REPOSITORIO DIGITAL UNIVERSITARIO (RDU-UNC)

The education networks of Latin America. Effects on bilateral trade during and after the cold war

Marina Murat, María Luisa Recalde, Pedro Degiovanni

The education networks of Latin America. Effects on bilateral trade during and after the cold war

Murat, Marina
Recalde, Maria Luisa
Degiovanni, Pedro

The education networks of Latin America. Effects on bilateral trade during and after the cold war.

Marina Murat[*]
María Luisa Recalde[†]
Pedro Gabriel Degiovanni[‡]

Resumen

El presente trabajo analiza el efecto sobre el intercambio comercial bilateral del stock de estudiantes internacionales provenientes de once países de ALADI en nueve países de la OCDE, para el periodo 1971-2012. Se utilizan distintos cofactores y especificaciones econométricas, y se controla por endogeneidad. Se encuentra que las redes educativas tienen efectos positives y significativos sobre importaciones y exportaciones. El impacto es mayor durante la Guerra Fría que luego de la misma, y se concentra en los bienes diferenciados. Similitudes políticas, institucionales y culturales disminuyen el efecto. El impacto de las redes educativas es robusto a distintas especificaciones y regresores.

Abstract

This paper tests the effects of students' movements from eleven LAIA countries into nine OECD economies on bilateral trade flows during years 1971 to 2012. We use several cofactors, different econometric specifications and controls for endogeneity. Our main results are that education networks have positive and significant effects on bilateral exports and imports. The impact of students on trade is higher during the cold war period than afterwards, and it concentrates on differentiated goods. Political, cultural and institutional similarities decrease the effect. We find the impact of education networks to be robust to different specifications and regressors.

Keywords: bilateral trade, education networks, international students, Latin America.

JEL: F14, F29, F54, I20

---

[*] Department of Economics, University of Modena and Reggio Emilia, Italy.
marina.murat@unimore.it
[†] Instituto de Economía y Finanzas, Universidad Nacional de Córdoba, Argentina.
lrecalde@eco.unc.edu.ar
[‡] Instituto de Economía y Finanzas, Universidad Nacional de Córdoba, Argentina.
pedrodegiovanni@outlook.com

1. Introduction

An article published in 2005 by the Magazine of the University of California Davis Magazine proudly stated that "[m]ore than 50 Chileans who studied agricultural sciences at UC Davis in the 1960s and 1970s – the 'Davis boys' – are widely credited with helping to transform their country into one of the world's leading fresh-fruit exporters", so that "[n]early all the table grapes you eat during the winter come from Chile, but you could also say they are the fruit of UC Davis. The same goes for the Chilean-grown apples, peaches, nectarines, pears and avocados that you find out of season in your grocery store" (Holder, 2005).

Facts like those reported in the Magazine are seldom acknowledged, but are not unusual. The cited education network of Davis graduates is just one among a vast number of webs of friendship and business ties among ex university mates existing worldwide. International students are a particular kind of people who move abroad to accumulate human and social capital and tend to return home after graduation. While abroad, they typically build social ties and develop a fondness for the alma mater and the country of studies that may last for a lifetime. The human capital they accumulate improves their expected earnings and the skilled endowments of their country of residence, but it is especially their transnational social capital that can trigger bilateral trade. As more generally with transnational social networks (Rauch, 2001), they possess a knowledge of the host country's peoples, institutions, norms and markets that added to their knowledge of the homeland can lower fixed costs of international transactions.

This study aims to test the influence of Latin American education networks on bilateral trade between Latin American and Western countries. More specifically, it focuses on the eleven countries of Latin America that are also the founding members of Latin American International Association (LAIA), and nine main OECD economies, during the period of time going from 1971 to 2012. We use data on international students enrolled at the tertiary level provided, in print, by the UNESCO Statistical Yearbook until 1997 and since 1998, on-line, by UNESCO Statistics, data on trade bilateral flows provided by WITS, as well as data on several other variables and cofounding factors. Given the period considered, we look at possible heterogeneities in the impact of university networks during the cold war period and afterwards.

Students of Latin American countries have moved abroad for their tertiary studies since colonial times, but in discontinuous waves. People from the upper classes used to study in Europe more often during the colonial period than afterwards[§]. For a long time following independence from Spain and Portugal, and well into the second half of the twentieth century, moving outside Latin America and even outside the home country to study was rather unusual. Things changed again during the cold war era, when each superpower, the United States and the Soviet Union, feared that Third World countries might side with the competing superpower, and tried to attract these countries' elites into their own spheres of influence. One effective and well-known way of influencing preferences and choices of elite classes is through education (Nye 2005). Since the sixties, both the Soviet Union and the United States provided scholarships and practical support to Latin American students willing to move to their universities. Additionally, the USSR designed specific curricula and created a dedicated institution in Moscow – the Peoples' Friendship University of Russia – for students from the Third World, while the United States actively supported the formation of new research and teaching Departments within Latin American universities. To this end, American private institutions and foundations, such as Ford, Rockefeller and Carnegie, contributed to provide academic personnel, skills and funds. With time, these departments – mostly in technological, scientific and economic fields – became the natural workplace for academically oriented returning students (McCarthy, 1987).

[§] At the beginning of the nineteenth century, leaders of independence, such as Simon Bolivar (leader of Venezuela, Bolivia, Colombia, Panama, Ecuador and Peru) and Manuel Belgrano (leader of Argentina), had studied in Spain. Bernardo O'Higgins, a Chilean leader, studied in the United Kingdom.

Meanwhile, push factors were also at work. Since independence and well until the twentieth century, Latin American economies grew rapidly, in some cases reaching standards of living that, during the first decades of the twentieth century, outpaced those of Europe. A consequence of this was mass migration from Europe and the emergence of new elite and upper middle classes in Latin America, with people that, again, used to travel to Europe, and now also to the United States, for tourism, business, and, from the sixties and seventies, also for university studies. The preferred destination for the latter was the United States, followed by other advanced Western economies and, at a distance, by some countries under Soviet influence.

With the end of the cold war the strong interest of the two superpowers on international students from Third World countries faded, but the outward movements from Latin America lasted and even grew more rapidly than before. In this process, however, the importance of the main destinations gradually changed. The more restrictive rules of entry adopted by the American government following the terrorist attacks of 9/11 2001 slowed the inflows of students to American universities, while the attractiveness of European and Australian universities increased because of various reasons. European countries typically charged lower university fees, they harmonized their curricula of studies – which implied that degrees were recognized cross-country – and offered easier conditions for staying after graduation. While the United States remained the preferred destination, increasing numbers of students moved to European countries and to Australia.

The base theoretical hypothesis of this study is that education networks, similarly to social and business networks, lower the invisible barriers that deter the economic exchanges between countries. Since the seminal paper by Gould (1994), the empirical literature on transnational social and business networks, has grown and provided support to the above hypothesis, showing that they can promote both bilateral trade Aleksynska and Peri (2012) Felbermayr and Young (2009) and foreign direct investments (Docquier and Lodigiani, 2010; Flisi and Murat, 2011) Reviews are in Egger, von Ehrlich and Nelson (2012) and Felbermayr and Toubal (2012). Specifically on education networks, Murat (2014), finds that they positively influence the bilateral trade of the United Kingdom. The novelty of this study is its focus on the Latin American education ties with Western countries, and their influence on imports and exports during the last two decades of the cold war and afterwards.

Our main results are that Latin American students positively and significantly affect the region bilateral exports and imports. More specifically, their influence is stronger during the cold war years than afterwards. Dissimilarities in institutions, culture and policy rights between sending and receiving countries play a substantial role in the student's influence on trade, and partly explain the difference between the two periods. Results are robust to different specifications and regressors. The rest of the paper is structured as follows: Section 2 briefly describes international students movements and trade flows during the period considered and the data utilized; Section 3 describes the empirical strategy; results are presented in Section 4, and Section 5 concludes.

2. Descriptive statistics and Data

2.a. Descriptive statistics

In 2011 there were more than 140.000 students from the eleven LAIA members in universities of 62 countries around the world. However, these numbers were concentrated in only 12 destination countries, representing 95% of the total. Nine of them are developed economies, historically the preferred destination of Latin American students – United States, Australia, Canada, France, Germany, Italy, Portugal, Spain, United Kingdom –, which in 2011 were 83% of student movements originating from Latin America and 51% of its trade outside the region, while the remaining three are Latin American countries – Cuba, Brazil and Chile –. As this paper's main goal is to test the impact of international students on the bilateral trade with countries outside the region, we focus the analysis on the nine developed countries.

The number of Latin American students in the nine receiving countries has been growing during the last 40 years: it was nearly 22.000 in 1973 and well above 100.000 in 2012. Latin American students started to move outside the region in conspicuous numbers in the sixties and seventies of the last century. Their outward movements grew rapidly especially since the end of the eighties, when the cold war ended and most Latin American countries adopted more liberal policies. Figure 1 shows the outward movements of international students from the eleven Latin American countries to the nine OECD economies during the years 1971-2012, the time span of this paper's database. The paths followed by the bilateral exports and imports of LAIA countries are similar to those of students.
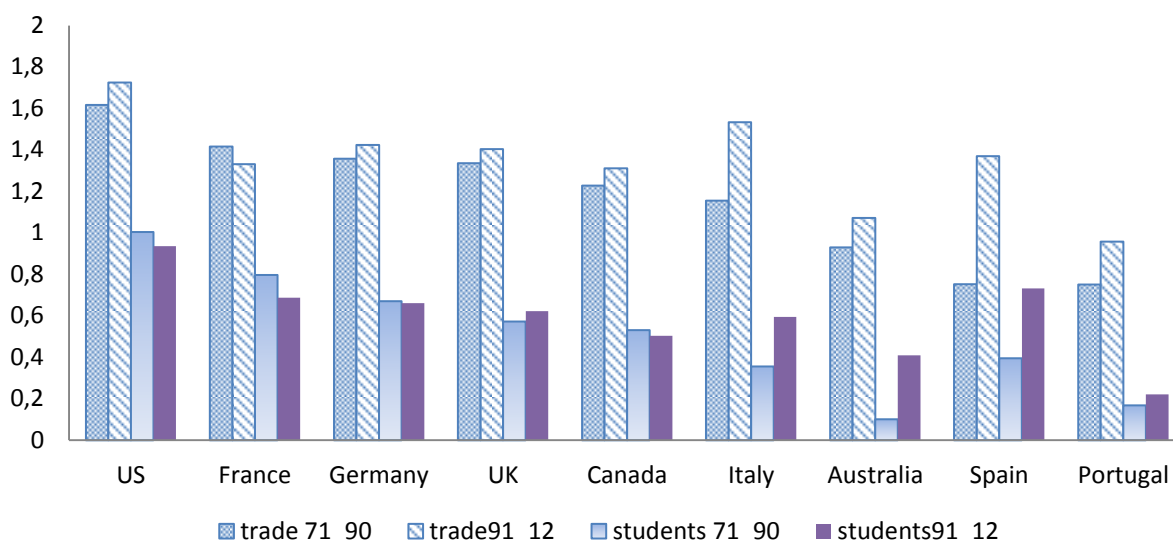
Figure 1

Students and trade
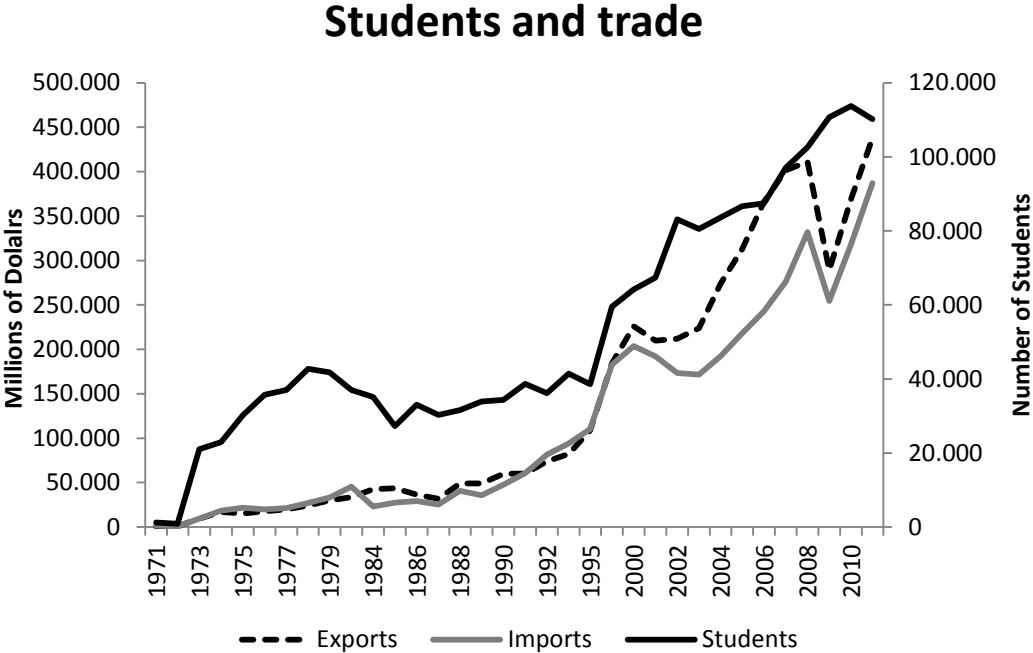
When considering two periods, before and after 1990, the composition of students' movements abroad presents some heterogeneity. Figure 2 shows that during the first period, a high proportion of students moved to the United States and a smaller one to European countries, among them France, Germany and the UK. Bilateral trade was also more concentrated on the United States, France, Germany and the UK, as well as Canada. Since the beginning of the nineties American universities remain the preferred destination, but student numbers in North America, Germany and France decrease, while they increase in the Latin European countries - Spain, Portugal and Italy –, the United Kingdom and Australia. The shifts in students' destinations can be related to both destination and sending countries characteristics. The terrorist attacks of 9/11 in the United States have been followed more restrictive policies on immigration and students' entry permits in the country. At the same time, Europeans countries and Australia become more attractive than before. One reason is the lower fees charged by European and Australian universities relatively to American ones. Another is the harmonization process of higher education, or Bologna Process, adopted by 47 European and non-European countries since 1997, which facilitates students' mobility (Erasmus programs) and establishes that degrees obtained in one country must be recognized by all other participating countries. A reason for preferring, in particular, Spain, Portugal, and Italy, are these countries' citizenship laws, which allow the descents of former emigrants to obtain their ancestors' citizenship, which is also a European Union citizenship. This guarantees entry, the payment of lower university fees in countries – such as the United Kingdom – where the fees paid by European Union students are lower than those of all other students, the entitlement to public welfare benefits during the years at university, and the right of permanent stay in any country of the European Union afterwards.

Figure 2

Average trade and ALADI students in destination countries, 1971-1990 and 1991-2012. In logs.

In the second period, the United States remains the preferred partner for bilateral trade, but the flows with Spain, Italy, Portugal and Australia increase significantly (Figure 2). Some descriptive statistics on bilateral trade, student numbers and other variables are in Table 1. It shows that the mean values of exports, imports and LAIA students in the destination country strongly increase from the first to the second period. Also, when the composition of the goods traded are considered, LAIA countries export more homogenous than differentiated goods in both periods (although the proportion of differentiated goods in exports increases in the second), and import especially differentiated goods. Regarding the other variables, trade integration, polity rights and common language are on average higher during the second period. The number of students enrolled in tertiary education in the average Latin American country is lower than in the OECD economy, but increases more rapidly between the two periods.

Table 1. - Some descriptive statistics (LAIA - OECD country pairs).

	1971-1990			1991-2012			1971-2012				
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Min	Max
Exports LAIA country to OECD country	1,360	379,765	1,406,075	1,704	2,783,197	18,100,000	3,064	1,716,399.00	13,600,000	0.70	283000000
Exports homogeneous goods	1,299	317,022	1,084,786	1,687	1,249,692	6,350,639	2,986	843,952.70	4,848,224	0.47	89800000
Export heterogeneous goods	1,324	175,054	914,198	1,691	1,184,659	8,337,025	3,015	741,303.30	6,292,150	1.00	117000000
Imports LAIA country from OECD country	1,362	334,923	1,203,087	1,705	2,299,380	12,400,000	3,067	1,427,000.00	9,311,105	1.93	186000000
Imports homogeneous goods	1,279	99,623	362,453	1,682	503,488	2,631,752	2,961	329,039.10	2,007,520	1.00	41300000
Imports heterogeneous goods	1,306	192,327	767,110	1,696	1,354,315	7,317,475	3,002	848,800.10	5,552,563	4.00	105000000
International students	1,158	447	1,030	1,627	860	1,740	2,785	689	1,500	0	14853
Trade integration	1,362	0.80	0.40	1,705	1.22	0.63	3,067	1.03	0.58	0.00	3
Polity rights sending countries	1,362	4.27	1.89	1,705	5.51	1.03	3,067	4.96	1.60	1.00	7
Common language	1,362	0.07	0.26	1,705	0.11	0.31	3,067	0.09	0.29	0.00	1
Education sending countries	1,362	903.23	994.70	1,705	2928.83	3015.91	3,067	2029.30	2551.01	22.89	13586
Education destination countries	1,362	9145.49	18169.71	1,705	18414.45	32948.43	3,067	14298.27	27768.90	87.45	134668

2.b. Data

Trade data for the period 1971-2000 were obtained from the NBER- United Nations trade data set, available at http://cid.econ.ucdavis.edu/data/undata/undata.html and documented in Feenstra *et al.* (2005), whereas WITS (COMTRADE) was used for the period 2001-2012. Bilateral data concern the *Exports* from each of the eleven founding members of LAIA (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Paraguay,

Venezuela and Uruguay) to each of the nine main OECD countries (Australia, Canada, France, Germany, Italy, Portugal, Spain, United Kingdom and United States) and the *Imports* of each LAIA economy from each of the OECD countries considered. Up to 1997, data on *International students* are provided by the UNESCO Statistical Yearbook and, since 1998, by UNESCO Statistics online: http://data.uis.unesco.org/.

Data on other variables, as *GDP* and countries' *Population*, are from the United Nations Statistics Division: http://unstats.un.org/unsd/default.htm. The values for the variable *Distance* are from CEPII: http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6. The variable indicating the level of *Trade integration* between country pairs is a polychotomous index[**] built by Baier *et al.* (2007) and available at www.nd.edu/~jbergstr/, until 2005. Following the same procedure, we completed the values for the period 2006-2012. Specifically, the index takes value 0 when there is no economic integration, 1 when an agreement is asymmetrical or one-way, 2 when an treaty corresponds to two-way preferential trade agreements, 3 when it defines a free trade agreement, and 4 when an agreement refers to a customs union.

Polity Rights is and index constructed by Freedom House Organization that ranges from 1 to 7, with the highest value corresponding to free and fair elections, competitive parties, the opposition playing an important role and minority groups having reasonable self-government; and the lowest value corresponding to lack of political rights and an extremely oppressive nature of the regime, sometimes in combination with civil war. Data on *Tertiary education*, regarding the stock of tertiary students in sending and destination countries, were collected from UNESCO Statistics. Data on the stocks of *Migrants* in OECD countries originating from the LAIA countries have been collected from the World Bank's Global Bilateral Migration Database.

3. Empirical strategy

The basic question we seek to examine is whether the exports and imports of the eleven Latin American countries with the nine OECD economies are influenced by the number of tertiary students from the Latin American countries into the OECD economies, after controlling for several characteristics of both sets of countries. To do so we use theory-based gravity-based estimations (Feenstra, 2004):

$$\ln(Y_{sdt}) = \beta_0 + \beta_1 \ln International\ students_{sdt} + \beta_2 \ln GDP_{st} + \beta_3 \ln Population_{st} + \beta_4 \ln GDP_{dt}$$
$$+ \beta_5 \ln Population_{dt} + \beta \ln Distance_{sd} + \beta_7 Trade\ integration_{sdt} + \beta_8 Polity\ rights_{st}$$
$$+ \beta_9 \ln Tertiary_{st} + \beta_{10} \ln Tertiary_{dt} + sd_{sd} + t_t + u_{sdt} \qquad (1)$$

In specification (1), the variable $\ln(Y_{sdt})$ measures the logarithm of either the value of exports or imports between sending (*s*) and destination (*d*) countries at time *t*. The variable providing the proxy for education networks is $\ln(International\ students_{sdt})$, which is the log of the number of students from country *s* in country *d* at time *t*. The rest of the equation includes some standard gravity control variables as well as regressors more specific to this study. Among the standard gravity controls, we include the log of the *GDP*, *Population* and *Distance* of sending and destination countries, and the level of trade agreements between them, *Trade integration*. We also consider other factors that can influence the bilateral trade between sending and destination country, such as the level of *Polity rights* in the sending country, higher levels are expected to be related to also freer markets and higher trade flows; and the number of students attending tertiary education in sending – *Tertiary sending country* – and destination economies – *Tertiary destination country* – , more students attending university imply higher human capital stocks, which should positively affect trade. Furthermore, we also include the set of sending-destination countries fixed effects to control for the bilateral resistance terms (sd_{sd}), and time dummies (t_t), to control for macroeconomic common shocks. After estimating equation (1) with pooled OLS models, we use the System

---

[**] Polychotomous variables are categorical variables that can be classified into many categories.

GMM specification, based on Blundell and Bond (1998) because we are concerned about the potential endogeneity of the international student stocks.

Our database extends along two periods of time, before and after the fall of the Berlin wall, which differed significantly between them both in terms of peoples' international movements and in terms of trade. They also roughly coincide with the prevalence of dictatorships and of more democratic governments in Latin America. The changes taking place both globally and in Latin America between the second half of the eighties and the beginning of the nineties may have affected the influence of education networks on bilateral trade. We therefore split the panel into two sub-periods, the first regarding the cold war years, from 1971 to 1990, and the second concerning the years of globalization, from 1991 to 2012. Whether the effects of education networks should be expected to decrease or increase from the first to the second period is not straightforward. On the one hand, sending and destination countries' institutions differed more and world markets were less integrated during the first period, which should weaken the influence of education networks on trade, while on the other, the proportion of imports of differentiated goods is higher in the second period (see Table 1 above), which should increase the impact of international students. Following Rauch (2001) specific knowledge and networks links are expected to have a stronger impact on the exchanges of differentiated goods than on those of homogenous ones (information on the characteristics of the latter being sufficiently provided by prices) and between more dissimilar countries.

To test these hypotheses, we first split goods into homogenous and differentiated according to whether their trade elasticity, as measured by Broda and Weinstein (2004), is higher or lower than 4 respectively, and separately run the regressions for each sub-group in each period. Next, we interact the *International students* variable with, respectively, the variables reporting the trade integration between countries, the level of *Polity rights* in each country, and the existence of a common language (*Language*). Coefficients on the interacted variables are expected to be negative, with a smaller absolute value in the second period.

To check for the robustness and sensitivity of overall results, we include further controls, such as the stocks of immigrants from the sending to the destination country at time t (*Immigrants$_{sdt}$*). Not only several empirical studies have shown that migrant networks can affect the bilateral trade between origin and residence countries but, in our investigation, the variable *Immigrants* might also be correlated with our variable of interest, *International students*. For example, students might prefer to move to destination countries where they can rely on the support of communities of nationals. The existence of a common language between sending and destination country is a proxy for cultural similarity, which can lower the fixed costs of trade (Felbermayr and Toubal, 2009). The *Language* variable also can be also correlated with *International students* if, for example, students prefer to move to countries where the main language is the same of their homeland. In both these cases the estimates of specification (1) would be affected by omitted variable bias.

4. Results

4.a. Baseline model

The main results of the basic specification are presented in Models 1-4 of Tables 2.A. and 2.B. As expected, international students have a positive, strong and significant impact on both exports and imports between the Latin American and OECD countries considered. More specifically, the values and significance of the coefficients on *International students* in the exports' regressions (Table 2.A) do not vary much between the OLS Models 1-4, being 0.25 in Model 1, which includes time dummies, 0.29 in Model 2, with country pair's fixed effects, 0.20 in Model 3, with the variable of interest lagged five years (in order to capture the

influence of former students on trade), and a long run value of 0.28 (= 0.091/(1-0.681))[††] in Model 4, where the dependent variable, lagged one time period, is included among the regressors to control for autoregressive processes. Hence, in this base specification, a one percent increase in the number of students from LAIA countries in the universities of destination countries increases the exports of LAIA economies to destination countries from 0.20% to 0.29%. The significance of coefficients, in all cases, is at 1%. Table 2.B. shows the influence of students on bilateral imports. Also in this case, coefficient values range from 0.14 in Model 2, to 0.21 in Model 3, with significance, in all cases, being at 1%. On average, therefore, the influence of education networks appears to be slightly lower on imports than on exports.

The potential endogeneity of the above results is controlled for by using the System Generalized Method of Moments estimator (Blundell and Bond, 1998) in Models 5 of Tables 2.A and 2.B. In both cases, the magnitude of SYS_GMM coefficients is similar to the OLS ones, supporting the robustness of results. Moreover, also in this specification, significance is at 1%. Specifically, with potential endogeneity being controlled for, a one percent increase of LAIA *International students* in the destination country leads to a 0.23% increase in the exports to that country and to a 0.15% increase in imports. As this is our preferred model, the magnitude of the impact of international students on imports and exports can be now made clear. Consider a 10 per cent increase in the average country-pair stock of international students. This would amount to an increase from 689 to 758 students, or 69 individuals per country pair. This increase would lead to a 2.3 per cent rise in total imports (coefficient on *International students* from Table 2.A., Model 5). Given that the average value of exports in the sample is $1,716.4 million (Table 1), such an increase would equal $39.48 million. This means that one additional average student generates an extra $572,174 value of exports. In turn, the same 10% increase in the average country-pair number of students, would lead to a 1.52% increase in imports (coefficient on International students from Table 2.B., Model 5). Given that the average value of imports is $1,427 million (Table 1), such an increase would equal $21.7 million. Hence, one additional average student generates an extra $314,353 value of imports. The magnitude of these coefficients are similar to those in Murat (2014), concerning the effects of international students in the United Kingdom bilateral trade, and of Aleksynska and Peri (2014), on the impact of transnational business networks on trade.

In sum, results are robust to different specifications. They show that the influence of students on bilateral trade is positive, strong and higher on exports than on imports. An explanation for this difference can be based on foreign students' consumption preferences for home country products, which can positively affect exports from the home economies (Gould, 1994).

The coefficients on control variables in our preferred model are as expected. For exports, none of the usual gravity variables (population and GDP) is significant, but that may be explained by the small variation of per capita GDP within receiving or sender countries. Distance has a negative and significant effect, trade integration and tertiary education are not significant and, surprisingly, polity rights have a negative effect on exports. For imports, the coefficient on sending country GDP and destination country's population are both positive and significant, while coefficients on destination country's GDP and sending population are negative but not significant. Distance has a negative and significant coefficient; trade integration agreements have a positive effect on trade, while polity rights and tertiary education have non-significant effects.

[††] Including the lagged dependent variable can give rise to dynamic panel or 'Nickel' bias as it can be correlated with the error term in the fixed effects specification (Nickel, 1981). The bias, however, diminishes with the length of time considered, which in our case is high: T=42.

Table 2.A - Dependent variable: LAIA exports to OECD selected economies.

MODELS	(1)	(2)	(3)	(4)	(5)	(6) SYS_GMM	(7) SYS_GMM
VARIABLES	OLS	OLS_FE	FE_LSt	FE_LDV	SYS_GMM	1971-1990	1991-2012
L.ln_exports				0.681***	0.793***	0.744***	0.839***
				(0.037)	(0.039)	(0.047)	(0.029)
ln_students	0.246***	0.291***		0.091***	**0.230***	0.478***	0.174***
	(0.065)	(0.057)		(0.025)	**(0.057)**	(0.135)	(0.046)
L5.ln_students			0.200***				
			(0.057)				
ln_sen_gdp	0.853***	0.023	0.036	0.037	-0.036	0.145	0.007
	(0.160)	(0.127)	(0.146)	(0.071)	(0.071)	(0.116)	(0.047)
send_ln_pop	-0.522**	-1.198	-0.072	-0.067	0.020	0.013	-0.003
	(0.225)	(0.822)	(1.036)	(0.363)	(0.083)	(0.143)	(0.058)
ln_rec_gdp	-0.631**	0.064	0.750**	0.036	-0.190	-0.450*	-0.106
	(0.306)	(0.260)	(0.360)	(0.121)	(0.167)	(0.256)	(0.129)
rec_ln_pop	2.338***	3.677***	2.536*	1.227***	0.274	0.095	0.199
	(0.402)	(1.016)	(1.299)	(0.444)	(0.185)	(0.245)	(0.153)
ln_distance	-1.074***				-0.279**	0.349	-0.189*
	(0.297)				(0.136)	(0.224)	(0.101)
trade_integration	0.145	0.110	0.017	0.002	0.045	0.156	0.014
	(0.120)	(0.077)	(0.099)	(0.031)	(0.032)	(0.146)	(0.025)
		-	-				
sen_polity_rights	-0.088**	0.084***	0.158***	-0.034**	-0.105***	0.028	-0.085***
	(0.039)	(0.032)	(0.049)	(0.015)	(0.034)	(0.020)	(0.031)
ln_sen_tertiary	0.495***	0.411***	0.421***	0.153***	0.051	-0.223	0.036
	(0.150)	(0.124)	(0.142)	(0.057)	(0.055)	(0.143)	(0.039)
ln_rec_tertiary	-0.339**	0.010	-0.169	-0.048	-0.076	0.103	-0.080
	(0.167)	(0.196)	(0.306)	(0.097)	(0.082)	(0.114)	(0.061)
Constant	8.221				8.136**	5.744	5.479*
	(8.643)				(3.775)	(6.035)	(3.221)
time dummies	yes	yes	yes	yes	yes	yes	yes
AR (2) test					0,127	0,263	0,244
Hansen J test (P-value)					0,213	0,113	0,197
Hansen diff. J test (P-value)					0,586	0,122	0,545
Number of instruments					78	81	95
Number of country pairs		99	99	99	99	94	99
Observations	2,784	2,784	1,741	2,300	965	836	1,464
R-squared	0.790	0.590	0.524	0.791			

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2.B - Dependent variable: LAIA imports from OECD selected economies.

MODELS	(1)	(2)	(3)	(4)	(5)	(6) SYS_GMM 1971-1990	(7) SYS_GMM 1991-2012
VARIABLES	OLS	OLS_FE	FE_LSt	FE_LDV	SYS_GMM		
L.ln_imports				0.662***	0.756***	0.676***	0.767***
				(0.045)	(0.044)	(0.064)	(0.042)
ln_students	0.204***	0.143***		0.060***	**0.152***	0.188***	0.092***
	(0.041)	(0.045)		(0.018)	**(0.044)**	(0.064)	(0.030)
L5.ln_students			0.210***				
			(0.040)				
ln_sen_gdp	0.938***	0.653***	0.531***	0.377***	0.190***	0.314***	0.199***
	(0.073)	(0.076)	(0.093)	(0.042)	(0.045)	(0.079)	(0.036)
send_ln_pop	-0.253*	-1.182**	-0.787	-0.418**	-0.034	-0.028	-0.022
	(0.135)	(0.494)	(0.610)	(0.202)	(0.042)	(0.103)	(0.038)
ln_rec_gdp	0.480***	0.064	0.211	-0.056	-0.092	-0.080	-0.038
	(0.179)	(0.160)	(0.205)	(0.079)	(0.080)	(0.174)	(0.065)
rec_ln_pop	1.025***	1.560***	-0.001	0.557*	0.355***	0.346**	0.380***
	(0.236)	(0.593)	(0.688)	(0.291)	(0.101)	(0.146)	(0.109)
ln_distance	-0.916***				-0.224***	-0.122	-0.271***
	(0.161)				(0.067)	(0.108)	(0.067)
trade_integration	0.377***	0.298***	0.268***	0.070**	0.084**	0.200*	0.055**
	(0.063)	(0.058)	(0.062)	(0.028)	(0.033)	(0.119)	(0.026)
sen_polity_rights	-0.019	-0.020	-0.039	-0.004	-0.025*	0.030	-0.059***
	(0.022)	(0.018)	(0.025)	(0.009)	(0.015)	(0.021)	(0.017)
ln_sen_tertiary	0.049	0.081	0.083	0.006	-0.068*	-0.177*	-0.034
	(0.117)	(0.092)	(0.094)	(0.039)	(0.041)	(0.100)	(0.032)
ln_rec_tertiary	-0.311***	0.312**	-0.272	0.127*	-0.076*	-0.022	-0.104***
	(0.089)	(0.152)	(0.165)	(0.069)	(0.039)	(0.074)	(0.038)
Constant	-17.105***				1.053	-0.238	0.849
	(3.991)				(2.143)	(4.166)	(1.861)
time dummies	yes	yes	yes	yes	yes	yes	yes
AR (2) test					0,112	0,934	0,298
Hansen J test (P-value)					0,103	0,176	0,328
Hansen diff. J test (P-value)					0,835	0,997	0,953
Number of instruments					78	95	97
Number of country pairs		99	99	99	99	92	99
Observations	2,785	2,785	1,742	2,302	965	420	1,151
R-squared	0.910	0.780	0.766	0.878			

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.b. Cold war and globalization.

The global economic and political landscape changed significantly during the time period covered by our data: in 1989 communist countries of Eastern Europe shifted from authoritarianism to more democratic forms of government and opened their frontiers to the free movements of people and goods, while in another part of the globe, Latin American countries were also substituting dictatorships with democracy and adopting more liberal economic policies. These changes affected the world's flows of people and goods to an

extent that the aggregate results of the above regressions may hide heterogeneous coefficients. To control for this possibility, regressions are rerun by using two sub-samples, one for the period 1971-1990, the other for 1991-2012. Models 6-7 of Tables 2.A and 2.B show clearly the consequences of this splitting of the data: both in the exports and the imports regressions the magnitude of first period coefficients on *International students* is about twice that of the second period. International students appear to have exerted a stronger influence on trade during the cold war years than during the following decades of globalization. Coefficients significance in Models 6-7 is at 1%, both for exports and for imports.

The reasons for this higher impact during the first period are not obvious and, given the very rapid growth in students' outward numbers and trade flows *after* 1989, the opposite might have been expected, i.e. a higher influence of education networks during the second period. Following Rauch (2001) these lower coefficients in the second period can be related to more similar political, educational, institutional and cultural factors between sending and destination countries in the second period. They could also be related to a lower exchange of differentiated goods, if their numbers had diminished in total trade. Table 1 clearly shows that sending and destination countries become more similar in the second period in political and institutional terms (polity rights levels in destination countries, omitted to save space, are higher than in sending countries, and more stable between the first and second period), and in terms of education levels. Figure 2 shows that in the second period students and trade shift towards destination countries, such as Spain, Italy and Portugal, with more similar institutions, languages and religion to those of the home countries. To better control for the source of the changes in coefficients, in what follows we first split imports and exports into homogeneous and heterogeneous goods and then test the interactions between *International students* and each of the above cofactors.

Table 3. - Influence of international students on trade in homogenous and heterogeneous goods. SYS_GMM

PERIODS	1971-1990				1991-2012			
	Homogeneous		Heterogeneous		Homogeneous		heterogeneous	
VARIABLES	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
L.ln_export_homg	0.508***				0.675***			
	(0.072)				(0.040)			
L.ln_import_homog		0.417***				0.508***		
		(0.098)				(0.054)		
L.ln_export_heterg			0.862***				0.867***	
			(0.031)				(0.031)	
L.ln_import_heterog				0.697***				0.650***
				(0.049)				(0.060)
ln_students	0.206	-0.016	0.175**	0.281***	0.107	0.055	0.184**	0.252***
	(0.146)	(0.132)	(0.078)	(0.088)	(0.082)	(0.084)	(0.092)	(0.056)
Control variables	yes	yes	yes	yes	yes	yes	yes	yes
Time dummies	yes	yes	yes	yes	yes	yes	yes	yes
Observations	805	797	600	578	1,453	1,449	1,333	1,455
Number of country pairs	93	93	93	94	99	99	99	99

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Some interesting facts emerge by splitting the data on exports and imports into homogenous and heterogeneous goods. One is that in every LAIA country the ratio of differentiated goods on total exports and imports increase from the first to the second period, with two exceptions: Argentina and Uruguay, where the proportion of commodities exported on total exports increases in the second period. Also, in all LAIA countries the exports and imports of differentiated goods grew more rapidly during the cold war than during globalization.

The separate regressions for homogenous and differentiated goods, in Table 2, show that coefficients on the exports and imports of heterogeneous goods are positive and significant both in the first and the second period, while they are not significant in the regressions concerning the homogenous goods. Also, the magnitude of coefficients is similar in the two periods, and higher for imports, where more differentiated goods are traded. These results are expected regarding the impact of network links on the exchanges of heterogeneous and homogeneous goods, but do help to make clear the lower aggregate coefficients on students observed in the second period of Tables 2.A and 2.B.

The results of the tests regarding the degree of similarity between sending and destination countries are in Table 3. There, as expected, the signs on the coefficients of the interacted variables, *International students* multiplied respectively to *Polity rights*, *Language* and *Trade integration* are always negative and in some models also significant. They show that as polity rights in sending countries increase, trade integration between sending and destination economies grows, and the country pair shares a common language, the influence of education networks on trade is lower.[‡‡] In all models, the coefficients on *International students* remain positive and significant. These results show that the factors regarding the increased similarity between sending and destination economies partly explain the lower aggregate coefficients of the second period.

4.c. Robustness

A potentially omitted variable from the above regressions is the stock of migrants in nine OECD countries originating from the LAIA countries. Migrants could affect trade directly, through their social networks, and could also be correlated with the variable *International students*, especially if the latter tend to prefer countries were they can find supporting communities of people from their homeland. To control for these possibilities, the variable *Migrants*, has been included among the regressors. Models 13 and 14 of Table 3 show that migrants have no influence on either exports or imports. In the same regressions, the coefficients on international students do not change with respect to those of the models of Table 2.A and 2.B. Inflation and other control variables have also been tested, results also in these cases do not change significantly. These tests are available from authors upon request.

[‡‡] *Common language*, concerning only two destination countries, Spain and Portugal, is not used as a dummy because it would lead to biased coefficients in the SYS_GMM regressions.

Table 4. - Interactions of *International Students* with features of countries. Robustness: *Immigrants*. SYS_GMM

	INTERACTIONS												Migrants	
	Polity rights				Common language				Trade integration				*Migrants*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	EXPORTS		IMPORTS		EXPORTS		IMPORTS		EXPORTS		IMPORTS		EXPORTS	IMPORTS
VARIABLES	1971-1990	1991-2012	1971-1990	1991-2012	1971-1990	1991-2012	1971-1990	1991-2012	1971-1990	1991-2012	1971-1990	1991-2012	1971-2012	1971-2012
L.ln_exports	0.613***	0.696***			0.680***	0.710***			0.650***	0.884***			0.806***	
	(0.055)	(0.055)			(0.050)	(0.052)			(0.068)	(0.046)			(0.031)	
L.ln_imports			0.650***	0.694***			0.690***	0.715***			0.627***	0.675***		0.622***
			(0.084)	(0.053)			(0.051)	(0.049)			(0.063)	(0.052)		(0.051)
ln_students	0.600**	0.509*	0.620***	0.367**	0.494***	0.298**	0.213**	0.315***	0.429*	0.164***	0.491**	0.322***	0.247***	0.160***
	(0.264)	(0.297)	(0.191)	(0.157)	(0.141)	(0.120)	(0.098)	(0.075)	(0.240)	(0.060)	(0.207)	(0.072)	(0.071)	(0.056)
ln_students *interaction[1]	-0.062	-0.031	-0.056**	-0.022	-0.210**	-0.030	0.015	-0.060***	-0.310	-0.029	-0.283*	-0.056**		
	(0.044)	(0.046)	(0.023)	(0.025)	(0.085)	(0.034)	(0.055)	(0.021)	(0.224)	(0.022)	(0.152)	(0.024)		
ln_migrants													-0.014	0.001
													(0.016)	(0.012)
Control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
time dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	613	1,266	420	1,151	613	1,266	615	1,266	418	1,266	615	1,266	1,684	1,686
Number of country_pair	93	99	92	99	93	99	94	99	91	99	94	99	99	99

Note: 1. interacted variables: interaction of ln_*International students* with, respectively, *Polity rights*, common *Language* and *Trade integration*. Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5. Concluding remarks

Students from different areas of the world have traditionally moved to more advanced and rich economies for their tertiary studies. Spilimbergo (2009) shows that a consequence of these movements is an improvement in the political relations between sending and destination countries. Focusing on eleven Latin American and nine OECD countries from 1971 to 2012, this paper shows that international students can also improve the economic interchanges, especially the trade of heterogeneous goods.

Considering the two sub periods analyzed (before and after 1990), Latin American students affected bilateral trade especially during the cold war period, despite the number of students was lower. This result can be partly explained by Latin American countries being in that period more dissimilar in terms of political regimes, institutions and culture from their OECD partners than in the subsequent decades. In the meantime there has been a convergence toward more similar political and institutional factors, triggered especially by improvements in Latin America, and by a partial shift of students' destinations toward the Latin countries of Europe: Spain, Portugal and Italy. Interestingly, during the cold war years, several Latin American heads of government that studied abroad pursued a military education, while those of the recent decades have prevalently chosen academic studies (Table A.2). Following Spilimbergo (2009), this shift in the type of studies may have also improved the political and institutional similarities with OECD countries.

Governments rarely take into account the impact of international students on the country's international economic exchanges and, consequently, seldom implement appropriate policies. This paper shows that students' international movements can trigger substantial improvements in bilateral exports and imports, which in turn can have positive and significant effects on the levels of income of countries.

6. References

Aleksynska, Mariya and Peri, Giovanni, 2012. "Isolating the network effect of immigrants on trade," *IZA*, DP No. 6941.

Aleksynska, Mariya and Peri, Giovanni, 2014. "Isolating the Network Effect of Immigrants on Trade," *The World Economy*, Wiley Blackwell, vol. 37(3), pages 434-455, 03.

Baier, Scott L. and Bergstrand, Jeffrey H., 2007. "Do free trade agreements actually increase members' international trade?," *Journal of International Economics*, Elsevier, vol. 71(1), pages 72-95, March.

Blundell, R. & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models, Journal of Econometrics, 87, 115–143.

Broda, Christian and David E. Weinstein, 2004. "Globalization and the Gains from Variety," NBER Working Papers 10314, National Bureau of Economic Research, Inc.

Docquier, F., & Lodigiani, E. (2010). Skilled migration and business networks. Open Economies Review, 21, 565–588.

Egger, P. H., von Ehrlich, M., & Nelson, D. R. (2012). Migration and trade. The World Economy, 35(2), 216–241.

Felbermayr, G. J., & Toubal, F. (2010). "Cultural proximity and trade" European Economic Review 54(2), 279–293

Felbermayr, G. J., & Toubal, F. (2012). Revisiting the trade-migration nexus: Evidence from new OECD data. World Development, 40(5), 928–937.

Felbermayr, G. J., & Young, B. (2009). The pro-trade effects of the brain drain: Sorting out confounding factors. Economics Letters, 104, 72–75.

Feenstra, R. C. (2004). Advanced International Trade: Theory and Evidence, Princeton, NJ: Princeton University Press.

Feenstra, Robert C., Robert E. Lipsey, Haiyan Deng, Alyson C. Ma and Hengyong Mo, 2005. "World Trade Flows: 1962-2000," NBER Working Papers 11040, National Bureau of Economic Research, Inc.

Flisi, S., & Murat, M. (2011). The hub continent. Immigrant networks, emigrant diasporas and FDI. The Journal of Socio-Economics, 40, 796–805.

Gould, David M, 1994. "Immigrant Links to the Home Country: Empirical Implications for U.S. Bilateral Trade Flows," The Review of Economics and Statistics, MIT Press, vol. 76(2), pages 302-16, May.

Holder, Kathleen, 2005. "The UC Davis-Chile connection: A relationship founded on fruit production branches out," *UC Davis Magazine*, 4.21.2005.

McCarthy, K.(1987) "From Cold War to Cultural Development: The International Cultural Activities of the Ford Foundation", Daedalus, 116(1), 93-117.

Murat, Marina, 2014. "Out of Sight, Not Out of Mind. Education Networks and International Trade," World Development, Elsevier, vol. 58(C), pages 53-66.

Nickell, Stephen J., 1981. "Biases in Dynamic Models with Fixed Effects," Econometrica, Econometric Society, vol. 49(6), pages 1417-26, November.

Nye J.S. (2005). Soft Power: The Means to Success in World Politics. Public Affairs. US.

Rauch, James E., 2001. "Business and Social Networks in International Trade," Journal of Economic Literature, American Economic Association, vol. 39(4), pages 1177-1203, December.

Spilimbergo, A. (2009). Democracy and foreign education. American Economic Review, 99(1), 528–543.

Appendix

Table A.2. – Students and share in total trade by destination country in 2011

Country	Students	Share in trade
USA	44,613	22.52%
Spain	29,002	3.74%
France	13,074	0.75%
Cuba	11,718	0.07%
Germany	6,815	8.86%
Italy	6,348	4.18%
Portugal	5,414	0.55%
UK	5,221	2.86%
Brazil	4,015	3.16%
Australia	3,899	0.46%
Canada	3,003	1.52%
Chile	2,694	1.09%

Source: UNESCO - WITS

Figure A.1.

Students and trade by sending country
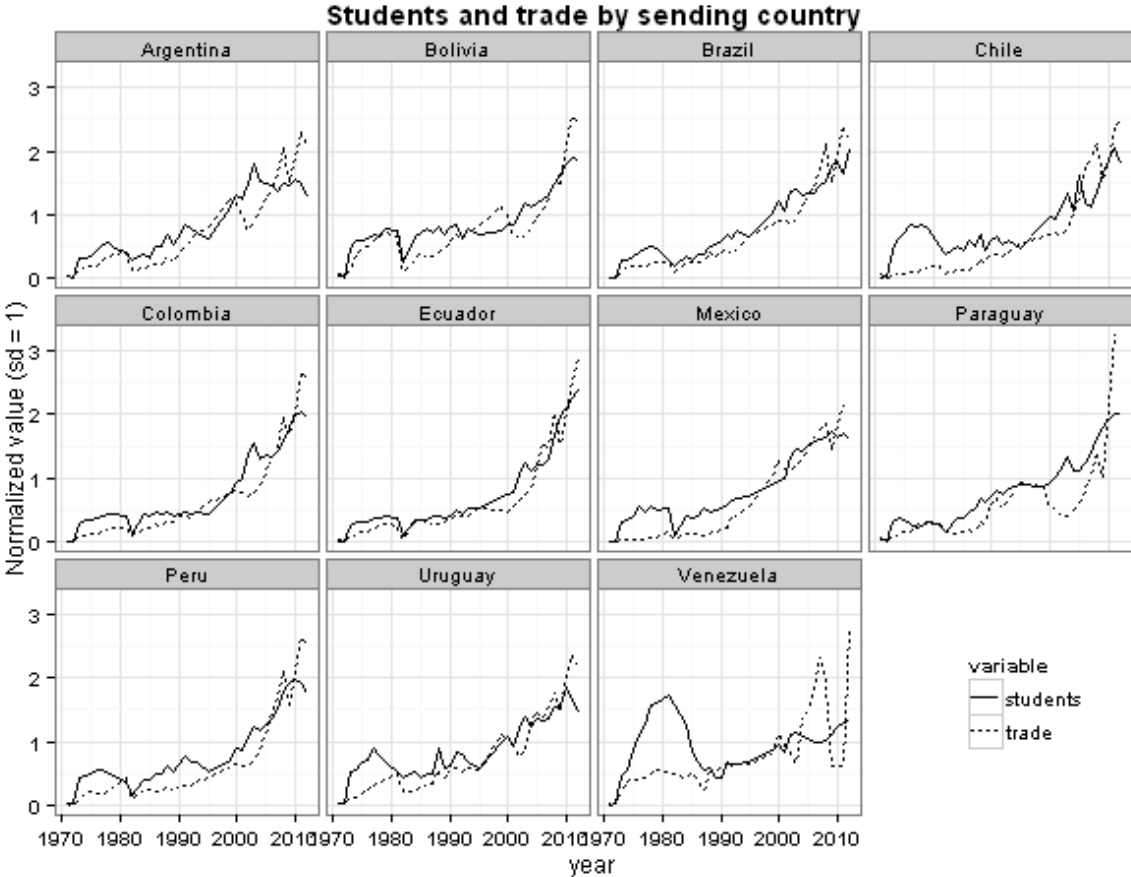
Table A.2 - Heads of State education, 1971-2012

Country		Head of State	Country(ies) of tertiary education		
Argentina					
1970	1971	Levingston	Argentina (Military)		
1971	1973	Lanusse	Argentina (Military)		
1973	1973	Cámpora	Argentina		
1973	1973	Lastiri	-		
1973	1974	Perón	Argentina (Military)		
1974	1976	Martínez	-		
1976	1981	Videla	Argentina (Military)	Panama (Military)	
1981	1981	Viola	Argentina (Military)	Panama (Military)	
1981	1982	Galtieri	Argentina (Military)	Panama (Military)	
1982	1983	Bignone	Argentina (Military)	Spain (Military)	
1983	1989	Alfonsín	Argentina		
1989	1999	Menem	Argentina		
1999	2001	De La Rúa	Argentina		
2001	2001	Puerta	Argentina		
2001	2001	Rodriguez Saá	Argentina		
2001	2002	Camaño	Argentina		
2002	2003	Duhalde	Argentina		
2003	2007	Kirchner	Argentina		
2007	-	Fernández	Argentina		
Bolivia					
1970	1971	Torres González	Bolivia (Military)		
1971	1978	Banzer Suárez	Bolivia (Military)	Panama (Military)	
1978	1978	Pereda Asbún	Bolivia (Military)	Italy (Military)	Argentina (Military)
1978	1979	Padilla	Bolivia (Military)	Argentina (Military)	United States (Military)
1979	1979	Guevara Arze	Bolivia		
1979	1979	Natusch Busch	Bolivia (Military)	Germany (Military)	Argentina (Military)
1979	1980	Gueiler Tejada	-		
1980	1981	Meza Tejada	Bolivia (Military)		
1981	1982	Torrelio	Bolivia (Military)		
1982	1982	Vildoso Calderón	Bolivia (Military)	United States (Military)	Panama (Military)
1982	1985	Siles Zuazo	Bolivia		
1985	1989	Paz Estenssoro	Bolivia		
1989	1993	Paz Zamora	Argentina	Belgium	
1993	1997	Sánchez de Lozada	United States		
1997	2001	Banzer Suárez	Bolivia (Military)	Panama (Military)	Argentina (Military)
2001	2002	Quiroga Ramírez	United States		
2002	2003	Sánchez de Lozada	United States		
2003	2005	Mesa	Spain	Bolivia	
2005	2006	Rodríguez Veltzé	Bolivia	United States	
2006	-	Morales	-		

Brazil

1969	1974	Garrastazu Médici	Brazil (Military)	
1974	1979	Geisel	Brazil (Military)	
1979	1985	Figuereido	Brazil (Military)	
1985	1990	Sarney	Brazil	
1990	1992	Collor	Brazil	
1992	1995	Franco	Brazil	
1995	2000	Cardoso	Brazil	
2000	2010	Lula da Silva	Brazil	
2010	-	Rousseff	Brazil	

Chile

1970	1973	Allende	Chile	
1973	1990	Pinochet	Chile (Military)	
1990	1994	Aylwin	Chile	
1994	2000	Frei Ruiz-Tagle	Chile	Italy
2000	2006	Lagos Escobar	Chile	United States
2006	2010	Bachelet	Chile	Germany Oriental
2010	2014	Piñera	Chile	United States
2014	-	Bachelet	Chile	Germany Oriental

Colombia

1970	1974	Pastrana Borrero	Colombia		
1974	1978	López Michelsen	Colombia	Chile	United States
1978	1982	Turbay	Colombia		
1982	1986	Betancur	Colombia	United States	
1986	1990	Barco	Colombia	United States	
1990	1994	Gaviria	Colombia		
1994	1998	Samper	Colombia	Mexico	
1998	2002	Pastrana	Colombia	United States	
2002	2010	Uribe	Colombia	United States	
2010	-	Santos	United States	United Kingdom	

Ecuador

1968	1972	Velasco Ibarra	Ecuador	France	
1972	1976	Rodríguez Lara	Ecuador (Military)	Argentina (Military)	Panama (Military)
1976	1979	Poveda	Ecuador (Military)		
1979	1981	Roldós	Ecuador		
1981	1984	Hurtado Larrea	Ecuador		
1984	1988	Febres-Cordero	Ecuador	United States	
1988	1992	Borja	Ecuador		
1992	1996	Durán Ballén	United States		
1996	1997	Bucaram	Ecuador	Germany	
1997	1997	Alarcón	Ecuador		
1997	1997	Arteaga	Ecuador		
1997	1998	Alarcón	Ecuador		
1998	2000	Mahuad	Ecuador	United States	

2000	2003	Noboa	Ecuador		
2003	2005	Gutiérrez	Ecuador		
2005	2007	Palacio	Ecuador	United States	
2007	-	Correa	Ecuador	Belgium	United States

Mexico

1970	1976	Echeverría	Mexico	
1976	1982	López Portillo	Mexico	
1982	1988	de la Madrid	Mexico	United States
1988	1994	Salinas de Gortari	Mexico	United States
1994	2000	Zedillo	Mexico	United States
2000	2006	Fox	United States	
2006	2012	Calderón	Mexico	United States
2012	-	Peña Nieto	Mexico	

Paraguay

1954	1989	Stroessner	Paraguay (Military)	
1989	1993	Rodríguez	Paraguay (Military)	
1993	1998	Wasmosy	Paraguay	
1998	1999	Cubas	Paraguay	
1999	2003	González Macchi	Paraguay	
2003	2008	Duarte	Paraguay	
2008	2012	Lugo	Paraguay	
2012	2013	Franco	Paraguay	
2013	-	Cartes	Paraguay	United States

Peru

1968	1975	Velasco Alvarado	Peru (Military)		
1975	1980	Moralez Bermúdez	Peru (Military)	Argentina (Military)	United States (Military)
1980	1985	Belaúnde Terry	France	United States	
1985	1990	García	Peru	Spain	France
1990	2000	Fujimori	Peru	France	United States
2000	2001	Paniagua	Peru		
2001	2006	Toledo	United States		
2006	2011	García	Peru	Spain	France
2011	-	Humala	Peru (Military)	Panama (Military)	

Uruguay

1967	1972	Pacheco Areco	-
1972	1976	Bordaberry	-
1976	1976	Demicheli	Uruguay
1976	1981	Méndez	Uruguay
1981	1985	Álvarez	Uruguay (Military)
1985	1985	Addiego Bruno	Uruguay
1985	1990	Sanguinetti	Uruguay
1990	1995	Lacalle	Uruguay
1995	2000	Sanguinetti	Uruguay

2000	2005	Batlle	Uruguay			
2005	2010	Vázquez	Uruguay			
2010	2015	Mujica	-			
2015	-	Vázquez	Uruguay			

Venezuela

1969	1974	Caldera	Venezuela			
1974	1979	Pérez	-			
1979	1984	Herrera Campins	Venezuela			
1984	1989	Lusinchi	Venezuela	Argentina	Chile	United States
1989	1993	Pérez	-			
1993	1993	Lepage	Venezuela			
1993	1994	Velásquez	Venezuela			
1994	1999	Caldera	Venezuela			
1999	2013	Chávez	Venezuela (Military)			
2013	-	Maduro	-			