Intellectual Property Rights, International Migration, and Knowledge Diaspora

Alireza Naghavi

University of Bologna
FEEM

Chiara Strozzi

University of Modena and R.E.
IZA

INGINEUS “Impact of Networks, Globalisation, and their INteraction with EU Strategies” is sponsored by the 7th Framework Programme of the European Commission. www.ingineus.eu

Road Map

1. Background
2. Theory
3. Empirical Evidence
4. Conclusions

1. Brain Drain vs. Brain Gain

- BD: Skilled emigration detrimental to growth in South
  - Seminal works: Barry and Soligo (1969), Bhagwati and Hamada (1974), Miyagiwa (1991)
- BG:Positive effects of emigration on skills and productivity
  - Incentive channel: Mountford (1997), Stark, Helmstein and Prskawetz (1997), Beine, Docquier and Rapoport (2001)
  - Return migration: Domingues Dos Santos and Postel-Vinay (2003), Mayr and Peri (2009), Dustmann et al. (2011)
  - Cross-border diaspora: Agrawal et al. (2011), Kerr (2008)

2. Diasporas

- cross-border networks foster innovation by promoting access to foreign-produced knowledge through trade, investment, recirculation of information and technology back into the sending country
- Examples (Meyer, 2001; Meyer & Brown, 1999):
  - student/scholarly networks
  - local association of skilled expatriates
  - short-term consultancies by high-skilled expatriates in their country of origin
  - other intellectual/scientific diaspora networks
- Little work on relation between knowledge absorbed by emigrants abroad and innovation in home countries
- Could diasporas transform brain drain into brain gain?

3. Intellectual Property Rights

- IPRs increase returns to working in innovation sector, shift labor there (Saint Paul, 2003, 2004)
- IPRs foster innovation (Chen & Puttinam, 2005)
- IPRs protection ineffective for innovation in less developed countries (Parello, 2008; Qian, 2007)
- Is it possible that IPRs have consequences for the effect of emigration on innovation, by influencing the magnitude of potential cross-border diasporas?

Aim of the paper

- What are the consequences of skilled emigration for innovation in developing countries?
- Does it always lead to a brain drain or could it result in a brain gain?
- Do diaspora networks play a role in this process?
- What is the role of IPRs protection?
- **Focus:**
  - **How skilled emigration from EDC may affect innovation activity in the home (sending) country**
  - **Impact of IPR regime in sending country on the magnitude of this phenomenon**

Theory: Main Implications

- Emigration reduces effective innovation activity as the most skilled leave (brain drain)
- Migration opens the diaspora channel (potential net brain gain)
- IPRs protection increases the magnitude of gains from diaspora by:

  - increasing the size of the innovation sector (diasporas fall on larger range of workers actively using their skills in the economy)

  - increasing the average skills of migrants

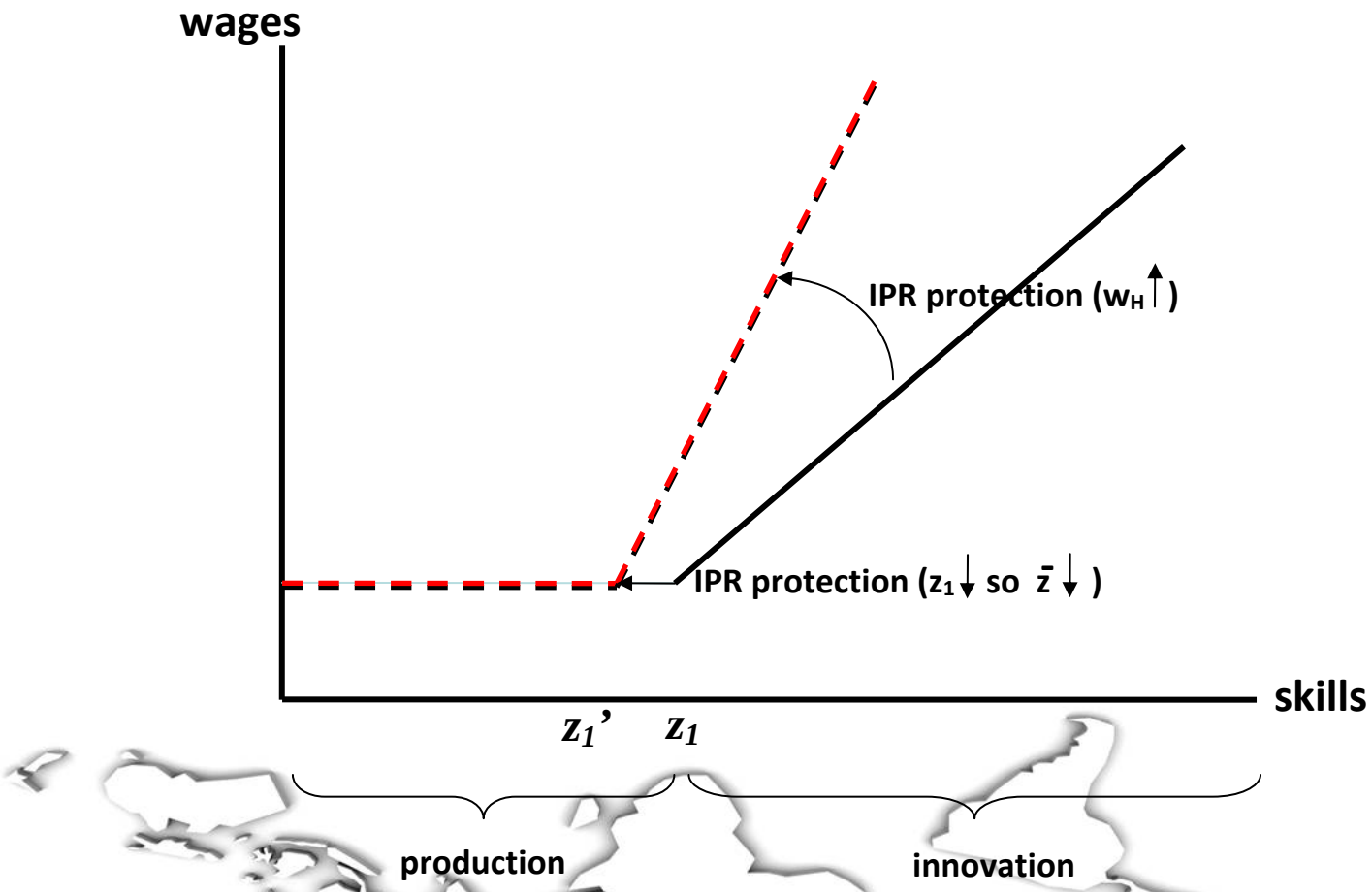
  (quality of skills learned and transmitted back)

- **In the presence of strong IPRs protection, the beneficial effects of diaspora are more likely to outweigh the negative effects of brain drain**

The Basics

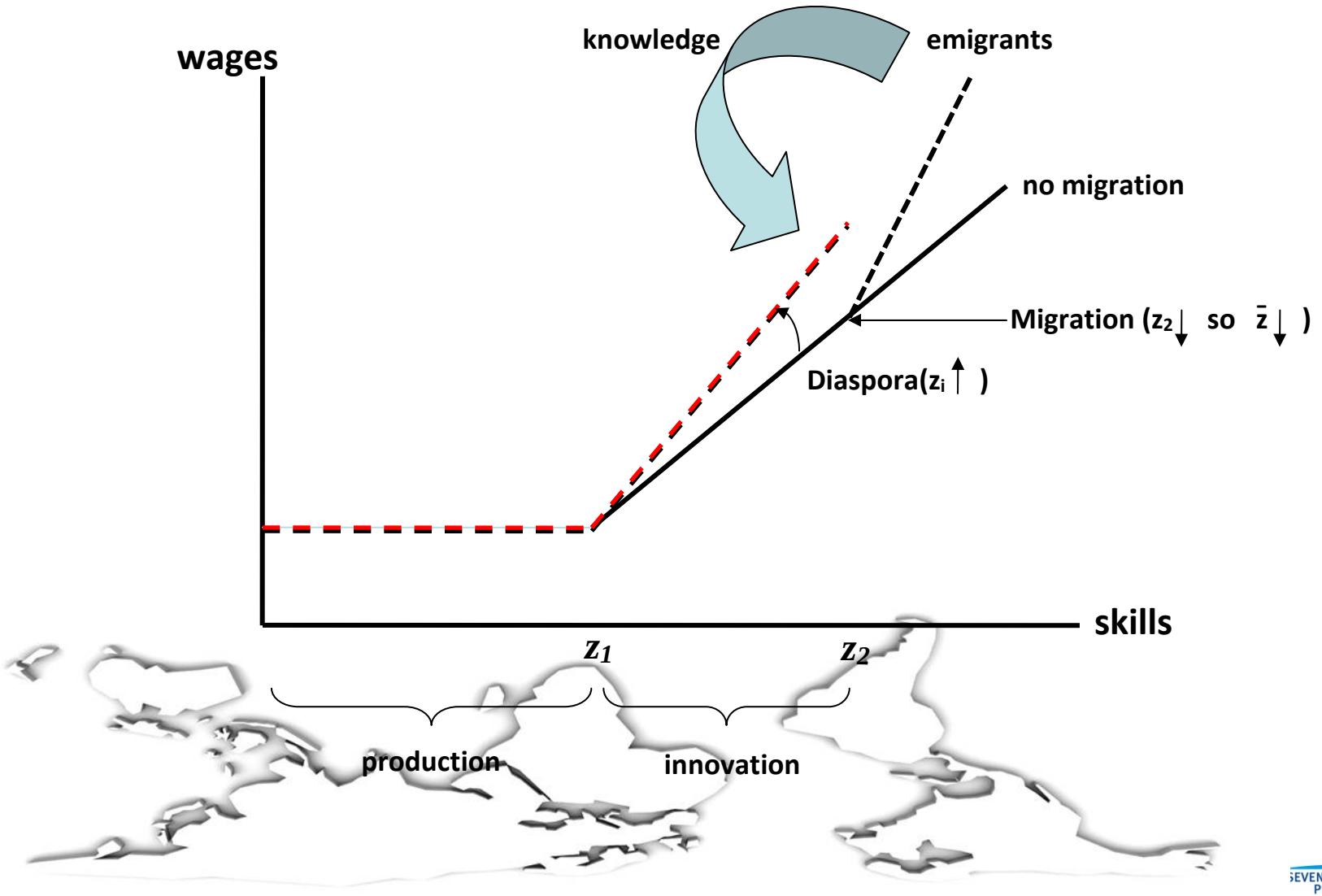
- 2 regions: South and a North as alternative region for employment with higher skilles and wages
- 2 sectors: production (no skills used), innovation
- Workers with a continuum of skills $z \in [0, \infty)$ and productivity $h_i(z) = z_i + Z$, where $Z = b\tilde{\zeta}$ is skills transferred back from the North through diaspora
- IPR: probability *q* that an innovator can obtain monopoly price on his invention ($\mu = 1/\alpha$), otherwise *p=MC=1* (Saint Paul, 2003, 2004)

Stronger IPR Enforcement

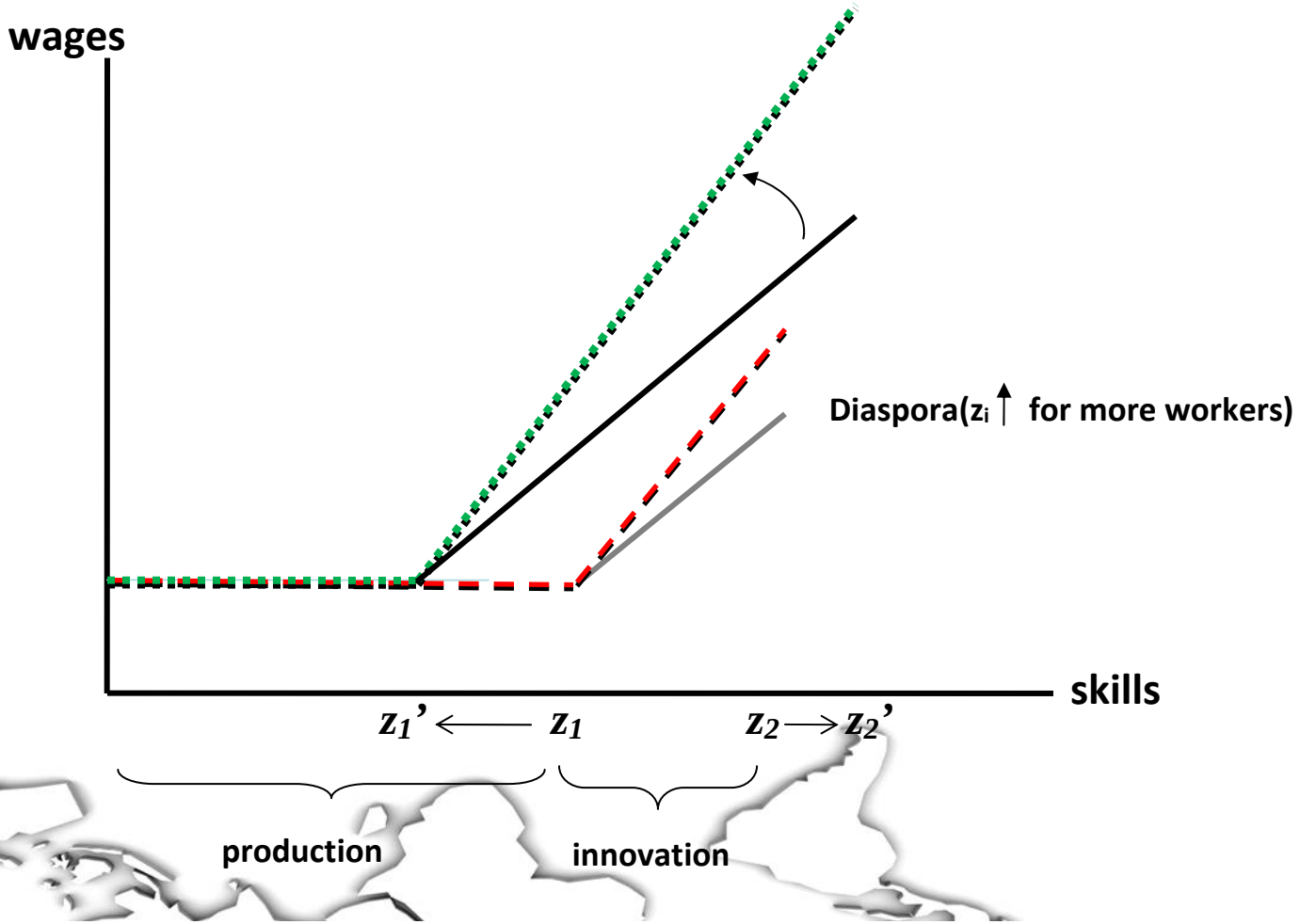


IPR protection increases size of the innovation sector

Diaspora Gains



IPR Impact on Diaspora



Diaspora effect falls on a larger range of workers

Empirical implications

- In the presence of strong IPRs protection, skilled emigration could be beneficial for innovation in the South

- Aim of the empirical analysis: find whether and under what circumstances skilled emigration could be beneficial for innovation in developing countries → the role of IPRs

Empirical Specification

$$patents_{it} = \beta_0 + \beta_1 emigr_{it-5} + \beta_2 IPR_{it-1} + \beta_3 emigr_{it-5} IPR_{t-1} + \\ + \gamma pop_{it} + \delta gdppc_{it-1} + \alpha_i + \eta_t + \varepsilon_{it},$$

- $patents_{it}$: measure of innovation in *i* (resident patents)
- $emigration_{it-5}$: emigration flow from *i*, lagged 5 years to account for time to interact in North, have patent granted
- IPR_{it-1}: IPRs protection index lagged
- $patents_{it}\ IPR_{it-1}$: interaction effect
- pop_{it}: population
- $gdppc_{it-1}$: GDP per capita lagged
- η_t: time effects
- α_i: controls (R&D expenditure, patent stock, trade, FDI, government spending, education)

Data

- EDC countries (IMF classification): 35 countries with data on patent, migration and IPRs protection
- Period: 1995-2006
- Patents data: WIPO
- Migration data: original migration data from national statistical offices and OECD into 27 OECD countries (Pytlikova)
- IPRs data: IPRs protection index (1-5): Park (2008)

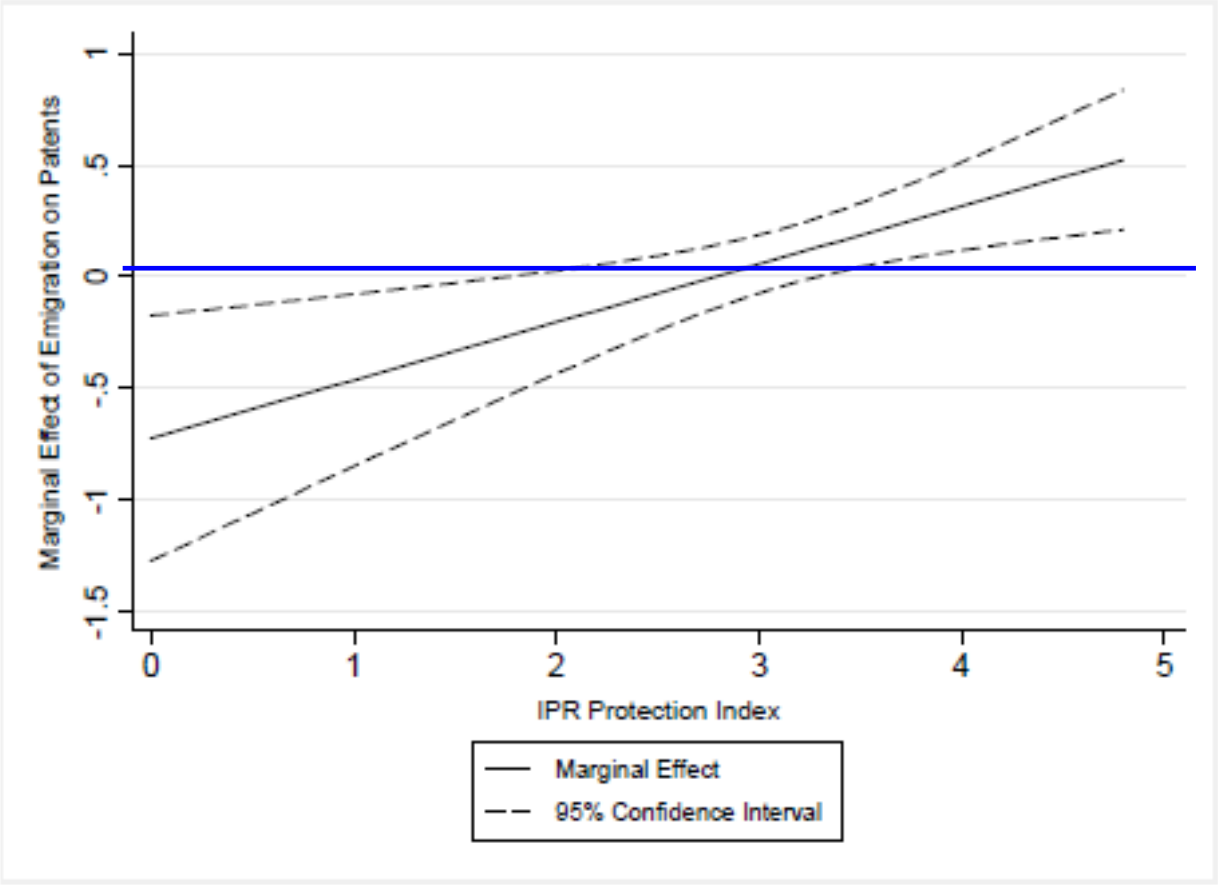
The Impact of Emigration and IPRs Protection on Resident Patent Applications

	Fixed Effects (1)	Fixed Effects (2)	Fixed Effects (3)	Fixed Effects (4)	Fixed Effects (5)	Fixed Effects (6)	Fixed Effects (7)	Fixed Effects (8)
Emigration Flow$_{t-5}$	**-0.421****	**-0.489****	**-0.924*****	**-0.400***	**-0.599****	**-0.398****	**-0.421****	**-0.538****
	(0.198)	**(0.185)**	**(0.212)**	**(0.207)**	**(0.254)**	**(0.194)**	**(0.201)**	**(0.244)**
IPRs Protection$_{t-1}$	**-1.330****	**-1.391****	**-2.057*****	**-1.323****	**-1.775****	**-1.338****	**-1.331****	**-1.581***
	(0.603)	**(0.620)**	**(0.670)**	**(0.639)**	**(0.731)**	**(0.601)**	**(0.618)**	**(0.785)**
Emigr. Flow$_{t-5}$ x IPRs$_{t-1}$	**0.123****	**0.135****	**0.207*****	**0.126****	**0.169****	**0.125****	**0.123****	**0.155****
	(0.056)	**(0.053)**	**(0.062)**	**(0.058)**	**(0.071)**	**(0.056)**	**(0.057)**	**(0.067)**
Population	4.873***	2.589**	4.077**	5.381***	4.834***	5.480***	4.878***	1.504
	(1.421)	(1.170)	(1.687)	(1.222)	(1.458)	(1.370)	(1.486)	(1.267)
GDP Per Capita$_{t-1}$	1.661**	1.279**	0.626	2.175***	1.550**	1.824**	1.663**	0.432
	(0.739)	(0.494)	(0.721)	(0.698)	(0.741)	(0.701)	(0.741)	(0.583)
Patent Stock (Appl.) $_{t-1}$		0.621***						0.877***
		(0.145)						(0.245)
R&D$_{t-1}$			1.212***					
			(0.374)					
Tertiary Education				-0.506				0.317
				(0.875)				(0.742)
Government Spending$_{t-1}$					-0.516			-0.388
					(0.330)			(0.379)
Trade$_{t-1}$						0.627		0.474
						(0.390)		(0.402)
FDI$_{t-1}$							0.030	-2.259
							(1.830)	(1.434)
Constant	-89.65***	-50.60**	-62.47*	-102.8***	-85.64***	-101.9***	-89.76***	-25.53
	(28.75)	(22.30)	(35.49)	(23.29)	(29.28)	(27.08)	(29.78)	(24.98)
Country Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Countries	35	32	32	35	35	35	35	31
Observations	348	321	200	280	316	343	348	224
R-Squared	0.354	0.484	0.534	0.378	0.365	0.382	0.354	0.560

Note: Robust standard errors in parentheses, clustered at country level. * significant at 10%; ** significant at 5%; *** significant at 1%.

Patent applications, patent stock, emigration flow, population and GDP per capita are in logarithms.

Impact of Migration and IPRs on Innovation



Robustness Checks

- Emigration Stock (instead of Flow)
- First difference (instead of OLS with Fixed effects)
- Resident Patent Grants (instead of Applications)
- “Skill-corrected” Emigration Index: take into account how technologically advanced host countries are ("where" emigrants go)

Conclusions

- Study of the link between cross-border diaspora networks and innovation in a developing country
- Focus on the joint role of skilled emigration and IPRs protection for innovation in the sending country
- In the presence of strong IPRs protection the beneficial effects of diaspora may outweight the negative effects of brain drain
- Relevance of a process of knowledge transfer independent of trade and FDI and mainly relying on people's movement