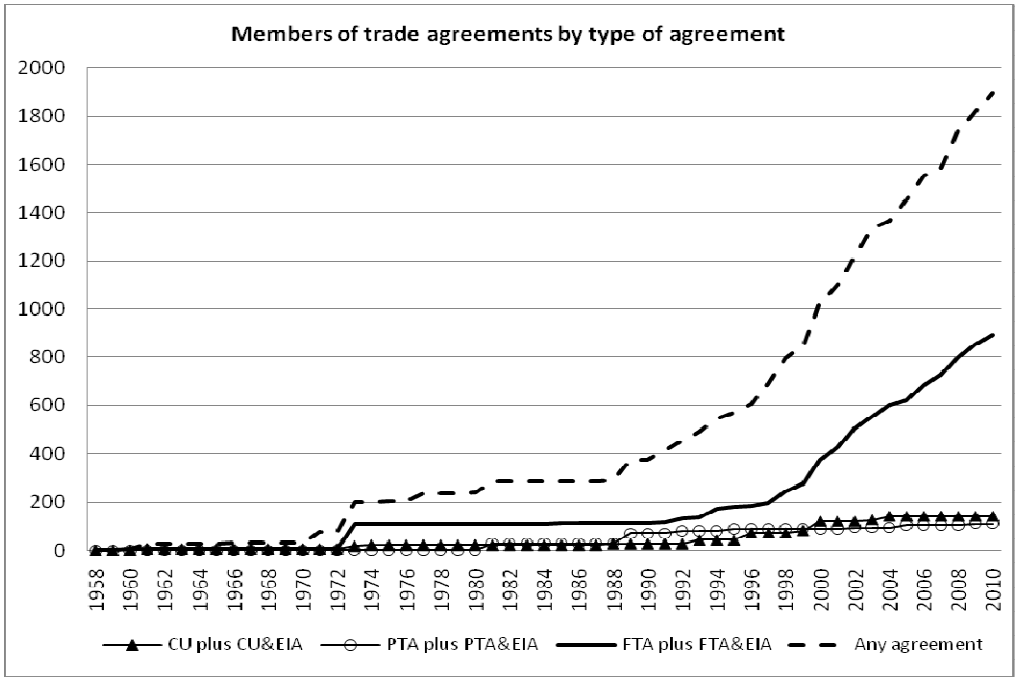
Figure 2. Average value of bilateral migration flows (cleaned from idiosyncratic error term), before and after the signature of a PTA (time=t0)



Source: Author's calculation on OECD data.

Note: 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).

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).

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

Table 1. List of PTAs containing visa and asylum provision

Agreement	Date
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 2. List of PTAs containing Labour market provision

Agreement	Date
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 3. List of PTAs containing GATS provision

Agreement	Date of entry in force
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 4. Summary statistics

(a) complete sample

Variable	Mean	Std. Dev.	Min	Max
Bilateral immigrants flows (in thousands)	2,815	10,740	0	218,8
Population (destination countries)	$3{,}10*10^7$	$4{,}15*10^7$	424700	$2{,}98*10^8$
Population (origin countries)	$2{,}02*10^7$	$5{,}48*10^7$	40130	$1{,}31*10^9$
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

Variable	Mean	Std. Dev.	Min	Max
Bilateral immigrants flows (in thousands)	2,299	8,127	0	111,9
Population (destination countries)	$2{,}98*10^7$	$4{,}32*10^7$	424700	$2{,}98*10^8$
Population (origin countries)	$1{,}59*10^7$	$6{,}75*10^7$	40130	$1{,}31*10^9$
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

Variable	Mean	Std. Dev.	Min	Max
Bilateral immigrants flows (in thousands)	3,289	12,660	0	218,8
Population (destination countries)	$3{,}25*10^7$	$3{,}93*10^7$	424700	$2{,}98*10^8$
Population (origin countries)	$2{,}54*10^7$	$3{,}19*10^7$	274000	$2{,}98*10^8$
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

Source: Author

Table 5. 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	-

Source: Author

Table 6. 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_{t-1}						-0.024	0.257***	0.180***	0.344***	0.133**
						(0.088)	(0.062)	(0.063)	(0.070)	(0,066)
Visa $provision_{t-1}$								0.223***		
								(0.054)		
GATS $provision_{t-1}$									-0.249***	
									(0.065)	
Labour Market $provision_{t-1}$										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 7. 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***	0.353***	0.371***	0.436***	0.217***					
	(0.098)	(0.097)	(0.093)	(0.001)	(0.001)					
Visa provision			-0.049							
			(0.073)							
GATS provision				-0.174***						
				(0.001)						
Labour Market provision					0.234**					
					(0.001)					
PTA_{t-1}						0.016	0.278**	0.215***	0.326***	0.190***
						(0.093)	(0.125)	(0.001)	(0.001)	(0,001)
Visa $provision_{t-1}$								0.205***		
								(0.001)		
GATS $provision_{t-1}$									-0.121***	
									(0.001)	
Labour Market $provision_{t-1}$										0.162***
										(0.001)
N. of observation	5810	6846[a]	6846[a]	6846[a]	6846[a]	5810	6846[a]	6846[a]	6846[a]	6846[a]
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.

Table 8. PTAs and the extensive margins of migration flows

Dependent variable:	Dummy =1 if positive migrants flows							
	Probit				OLS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PTA	0.382**	0.208	0.713***	0.116	0.031**	0.015	0.033**	-0.001
	(0.162)	(0.166)	(0.208)	(0.175)	(0.015)	(0.016)	(0.016)	(0.015)
Visa provision		0.680***				0.043***		
		(0.157)				(0.012)		
GATS provision			-0.543**				-0.003	
			(0.210)				(0.017)	
Labour Market provision				0.672**				0.057***
				(0.210)				(0.016)
N. of observation	3843[a]	3843[a]	3843[a]	3843[a]	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. [a] Number of observations strongly reduced because dependent variable is perfectly predicted by fixed effects

Table 9. PTAs and bilateral migration/trade. A comparison

	OLS				Poisson			
Dependent variable:	immigrants (ln)	imports (ln)	immigrants (ln)	imports (ln)	immigrants	imports	immigrants	imports
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PTA	0.172***	-0.037			0.354***	0.043***		
	(0.001)	(0.051)			(0.001)	(0.000)		
PTA_{t-1}			0.256***	0.048			0.283***	0.039***
			(0.000)	(0.034)			(0.001)	(0.000)
N. of observation	7252	7252	7252	7252	6789[a]	6789[a]	6789[a]	6789[a]
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. [a] 48 observation dropped because of only one observation per group, 415 observation dropped because of all zero outcomes. [b] 38 observation dropped because of only one observation per group.

Table 10. PTAs and bilateral migration/trade. A comparison. Time period 2002-2008

	OLS				Poisson			
Dependent variable:	immigrants (ln)	imports (ln)	immigrants (ln)	imports (ln)	immigrants	imports	immigrants	imports
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PTA	0.108	-0.024			0.238***	0.001***		
	(0.348)	(0.060)			(0.001)	(0.000)		
PTA_{t-1}			0.212***	0.084**			0.155***	0.013***
			(0.068)	(0.040)			(0.001)	(0.000)
N. of observation	5236	5236	5236	5236	4860[a]	5165[b]	4860[a]	5165[b]
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. [a] 48 observation dropped because of only one observation per group, 415 observation dropped because of all zero outcomes. [b] 38 observation dropped because of only one observation per group.

Appendix

A1 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)[44]. 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 one if they have a PTAs in common) to instrument PTA dummy[45]. Coefficient associated to the first stage regression result (table A1.1), 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 A1.1 shows results for both first and second stage regression.

[44] 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.

[45] 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 A1.1 Bilateral migration flows and PTAs. 2SLS regression results

	First Stage	Second Stage	
Dependent variable:	PTA	Immigrants flows	Dummy positive migrants flows
Domino Effect (instrumental variable)	0.0366***	-	
	(0.000)		
PTA (instrumented)		0.247***	0.064***
		(0.053)	(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, destinatio-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.

A2 Propensity Score Matching Estimation

In the main part of the text (section 5) 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 or deter migration flows. 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[46] (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 2003). Gravity style model results (not reported here but available under request) are completely in line with existing literature.[47] 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 that 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 exogenous (experimental) variable and its coefficient keeps the pure attraction effect. Second stage results in table A2.1 and A2.2 widely confirm what shown and discussed in the main text.

[46] See Dehejia and Wahba (2002)

[47] First stage gravity regression includes year, origin and destination country fixed effects, geographic variables (distance, common border, language and colony), per capita GDP in both origin and destination country. Dependent variable is a dummy equal to one if positive trade flow between origin and destination country

Table A2.1 Propensity Score Matching estimation (second stage)

Dependent variable:	Immigrants flows in mil. (ln in OLS)							
	OLS				Poisson			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PTA	0.145*	0.021	0.328***	0.005	0.250***	0.219***	0.301***	0.176***
	(0.074)	(0.077)	(0.094)	(0.0841)	(0.002)	(0.002)	(0.002)	(0.002)
Visa provision		0.308***				0.088***		
		(0.074)				(0.002)		
GATS provision			-0.368***				-0.107***	
			(0.090)				(0.002)	
Labour Market provision				0.263***				0.183***
				(0.086)				(0.002)
N. of observation	4301	4301	4301	4301	3986[a]	3986[a]	3986[a]	3986[a]
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 A2.2 Propensity Score Matching estimation (second stage). PTA lagged

Dependent variable:	Immigrants flows in mil. (ln in OLS)							
	OLS				Poisson			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PTA_{t-1}	0,360***	0,226**	0,494***	0,168*	0,205***	0,170***	0,219***	0,164***
	(0,087)	(0,089)	(0,098)	(0,090)	(0,002)	(0,002)	(0,002)	(0,002)
Visa $provision_{t-1}$		0,391***				0,127***		
		(0,083)				(0,000)		
GATS $provision_{t-1}$			-0,399***				-0,030***	
			(0,101)				(0,002)	
Labour Market $provision_{t-1}$				0,538***				0,122***
				(0,112)				(0,002)
N. of observation	4301	4301	4301	4301	3986[a]	3986[a]	3986[a]	3986[a]
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.

Appendix A3 Placebo test

Table A3.1 Falsification regressions - OLS

	Dependent variable: immigrants flows in mil. (ln)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PTA_{t+5}	0.110	0.113	-0.0500	0.0924				
	(0.084)	(0.087)	(0.243)	(0.205)				
Visa $provision_{t+5}$		-0.0703						
		(0.167)						
GATS $provision_{t+5}$			0.193					
			(0.254)					
Labour Market $provision_{t+5}$				0.0237				
				(0.216)				
PTA_{t-5}					-0.151	-0.157	-0.227*	-0.157
					(0.106)	(0.107)	(0.128)	(0.107)
Visa $provision_{t-5}$						0.459		
						(0.335)		
GATS $provision_{t-5-1}$							0.328*	
							(0.171)	
Labour Market $provision_{t-5-1}$								0.459
								(0.335)
N. of observation	3447	3447	3447	3447	4627	4627	4627	4627
R-sq	0.953	0.953	0.953	0.953	0.951	0.951	0.951	0.951

Note: robust standard errors in parentheses. All regressions include year, destination-, origin-country, destination-period, origin-period and country pair fixed effects. 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. Constant not shown but included. ***p<0,01; **p<0,05; *p<0,1.