The Economics of International Migrations: Models of optimal migration and Empirical Evidence

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Luca d'Agliano Summer School, 2009
Lecture 2

A Framework to analyze the choice of migration

- An economic theory of migration should be based on a model in which individual choose location to maximize utility
- Utility depends on income (and non-income) benefits of migrating net of migration costs
- There are two models used as foundation
- Model 1: Borjas 1987-Roy 1951
- Model 2: McFadden 1974
  - They are simple
  - They are constructed with an eye to the empirical specification that can be estimated using migration flows as data.
  - They have been used in recent empirical analysis that we can therefore review here.

Common Framework to analyze determinants of total flows and selection on observable characteristics

- Model 1:
- Ex-ante identical individuals born in country *o* (we extend it to heterogeneous individuals later) compare utility from staying in o or moving to j:
- $U_o = f(w_o) + v_{oi},$
- $U_j = f(w_j) + v_{ji},$

υ_{ji} and υ_{oi} are zero-mean normally distributed idiosyncratic shock

w_o and w_j are average wages in o and j

There is a cost C_{oj} of migrating from o to j.

Model 1: Continued

- Define the Index function, as the difference of utility between locations

$$I_{oj} = f(w_j) - f(w_o) - C_{oj} + (\nu_{ji} - \nu_{oi},)$$

- If I_{oj}>0 then migrate, if I_{oj}<0 then stay in o. The probability of migrating is:

$$P_{oj} = Pr(\epsilon_j > z_{oj}) = 1 - \Phi(z_{oj})$$

- Where

$$\epsilon_j = \nu_{ji} - \nu_{oi}$$

$$z_{oj} = (f(w_j) - f(w_o) - C_{oj})/\sigma_\epsilon$$

Model 1: Continued

Linearize the expression and use migration rates as measure of probability P_{oj}, allow an error and obtain the basic specification:

$$\frac{Mig_{oj}}{Pop_o} = \beta_0 + \beta_{wo} w_o + \beta_{wj} w_j + \beta[C(Geography, Laws, Networks)] + u_{oj} \quad (1)$$

Predictions:

$$\beta_{wo} = -\Phi' f' < 0,$$

$$\beta_{jo} = \Phi' f' > 0,$$

$$\beta = -\Phi < 0$$

More demanding with origin and destination country fixed effects

$$Mig_{oj} = \beta_0 + D_o + D_j + \beta_w (w_j - w_o) + \beta[C(Geography, Laws, Networks)] + u_{oj}$$

Model 1: Continued

- Used in several studies by Hatton and Williamson (1998), Clarke et al (2007), Mayda (2009) and Mayda (2006)
- Pro:
  - Intuitive and robust
  - Simple
  - Can be used to analyze group-specific migration (grouping people by observable characteristics)
  - Used to analyze selection
- Limits:
  - Derived heuristically from a two-country comparison, rather than multi-country one
  - Not the usual “log” gravity structure

Model 2

- Consider again the utility comparison between migrating to j and staying in o, now however explicitly assume that *f()* is linear

$$U_{oj} = \alpha(w_j - w_o) - C_{oj} + (\epsilon_{ji})$$

- This corresponds to a bilateral comparison between linear utility of a discrete number of choices. Under the assumptions that the disturbance is i.i.d. as a extreme value Weibull we are in the conditional Logit framework (McFadden 1974).

- Under those conditions the log ratio of probability of each choice is a linear function of the utility differences:

$$ln\frac{P_{oj}}{P_{oo}} = \alpha(w_j - w_o) - C_{oj}$$

Model 2: Continued

- Assuming that the probability ratio is approximately measured by the ratio of migrants and stayers, and that the cost of migration can be captured by the controls we obtain the following estimating equation:

$$ln(\frac{Mig_{oj}}{Stayer_{oo}}) = \alpha(w_j - w_o) + \beta^c[Geography, Laws - Policies, Networks] + u_{oj} \quad (2)$$

- Differences with (1):
  - Dependent variable in logs
  - Standardized by the number of stayers
  - Wages enter in differences

Model 2, applications

- Ortega and Peri (2009) use it to estimate an equation on the total size of migration, on a panel, controlling for country of origin country effects

$$ln(Mig_{ojt}) = D_{ot} + D_o + \alpha(w_{jt} - w_{ot}) + \beta_c[Geography, Laws - Policies, Networks]_{ojt} + u_{ojt}$$

- Focus on immigration laws
- Focus on other receiving country factors that may affect the cost of immigration

Model 2: Applications

- Grogger and Hanson (2008), by education group c=High, Medium, Low, cross section

Scale

$$ln(\frac{M_{oj}^c}{M_o^c}) = \alpha(w_j^c - w_o^c) + \beta_c[Geography, Laws - Policies, Networks] + u_{oj}^c$$

Selection

$$ln(\frac{M_{oj}^H}{M_{oj}^L}) - ln(\frac{M_o^H}{M_o^L}) = \alpha[(w_j^H - w_o^H) - (w_j^L - w_o^L)] + \beta_{diff}[Geography, Laws - Policies, Networks] + u_{oj}^c$$

Sorting

$$ln(\frac{M_{oj}^H}{M_{oj}^L}) = D_0 + \alpha[(w_j^H - w_j^L)] + \beta_{diff}[Geography, Laws - Policies, Networks] + u_{oj}^c$$

Empirical Implementation: a brief description of Data and Data issues

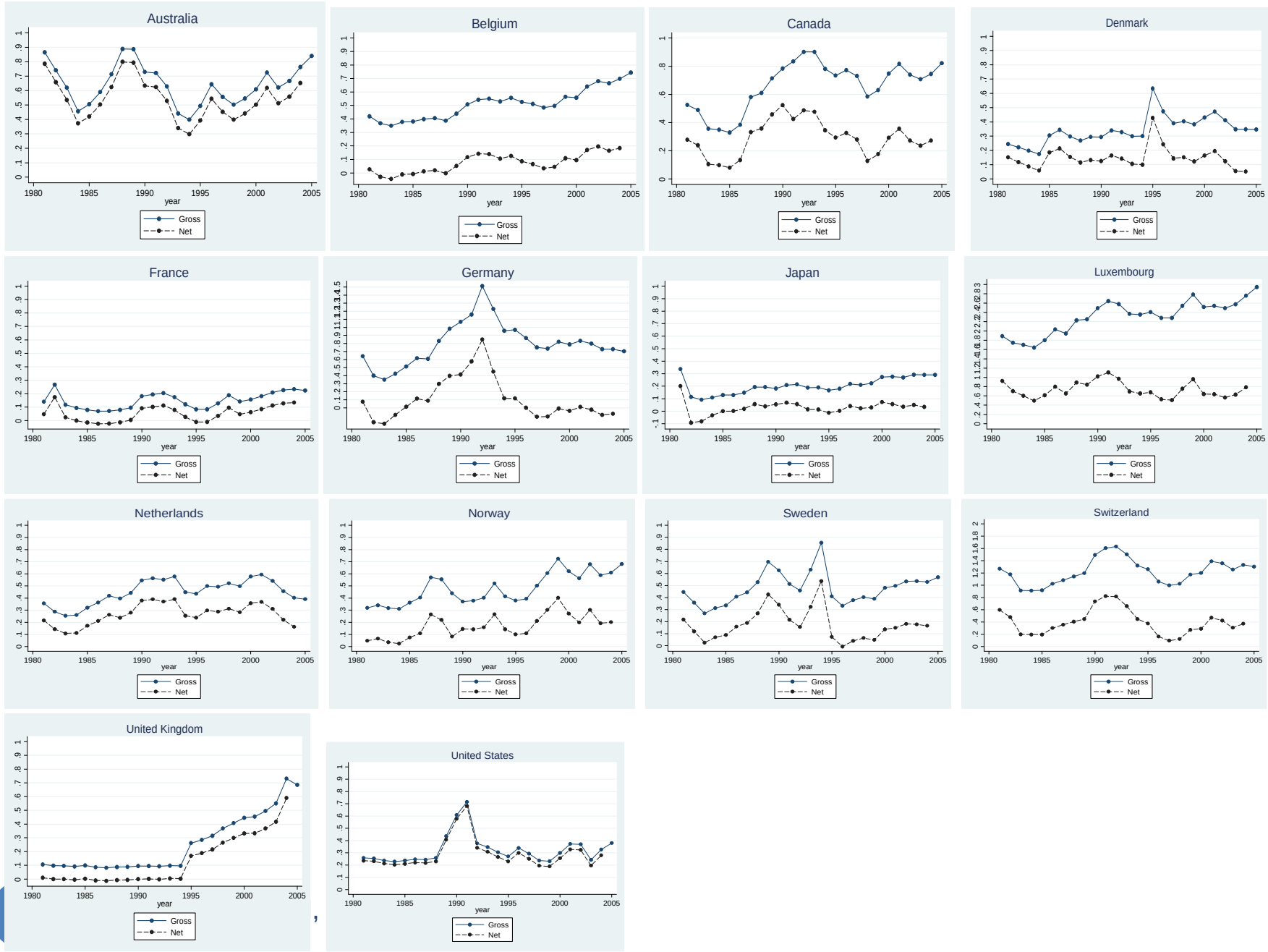
- To implement the regression equations economists have used a variety of sources.
  - Single receiving country (often the US) with many countries of origin.
  - Several OECD receiving countries in a cross-section
  - Several OECD receiving countries in a Panel

- The limits of the data go from the availability, to their comparability across countries, to the inclusion of documented immigrants only to the issue of return migrants.

Immigration Flows

- Description of Data (from Ortega and Peri 2009):
  - Flows: International Migration Dataset (IMD) provided by the OECD. Based on Population registers and residence permits. Total inflow of foreign persons, independently of the reason. 14 receiving countries, 74 countries of origin. 1980-2005.
    - Limits: only documented and no re-migration
  - Stocks: We infer the immigration stocks in each year using the gross immigration data flows and the data on immigrant stocks (by country of origin) from Docquier (2007) for 29 OECD countries in years around 1990 and around 2000. We estimate the re-migration rates to match stock changes 1990-2000 and apply to 1980-2005.

Panel A1: Immigration flows relative to population, Gross and Net for 14 OECD Countries



Countries of Origin		
Algeria	Ghana	Nigeria
Australia	Greece	Norway
Austria	Guatemala	Pakistan
Bangladesh	Guyana	Peru
Belgium	Haiti	Philippines
Bosnia-Herzegovina	Honduras	Poland
Brazil	Hong Kong	Portugal
Bulgaria	Hungary	Romania
Cambodia	Iceland	Russian Federation
Canada	India	Slovenia
Chile	Iran	Somalia
China	Iraq	South Africa
Colombia	Ireland	South Korea
Croatia	Italy	Spain
Cuba	Jamaica	Sri Lanka
Cyprus	Japan	Suriname
Denmark	Kenya	Sweden
Dominican Republic	Laos	Thailand
Ecuador	Lebanon	Tunisia
El Salvador	Malaysia	Turkey
Ethiopia	Mexico	UK
Fiji	Morocco	USA
Finland	Netherlands	Vietnam
France	New Zealand	Zaire
Germany	Nicaragua	

Average values in countries of destination and origin

variable	1980	1990	2000	2004
GDP per person Origin	7,944	9,442	11,198	12,018
GDP per person Destination	17,979	21,916	28,565	29,022
Employment rate Origin	42%	44%	46%	47%
Employment rate Destination	47%	49%	50%	49%
Gini Origin	0.38	0.39	0.40	0.40
Gini Destination	0.31	0.33	0.33	0.33
Share of population between 14 and 24 years, Origin	9.2%	8.6%	8.82%	8.81%
Share of population between 14 and 24 years, Destination	7.1%	6.1%	5.25%	5.99%
Observations Origin	77	77	77	77
Observations Destination	14	14	14	14

Characteristics of destination countries relative to sending

- 1) Income per capita higher by 17,000$ in 2005
- 2)Higher employment rate
- 3) Lower level of inequality (Gini)
- 4) Lower share of people between 14 and 24

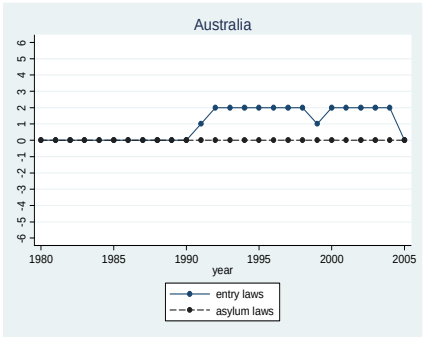
Immigration Laws

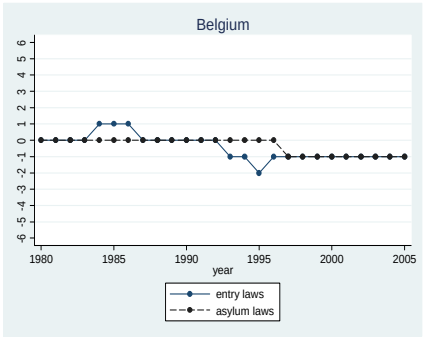
- Collect all immigration laws changes 1980-2005 in receiving countries (total 250 reforms)
- Define
  - Tightness of Entry laws
    - -1 (+1) if lower/increase requirement-documents-fee for entry.
    - +1 (-1) Decrease/increase the number of visa, temporary entries.
    - +1 (-1) Increases/decreases the enforcement against undocumented
  - Tightness of Stay Laws
    - -1(+1) Decreases (increases) the number of years needed for permanent stay
    - -1 (+1)Eliminates/introduces residence, registration constraints
  - Tightness of Asylum
    - Same a Entry, for Asylum seekers
  - Maastricht (free labor mobility between EU members)
  - Schengen (Border agreement between some EU countries)

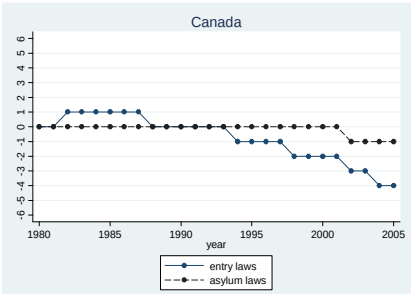
Examples

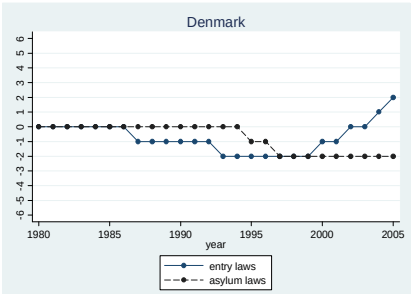
- **Australia**,1992
  - Immigration (Education) Charge Act :
    This act outlines payment procedures for a new English education charge (not to exceed $4, 080) imposed on visa applicants, if the application was made on or after January 1, 1993.
  - +1 Entry
- **Canada**, 1993
  - Policy:
    With the change in the government, immigration policy abandoned quantitative goals such as quotas and became oriented around qualitative aspects (i.e. considering applications based on the individual's background and the needs for the country)
  - +1 Entry, Also shift to skilled

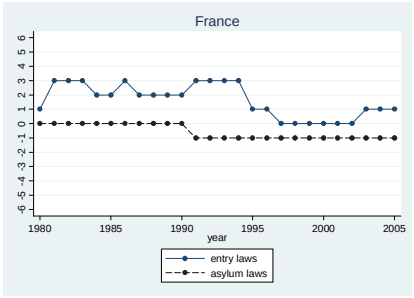
Panel A2: Tightness of immigration reforms over time. 14 OECD countries 1980-2005

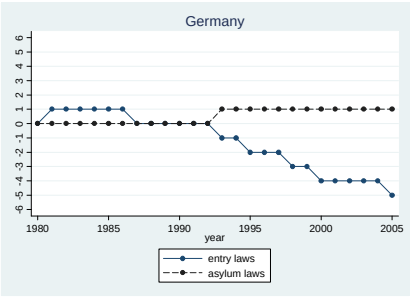


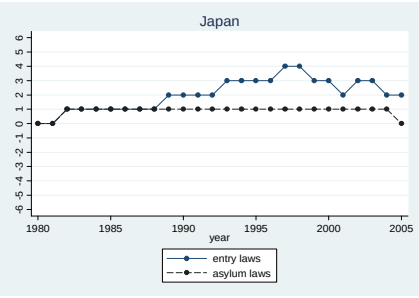


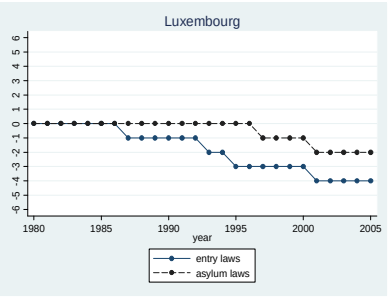


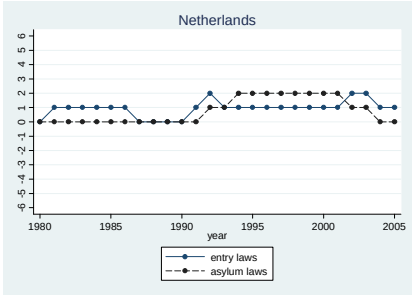


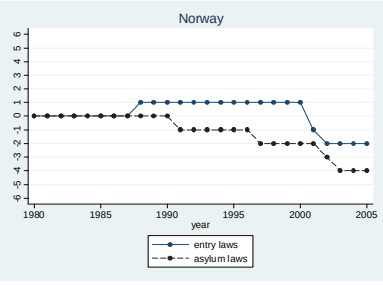


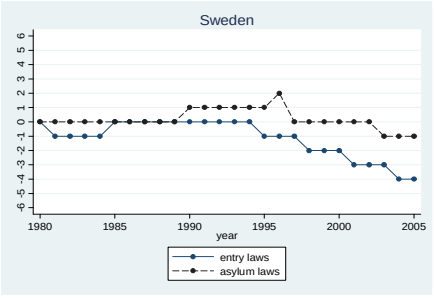


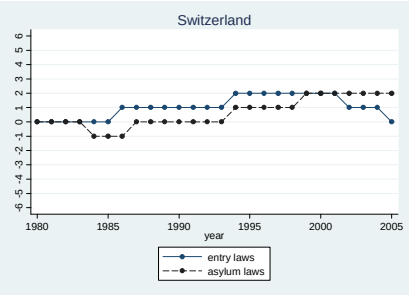


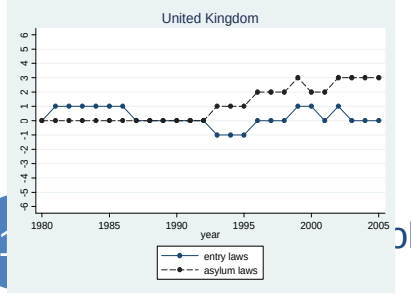


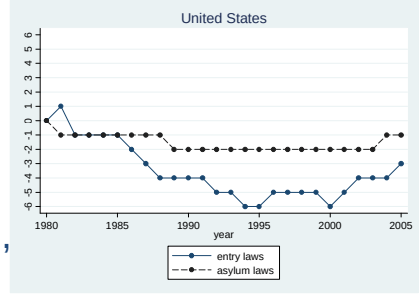












Estimating equation

- Assume that we observe every year, with an error, the number of people from a set of country O resident in the set of countries D. The previous equation gives:

$$ln(Migrants)_{odt} = \phi_w W_{dt-1} + D_d + D_{ot} + \phi_d \ln(Distance)_{od} + \phi_b (Land\ Border)_{od} +$$
$$+\phi_c (Colonial)_{od} + \phi_l (Language)_{od} + e_{odt}$$

Table 1 Ortega and Peri 2009
14 OECD receiving Countries, 1980-2005

Specification:	*(1) Basic: Income in levels*	*(2) Income in logarithms*	*(3) Decomposition log(wage)-log(employment rate)*	*(4) Including country of destination controls*	*(5) Income is lagged 2 periods*	*(6) Omitting UK*	*(7) Omitting US*
Income per capita, destination	0.06**	0.29**		0.04*	0.06**	0.06**	0.06**
	(0.01)	(0.10)		(0.02)	(0.01)	(0.01)	(0.01)
Income per worker, destination			0.17**				
			(0.08)				
Employment/population, destination			2.53**				
			(0.93)				
Ln(population), destination				2.39			
				(1.66)			
Gini, destination				-0.01			
				(0.02)			
(Percentage of population between 15 and 24), destination				0.002			
				(0.02)			
Land Border	-1.29	-1.29	-1.29	-1.39	-1.33	-1.66*	-1.29
	(0.73)	(0.73)	(0.76)	(0.73)	(0.73)	(0.75)	(0.73)
Same Language	0.08	0.08	0.08	0.16	0.08	0.13	0.08
	(0.40)	(0.41)	(0.40)	(0.42)	(0.42)	(0.40)	(0.41)
Colonial Ties	2.66**	2.65*	2.65*	2.66**	2.63**	2.04**	2.65**
	(0.42)	(0.42)	(0.42)	(0.42)	(0.33)	(0.78)	(0.42)
Log(distance)	-2.02	-2.02**	-2.04**	-2.02**	-2.03**	-2.14**	-2.02**
	(0.32)	(0.32)	(0.32)	(0.32)	(0.32)	(0.31)	(0.32)
Observations	21,805	21,805	21,805	21,148	19,776	19,091	21,805

Table 2; Ortega and Peri 2009

Specification:	(1) Basic	(2) Log income	(3) Combining entry and stay laws	(4) Including other destination country controls	(5) Immigration Laws lagged 2 periods	(6) Omitting the UK	(7) Omitting the US
Panel A: Including bilateral geographic characteristics to control for migration costs							
Income per capita, Destination	0.06**	0.53**	0.07**	0.09**	0.05**	0.07**	0.06**
	(0.03)	(0.25)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
Tightness of immigration entry laws	-0.13**	-0.14**	-0.09**	-0.15**	-0.12**	-0.12**	-0.20**
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)
Tightness of asylum laws	-0.02	-0.03	-0.04	-0.03	-0.08	0.16**	-0.14*
	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)	(0.07)
Maastricht	0.15	0.14	0.18	0.19	0.03	-1.12	0.61
	(0.63)	(0.63)	(0.53)	(0.64)	(0.61)	(0.63)	(0.66)
Schengen	0.26	0.33	0.28	0.31	0.34	0.67	0.37
	(0.61)	(0.61)	(0.61)	(0.62)	(0.60)	(0.63)	(0.53)
Panel B: Including the full set of origin-destination country pair dummies to control for pair-specific migration costs							
Income per capita Destination	0.07**	0.77**	0.13**	0.11*	0.11**	0.13**	0.07*
	(0.02)	(0.30)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
Tightness of immigration entry laws	-0.10**	-0.08**	-0.03	-0.04*	-0.05**	-0.05**	-0.04
	(0.02)	(0.03)	(0.017)	(0.02)	(0.02)	(0.02)	(0.03)
Tightness of asylum laws	-0.05	-0.20**	-0.23**	-0.14*	-0.26**	-0.05	-0.20**
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Maastricht	1.09**	0.59**	0.72**	0.78**	0.60**	0.81**	0.77**
	(0.43)	(0.18)	(0.18)	(0.17)	(0.16)	(0.15)	(0.17)
Schengen	0.60**	0.12	0.26*	0.27*	0.24*	-0.01	0.24*
	(0.33)	(0.15)	(0.15)	(0.14)	(0.14)	(0.08)	(0.14)
Observations	21,805	21,805	21,805	19,776	21,148	19,332	19,332

Table 3: Adding Country of destination Controls

Specification:	(1) Using Median income	(2) Including total welfare spending per person (1980-2000)	(3) Including labor market laws (1980-2000)
Income per capita, Destination	0.04**	0.07**	0.06**
	(0.01)	(0.02)	(0.02)
Tightness of immigration entry laws	-0.12**	-0.09**	-0.14**
	(0.03)	(0.02)	(0.03)
Welfare spending per person		0.78**	
		(0.16)	
Employment Protection Laws			-0.65**
			(0.27)
Minimum wage (relative to median)			-3.46**
			(1.15)
Observations	21747	15883	8673

Main results Clarke, Hatton and Williamson ReStat 2007 (linear specification)
US, 1971-1998

EXPLAINING U.S. IMMIGRATION

TABLE 5.— GROSS IMMIGRATION RATE REGRESSIONS (81 COUNTRIES, 28 YEARS; DEPENDENT VARIABLE: LOG IMMIGRANTS ADMITTED/SOURCE COUNTRY POPULATION)

	(1)	(2)	(3)
Constant	−18.31	−16.89	−16.65
	(7.3)	(8.4)	(38.8)
GDP per capita ratio (foreign/U.S.)	−2.47	−1.77	−2.76
	(3.0)	(2.6)	(4.0)
Schooling years ratio (popn. > 14) (foreign/U.S.)	4.00	3.08	3.79
	(4.2)	(4.0)	(4.2)
Share of population aged 15–29 (foreign)	12.46	10.32	
	(1.6)	(1.6)	
Inequality ratio (foreign/U.S.)	13.30	7.51	14.92
	(3.0)	(2.0)	(4.0)
Inequality ratio (foreign/U.S.) squared	−5.79	−3.07	−6.44
	(2.9)	(1.9)	(2.8)
Inverse of income squared (foreign)	−0.61	−0.33	−0.70
	(2.2)	(4.2)	(2.8)
Distance from U.S.	−0.28	−0.09	−0.20
	(7.7)	(2.1)	(5.0)
Landlocked	−0.36	−0.33	
	(1.0)	(1.1)	
English-speaking origin	1.19	0.31	1.04
	(3.8)	(1.0)	(3.5)
Immigrant stock (t − 1)/foreign population		89.90	
		(5.9)	
(Immigrant stock (t − 1)/foreign population)^2		−418.74	
		(8.4)	
IRCA legalization X_{irc}			1.37
			(3.4)
R^2 (between)	0.68	0.80	0.71
No. of observations	2,268	2,268	2,268

Mayda (2009) 14 OECD countries 1980-1995

Equation	1	2	3	4	5	6	7	8	9	10
Dependent variable	Emigration rate									
log per worker gdp (destination)	24.62	24.79	29.41	29.34	33.01	52.05	167.41	103.07	17.35	20.66
	11.30*	11.27*	11.48*	11.53*	12.55**	23.09*	57.55**	40.79*	8.15*	9.40*
log per worker gdp (origin)	-0.77	-1.03	3.32	3.94	-9.04	-2.4	-2.98	-1.44	7.63	7.45
	7.23	7.09	8.02	8.22	5.63	2.07	3.19	1.65	8.71	8.73
log distance	-41.01	-40.65	-40.66	-37.94		-9.61	-20.63	-10.94	-41.85	-41.84
	9.50**	9.08**	9.08**	8.00**		3.21**	6.18**	2.57**	8.41**	8.41**
land border	-28.16	-36.97	-36.95							
	19.67	23.23	23.28							
common language		22.05	22.03							
		15.87	15.87							
colony		3.03	2.89							
		16.89	16.93							
share of young population (origin)			242.36	248.25	165.76	292.87	521.77	155.71	281.48	283.68
			110.23*	112.35*	88.77+	118.63*	177.22**	60.80*	118.34*	116.99*
per worker gdp (destination)*immig policy change									7.56	17.17
									2.04**	5.84**
per worker gdp (origin)*immig policy change									-3.37	-3.2
									1.37*	1.44*
log distance*immig policy change									-10.2	-10.18
									2.50**	2.48**
share of young population (origin)*immig policy change									144.47	149.85
									48.43**	48.47**
immig policy change										-106.51
										69.14
number of observations	8010	8010	8010	8010	8010	551	606	650	8010	8010
R-squared	0.24	0.25	0.25	0.24	0.85	0.04	0.07	0.06	0.27	0.27

OLS estimates. Destination and origin countries' dummy variables are included in specifications (1) (4) and (9) (10). Regression (5) includes country pair fixed effects.

Grogger and Hanson 2008: 15 destination and 102 source countries, around 2000

Table 4: Regression results from linear-utility model

Equation:	Scale	Selection	Sorting	Sorting	Sorting	Sorting
Wage data source:	WDI	WDI	WDI	WDI	LIS	LIS
Variable	(1)	(2)	(3)	(4)	(5)	(6)
$W_h^j - W_s^j$	0.018					
	(0.029)					
$(W_h^3 - W_h^1) - (W_s^3 - W_s^1)$		0.072				
		(0.013)				
$(W_h^3 - W_h^1)$, pre-tax			0.060		0.026	
			(0.026)		(0.013)	
$(W_h^3 - W_h^1)$, post-tax				0.103		0.048
				(0.045)		(0.022)
Anglophone dest.	1.451	0.567	0.838	0.636	0.817	0.678
	(0.873)	(0.183)	(0.183)	(0.256)	(0.193)	(0.241)
Common language	0.648	1.268	0.355	0.352	0.331	0.332
	(0.293)	(0.248)	(0.137)	(0.139)	(0.125)	(0.124)
Contiguous	0.880	-0.384	-1.005	-1.007	-1.108	-1.097
	(0.401)	(0.373)	(0.229)	(0.237)	(0.230)	(0.240)
Longitude diff.	0.003	-0.009	0.004	0.004	0.005	0.005
	(0.004)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
Log distance	-1.152	0.676	-0.245	-0.259	-0.273	-0.279
	(0.171)	(0.131)	(0.092)	(0.097)	(0.107)	(0.111)
LT colonial rel.	2.159	-0.711	-0.391	-0.445	-0.505	-0.550
	(0.411)	(0.193)	(0.176)	(0.161)	(0.150)	(0.137)
ST colonial rel.	2.641	-0.395	-0.129	-0.187	-0.195	-0.224
	(0.601)	(0.431)	(0.256)	(0.257)	(0.276)	(0.276)
Visa waiver	0.589	-0.299	0.335	0.364	0.440	0.471
	(0.314)	(0.135)	(0.164)	(0.172)	(0.200)	(0.203)
Schengen sig.	0.058	0.402	0.430	0.403	0.528	0.507
	(0.337)	(0.166)	(0.250)	(0.252)	(0.295)	(0.304)
Asylee share	-1.221	-2.512	-3.590	-3.635	-3.998	-4.007
	(3.698)	(0.818)	(0.901)	(0.709)	(0.929)	(0.810)
Observations	2786	1393	1393	1393	1214	1214
R-squared	0.44	0.47	0.61	0.61	0.63	0.63
Clusters	15	15	15	15	13	13

Summarizing the evidence:

- 1) Strong evidence of a positive effect of wage differential (especially of the wage of the receiving country) on total size of migration flows.
- 2) Weak evidence of a positive effect of the share of young population in the sending country on total flows.
- 3) Strong evidence of a negative distance effects, much weaker evidence of any common language, border and colony ties effects.
- 4) Different immigration laws analyzed (quotas, indicators, IRCA) generally finding significant effects.

Comparison with gravity equation estimates in international trade

- 1) Very popular even with very little theoretical foundation, increasing effort to find a credible theoretical underpinnings.
- 2) Focused on total flows and on selection, in trade on total flows and on type of traded goods, plus, recently on extensive and intensive margin.
- 3) There is a literature on trade and growth that has used the trade predicted from a gravity equation (Frenkel and Romer QJE 1999) to instrument trade across countries and identify the effect on growth.
  - Using geography determinants and push-factors in the sending country one can adopt a similar strategy to determine employment-productivity effects of international migrations.