

# The Gravity of High Skilled Migration Policies

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# Motivation

*“...more than 40 percent of Fortune 500 companies were founded by immigrants or their children...The revenue generated ...is greater than the GDP...of every country in the world outside the U.S., except China and Japan.”*

Forbes (2011)

*“...if Europe really wants to have a knowledge based economy, if it wants to play a leading role in innovation and research, if it wants to be competitive in the global economy, it needs to do much more to attract the smartest and the brightest.”*

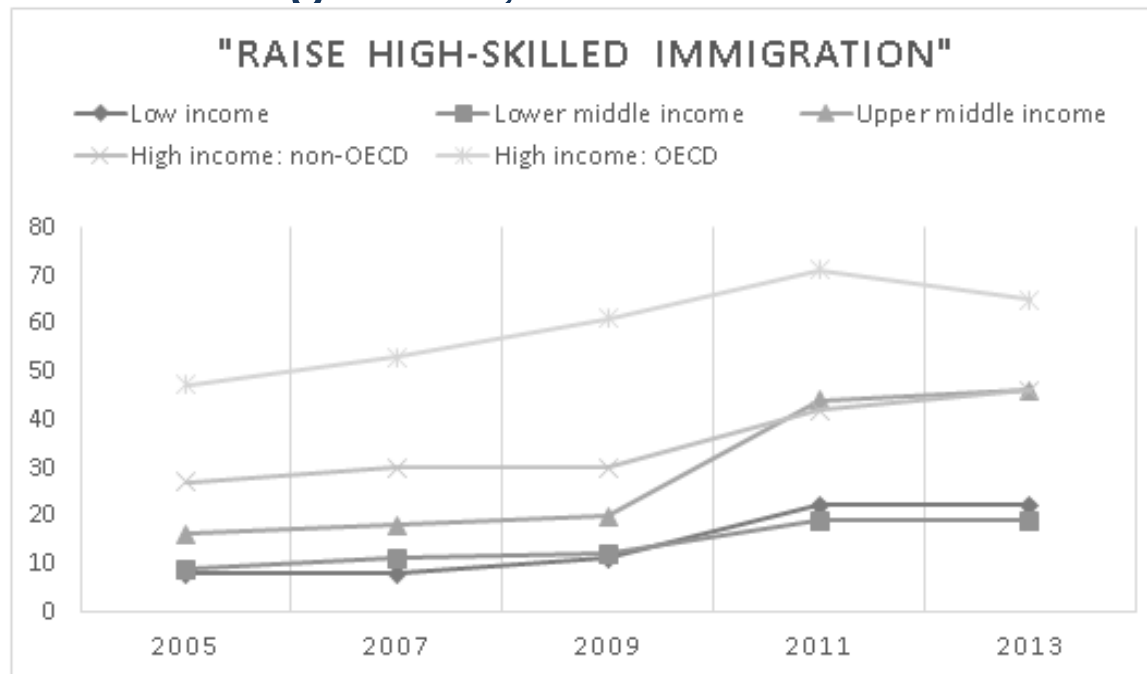
Cecilia Malmström, EU Commissioner (2012)

# Motivation

- “Global Competition to attract high-skilled migrants” Boeri et al (2012)
- To encourage movement of the “best and the brightest” Kapur and McHale (2005)
- OECD destinations at centre of competition
  - Historically attracted largest proportion of HS migrants (Artuç et al 2014)
  - Shortage in domestic supply of skills (Papademetriou and Sumption 2013)
- Efficacy of nation states’ (high skill) immigration policies remain highly contested

# Motivation

- 2013, approx. 40% of 172 UN member states declared explicit interest to increase the level of high-skilled migration, doubled since 2005.



Data source: UN World Population Policies (2013)

# Importance of HS migration

- Between 2000/01 and 2010/11 number of migrants residing in OECD countries rose 70% to 35 million (Arslan et al 2014), Why?
  - Growth by raising human capital stock, (Boubtane et al 2014)
  - Growth via increased diversity (Alesina et al 2013)
  - STEM workers main drivers of productivity growth (Peri et al 2016)
  - Spur technological progress through diffusion of knowledge and innovation (Kerr and Lincoln 2010, Hunt and Gauthier-Loiselle 2010)
  - In particular, knowledge that cannot be codified and transmitted through other information channels requires ‘knowledge-carriers’ to physically move in order to transfer knowledge across borders and to create spill-overs elsewhere (OECD 2008)

# More Politically Viable?

## Sun readers on immigration

To what extent should the following groups of people be allowed to come and live in Britain? Poll of Sun readers

	ALL	CON	LAB	UKIP
<b>Wealthy, looking to invest in Britain</b>				
Allow in more / present numbers	66%	78%	65%	64%
Allow fewer / none	20%	12%	22%	31%
<b>Paying to study in British universities</b>				
Allow in more / present numbers	58%	64%	61%	51%
Allow fewer / none	29%	28%	25%	46%
<b>High levels of education and skills, looking for high paid jobs</b>				
Allow in more / present numbers	58%	66%	61%	55%
Allow fewer / none	30%	26%	26%	42%
<b>Coming to work in the British health service</b>				
Allow in more / present numbers	53%	63%	56%	44%
Allow fewer / none	32%	27%	27%	49%
<b>Fleeing persecution or war in other countries</b>				
Allow in more / present numbers	30%	29%	41%	21%
Allow fewer / none	54%	60%	39%	74%
<b>With family in the UK, coming to live with relatives</b>				
Allow in more / present numbers	20%	17%	24%	13%
Allow fewer / none	66%	75%	62%	84%
<b>Low levels of education/skills, looking for low paid work</b>				
Allow in more / present numbers	11%	10%	13%	9%
Allow fewer / none	77%	80%	74%	89%

# The Controversy

- Degree to which high skilled immigration policies have been effective remains contested (Bhagwati and Hanson 2009)
- Jasso and Rozenzweig (2009):
  - Examine roles of skill premia and cultural proximity , study of skill composition of immigration to Australia and United States
  - ***“There is no evidence that the differences in the selection mechanism used to screen employment migrants in the two countries play a significant role in affecting the characteristics of skill migration”***

# The Controversy

- Doornik et al (2009): argue attracting HS migrants likely depends upon broader economic and social factors as opposed to the ‘technical approach’ adopted
- Papademetriou et al (2008) coined the term ‘immigration package’



# Existing Literature

- Determinants of international migration
  - **Income and wage differentials:** (Grogger and Hanson 2010, Belot and Hatton 2012, Ortega and Peri 2013, Beine et al 2013), **Networks and diasporas:** (Pedersen et al 2008, Beine et al. 2011, Beine and Salomone 2013), **Credit constraints:** (Vogler and Rotte 2000, Clark et al 2007, Belot and Hatton 2012) , **(Un)employment** (Beine et al 2013, Bertoli et al 2013)

# Existing Literature

- Immigration policies:
  - Immigration regimes on aggregate bilateral migration flows (Mayda 2010, Ortega and Peri 2013, Czaika and de Haas 2014)
    - What proportion of migration flow will specific policy affect?
  - Particular migration categories:
    - **Asylum seekers** (Vogler and Rotte 2000, Holzer, Schneider, and Widmer 2000, Hatton 2005, 2009, Thielemann 2006)
    - **Irregular migrants** (Czaika and Hobolth 2014)

# Contribution

- Examine efficacy of HS migration policies on inflow of HS migrants, 10 OECD destinations, 185 origins, 2000-2012
  - Three new datasets
    - **Bilateral migration flows** by skill: harmonised by:
      - **Origin**: nationality vs. country of birth
      - **Skill**: occupation
      - **Location where flow recorded** : onshore vs. offshore
      - **Duration of stay**: long-term
    - **Unilateral migration policies**
    - **Bilateral migration policies**
  - Pseudo-gravity model, well specified (e.g. HS wages, explicit policy variables, amenities), Empirical considerations, Zeroes, MRM, RUM consistency...

- Sjaastad (1962): foundation for modern theoretical approaches, casting potential migrants as rational maximisers of human capital investments
- Micro-founded pseudo-gravity model theoretical workhorse studies on determinants of migrants' location decision:
  - Grogger and Hanson 2011, Beine et al 2011, Boeri et al 2012, Ortega and Peri 2013, Beine et al 2013, Beine and Salamone 2013, Bertoli and Fernandez Huertas-Moraga 2013, Bertoli et al 2013, Beine et al 2014, Beine and Parsons 2015, Bertoli and Fernandez Huertas-Moraga 2015

# Model

- Based on Random Utility Model
  - Off-the-shelf (inclusion of migrant skill and amenities)
    - **Scale equation** (of the total of high-skilled migration)
    - **Selection equation** (the difference between high-skilled and migrants of all other skill categories)

- Scale

$$\ln n_{odt}^{HIGH} = \beta_1(\ln W_{dt}^{HIGH}) + \beta_2(\ln A_{dt}) - \beta_3(\ln E_{dt}) - \beta_4(P_{dt}) - \beta_5(X_{od}) - \beta_6(\ln M_{odt}) - \beta_7(P_{odt}) + \delta_{ot} + \varepsilon_{odt}^{HIGH}$$

- Selection

$$\ln(n_{odt}^{HIGH} / \sum_z n_{odt}^z) = \beta_1(\ln W_{dt}^{HIGH} - \ln W_{dt}^{AVERAGE}) + \beta_2(\ln A_{dt}) - \beta_3(\ln E_{dt}) - \beta_4(P_{dt}) - \beta_5(X_{od}) - \beta_6(\ln M_{odt}) - \beta_7(P_{odt}) + \delta_{ot} + \varepsilon_{odt}$$

# Model

- $A_{dt}$ : Amenities (Schools, Quality Living, technology)
- $E_{dt}$ : Economic Factors (Unemployment, Population)
- $P_{dt}$ : Time-varying destination specific HS policies
- $X_{od}$ : Time invariant bilateral factors
  - Geographic factors: distance, common border
  - Cultural factors: language, shared colonial heritage
- $M_{odt}$ : Time-varying migrant networks
- $P_{odt}$ : Time-varying bilateral & multilateral policies
- $\delta_{ot}$ : Origin-time fixed effects

# Empirical Considerations

- Large proportion of zeroes in migration data
  - Santos Silva and Tenreryo (2006)
    - When variance of error term a function of independent variables the expected value of the error term will also depend on the value of the regressors.
    - Biased and inconsistent results
    - Propose PPML estimator = unbiased estimates

# Empirical Considerations

- Theoretical consistency (Beine et al (2014), Bertoli and Huertas-Moraga (2015)):
  - Theoretical derivation dependent upon assuming:
    - Utility derived from destination varies neither across origins *nor* individuals
    - Stochastic component of utility is i.i.d. conforms to an EVT-1 distribution
  - Implications?
    - Scale of migration from  $o$  to  $d$  depends upon the utility associated with all other possible destinations i.e. ‘Multilateral Resistance to Migration’,
    - For model to be consistent with the underlying RUM - one which doesn’t violate the IIA assumption - necessary to include origin-time dummies, to control for the population at origin
      - Technically: implies that the expected value of gross migration flows conditional on our independent variables (as well as the dummies) are independent across all individuals in the dataset.



# Empirical Considerations

- **Multilateral Resistance**
  - Constitutes an omitted variable if not accounted for, approaches?
    - Anderson and van Wincoop (2003):
      - Estimate a large set of non-linear simultaneous equations to explicitly calculate the relevant terms
    - Feenstra (2004):
      - Inclusion of origin-time and destination-time fixed effects
    - Head, Mayer and Ries (2010):
      - Crudely calculate multilateral resistance terms using trade triads
    - Bertoli and Fernandez Huertas-Moraga (2013):
      - Particularly rich and high frequency data, use CCE estimator of Peseran (2006).
    - Baier and Bergstrand (2009): explicitly model the multilateral resistance to migration terms
      - Use 1<sup>st</sup> order Taylor expansion to approximate MRM terms

# Empirical Considerations

- Multilateral Resistance (Cont...)
  - Grösch (2012) unique in this regard?
  - Estimated using OLS

$$MRDIST_{ij,t} = \left[ \left( \sum_{k=1}^C \theta_{k,t} \ln \text{Dist}_{ik} \right) + \left( \sum_{m=1}^C \theta_{m,t} \ln \text{Dist}_{mj} \right) - \left( \sum_{k=1}^C \sum_{m=1}^C \theta_{k,t} \theta_{m,t} \ln \text{Dist}_{km} \right) \right]$$
$$MRADJ_{ij,t} = \left[ \left( \sum_{k=1}^C \theta_{k,t} \text{Adj}_{ik} \right) + \left( \sum_{m=1}^C \theta_{m,t} \text{Adj}_{mj} \right) - \left( \sum_{k=1}^C \sum_{m=1}^C \theta_{k,t} \theta_{m,t} \text{Adj}_{km} \right) \right]$$

- $\Theta$  = share, country population to world total

$$N_{k,t}/N \text{ and } N_{m,t}/N$$

# Empirical Considerations

- Modelling policies:
  - **Binary variable** approach, equals one if policy in force in a certain year
    - Advantageous since may exploit within *and* across variation
  - **Indices of policy restrictiveness**
    - Subjective coding? Selection of policies?
    - Zero assigned to country at time zero
    - Increases/decreases by 1 should policy in year  $t$  be more/less restrictive.
    - What level of restrictiveness does each destination country actually begin period with?
      - Assigning zero value militates against cross-country comparisons.
    - Approach assumes equal weighting of relative importance of policies
    - Approach assumes such policies affect various immigrant groups in a uniform way.

# Empirical Considerations

- Modelling policies:
  - **Policies implemented to varying and differing degrees...**
  - Trade-off external validity & specificity
  - Adopt standard definition/criteria to judge whether specific policy in place in particular country-year.

# Flow Data

- Bilateral migration flow data by skill
  - 10 OECD destinations, 185 origins, 2000-2012
  - Focus on labour (economic) migrants
  - Various (administrative) sources: ministries, access, expense
- Definition of origin
  - Country of birth (stocks) vs. nationality [**Nationality**]
- Definition of skill?
  - Education, Occupation, Salaries... [**Occupation**]
  - Harmonised to ISCO 2008 1-digit, first 3 categories
- Duration of stay
  - Temporary vs. long-term [**long-term**]
- Location where flow recorded
  - Onshore vs. offshore [**Offshore**]

# Flow Data

- Sources:
  - Administrative files (AUS, CAN, ISR, NZL)
  - Employment visas (KOR)
  - Work/residence permits (CHE, GBR, USA)
  - Population and employment registers (NOR, SWE)
- Various national classifications, data obtained 1-5 digits
- Harmonised individual occupations to ISCO (2008) 1-3
  - (1) Managers, senior officials and legislators
  - (2) Professionals
  - (3) Technicians and associate professionals
- Occupations commensurate with tertiary ed.

# Flow Data

## Switzerland

Occupational Classification: Swiss Standard Classification of Occupations 1990

Categories counted as highly skilled:

- Minor Group 291: Engineers
- Minor Group 292: Technicians
- Minor Group 293: Technical Drawing Occupations
- Minor Group 294: Technical Personnel
- Minor Group 321: Banking and Insurance Professionals
- Minor Group 322: Advertising and Marketing Occupations
- Minor Group 324: Accountants and Financial Advisers
- Minor Group 325: Brokers, Lenders and Auctioneers
- Sub-Major Group 33: Large Organization and Administration Occupations
- Minor Group 362: Legal and Judicial Occupations
- Sub-Major Group 37: Media and Related Occupations
- Minor Group 381: Musicians
- Minor Group 382: Entertainment Occupations
- Minor Group 383: Artistic Creators
- Sub-Major Group 42: Health Occupations
- Sub-Major Group 43: Social and Spiritual Assistance and Education Occupations
- Sub-Major Group 44: Teaching and Education Occupations
- Sub-Major Group 45: Science Occupations (Both Social Sciences & Natural Sciences)

## United Kingdom

Occupational Classification: U.K. Standard Occupational Classification 2000

Categories counted as highly skilled:

- 521 individual 2-4 digit occupational names individually assigned (concordance is available on request from the author)

# Migration Policy Data

- Chaloff and Lemaitre (2009)
  - Demand-driven policies (short term):
    - Required to have job offer before entry to domestic labour market
    - Employers take leading role in recruitment process
  - Supply-driven policies (long-term):
    - Can apply for a work permit without an actual job offer
    - PBS: qualifications, age, work experience, language skills, prior wages
  - Hybrid systems:
    - Countries' policies typically comprise mixture of elements



# Migration Policy Data

- 17 main policy variables:
  - Quotas, Labour Market Test, Shortage List (Shortage list exemption to LMT), Points-Based System (PBS dominated by shortage list), Labour Market Protection, Contingent on job offer (Need job offer + shortage profession), Employer portability, Family Reunification (Immediate Family Reunification), Spouse work rights (Immediate spouse work rights), Permanency rights (Immediate Permanency rights), Student Job Seekers' Visa, Student Switching, Intra-company transfers, Return programme, Financial Incentives, Freedom of Mobility, Investors/ Business Visa
- 19 destination countries
- 1990-2013 (and beyond)

# Migration Policy Data

**Labour Market Test:** Is there a mechanism in place to attempt to ensure the position cannot be filled by domestic workers?

**Shortage List:** Is there a list of in-demand or otherwise valued occupations which is somehow incorporated into the selection process for HS migrants?

**Points-Based System:** Is there a selection system that grants applicants points for particular attributes and allows entry to all those over a particular threshold?

**Job offer contingency:** Is it possible to enter the country as a HS migrant without first having a job offer?

**Permanency rights:** Are HS migrants privileged in getting permanent residence or citizenship?

**Financial Incentives:** Are there special financial arrangements (such as tax exemptions, or allowances) pertaining to HS migrants?

# Migration Policy Data

- **Bilateral Migration Policies**
  - 19 destination countries (3,161 in total)
  - 2000s but many data back to 60s/70s
  - Temp. Employment, Seasonal Employment, Training, Working Holidaymaker, Co-op, Social Security, Double Taxation, Tax Information Exchange, Recognition of Diplomas, Multilateral Agreements
  - **Social security agreements**
    - Equality in treatment between signatories regarding the payment of benefits abroad
  - **Double taxation agreements**
    - Avoidance of double taxation on income etc.
    - Also seek to reduce fiscal evasion
  - **Recognition of diplomas**
- **Multilateral agreements (single DV)**

# Data

- Unemployment data (OECD)
- Total population (International Database, US Census Bureau)
- HS wages (OECD) – avg annual wages \* ratio 9th -5th decile
- Migrant networks (three rounds of the OECD DIOC)
- Contiguity, common language, distance, colony (CEPII database)

- Amenities
  - **Global (city) appeal:** UN salary country multipliers (variety of goods and urban amenities)
  - **Net-of-tax:** fixed salaries to tax schedules (OECD)
  - **Children's education:** PISA scores (OECD)
  - **Technological development:** (ICT coverage)
  - **Health:** Life Expectancy

# Baseline Results

		(1) PPML	(2) PPML	(3) PPML	(4) PPML	(5) PPML
<i>Destination controls</i>	<b>HS wages (log)</b>	1.069*** (0.119)	1.066*** (0.120)	0.751*** (0.123)	0.749*** (0.124)	0.657*** (0.128)
	<b>Unemployment (log)</b>	-0.719*** (0.113)	-0.695*** (0.117)	-0.533*** (0.148)	-0.482*** (0.145)	-0.445*** (0.150)
	<b>Population (dest, log)</b>	1.544*** (0.127)	1.519*** (0.132)	1.083*** (0.174)	0.976*** (0.172)	0.912*** (0.181)
<i>Dyadic controls</i>	<b>Network size (log)</b>	0.130*** (0.0107)	0.119*** (0.0104)	0.141*** (0.0112)	0.128*** (0.0105)	0.125*** (0.0115)
	<b>Contiguity</b>	0.577*** (0.122)	0.648*** (0.124)	0.317*** (0.0979)	0.420*** (0.0972)	0.456*** (0.0977)
	<b>Common language</b>	0.950*** (0.0914)	0.953*** (0.0962)	0.878*** (0.0729)	0.846*** (0.0762)	0.850*** (0.0796)
	<b>Distance (log)</b>	-0.0812 (0.0545)	-0.117** (0.0545)	-0.0958** (0.0464)	-0.111** (0.0443)	-0.138*** (0.0463)
	<b>Colony</b>	0.324*** (0.0572)	0.305*** (0.0623)	0.300*** (0.0612)	0.216*** (0.0637)	0.183** (0.0797)
	<b>Free mobility</b>	1.139*** (0.135)	1.017*** (0.136)	0.719*** (0.120)	0.552*** (0.115)	0.494*** (0.116)
	<b>Diploma recognition</b>		0.305*** (0.0896)		0.631*** (0.100)	0.599*** (0.0978)
<b>Social security</b>		-0.0369 (0.0628)		0.121** (0.0603)	0.117* (0.0596)	
<b>Double taxation</b>		-0.299*** (0.0487)		-0.375*** (0.0480)	-0.343*** (0.0473)	
<i>Unilateral Policies</i>	<b>Permanency</b>			1.062*** (0.156)	1.075*** (0.152)	1.193*** (0.159)
	<b>Financial incentive</b>			0.0801 (0.0967)	0.0358 (0.0932)	-0.192* (0.115)
	<b>Job offer</b>			-1.854*** (0.175)	-1.896*** (0.166)	-1.893*** (0.172)
	<b>LM test</b>			0.169 (0.164)	0.143 (0.159)	0.113 (0.158)
	<b>Shortage list</b>			-0.641*** (0.0778)	-0.699*** (0.0813)	-0.649*** (0.0977)
	<b>PB-system</b>			1.492*** (0.124)	1.382*** (0.117)	
	<b>PB-System (GBR)</b>					1.299*** (0.122)
	<b>PB-System (CAN)</b>					0.959*** (0.192)
	<b>PB-System (AUS)</b>					1.530*** (0.183)
	<b>PB-System (NZL)</b>					1.507*** (0.195)
	<b>Origin*Time FE</b>	yes	yes	yes	yes	yes
	<b>N</b>	20,240	20,240	20,240	20,240	20,240
	<b>R-sq</b>	0.961	0.962	0.969	0.971	0.971

Note: Standard errors in parentheses: \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

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# Robustness

- 1) Include MRM terms
- 2) Dyadic fixed effects (cultural distance)
- 3) it and jt FE and compare  $R^2$
- 4) Amenities
- 5) Balanced panel
- 6) GMM

# Results Selection

- Estimate selection equation zero-one inflated betafit model with modified zero-one boundaries (Smithson and Verkuilen 2006)
- Also SUR on high skilled and all other skilled

# Results Selection

		(1) Beta	(2) Beta	(3) Beta	(4a) SUR	(4b) SUR
<i>Destination controls</i>	HS wage premium (log)	1.019***	1.003***	0.946***		
		(0.049)	(0.049)	(0.057)		
	HS wages (log)				0.617***	
					(0.029)	
	Non-HS wages (log)					0.223***
						(0.038)
	Unemployment (log)	-0.746***	-0.754***	-0.684***	-0.728***	0.194***
		(0.037)	(0.037)	(0.044)	(0.040)	(0.049)
Population (dest, log)	0.870***	0.879***	0.922***	1.198***	-0.083*	
	(0.040)	(0.040)	(0.047)	(0.041)	(0.050)	

# Results Selection

<i>Dyadic controls</i>	Network size (log)	-0.046***	-0.050***	-0.045***	0.153***	0.229***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
	Contiguity	-0.261***	-0.268***	-0.265***	-0.176**	0.079
		(0.093)	(0.094)	(0.092)	(0.087)	(0.107)
	Common language	-0.183***	-0.164***	-0.045*	0.492***	0.530***
		(0.024)	(0.025)	(0.025)	(0.026)	(0.032)
	Distance (log)	0.004	0.010	0.074***	-0.143***	-0.187***
		(0.017)	(0.017)	(0.018)	(0.015)	(0.018)
	Colony	1.371***	1.350***	1.321***	-0.097**	-1.545***
		(0.050)	(0.051)	(0.052)	(0.041)	(0.050)
	Free mobility	-0.027	-0.102*	-0.235***	0.470***	1.180***
		(0.055)	(0.056)	(0.055)	(0.045)	(0.055)

# Results Selection

<i>Bilateral agreements</i>	Diploma recognition		0.190***	0.204***	1.050***	0.820***
			(0.028)	(0.028)	(0.037)	(0.046)
	Social security		0.036	0.082**	-0.097***	-0.111**
			(0.033)	(0.032)	(0.037)	(0.045)
	Double taxation		-0.012	-0.009	0.144***	0.287***
		(0.022)	(0.022)	(0.025)	(0.031)	
<i>Unilateral policies</i>	Permanency			-0.345***	0.860***	1.015***
				(0.040)	(0.029)	(0.037)
	Financial incentive			0.575***	-0.114***	-0.550***
				(0.031)	(0.023)	(0.029)
	Job offer			0.155**	-0.582***	-0.351***
				(0.069)	(0.046)	(0.056)
	LM test			0.239***	0.328***	0.027
				(0.037)	(0.028)	(0.035)
	Shortage list			-0.389***	-0.488***	0.078**
				(0.032)	(0.026)	(0.032)
PB system			0.238***	0.805***	0.198***	
			(0.061)	(0.043)	(0.053)	

# Results Selection

**Points-based systems:** increase selection in comparison with requiring a job offer, clearance through a labour market test, working in shortage listed occupation.

**Post-entry rights:** reduce human capital content of labour flows since 'roads to permanency' prove more attractive for non-high skill workers.

**Recognition diplomas/Social security rights:** increase selection on skills

**Double taxation agreements:** neutral on selectivity.

# Results Selection

**HS Wages:** a rising skill premium, shifts skill composition of inflows towards higher skilled (Roy model, Borjas 1987).

**Unemployment:** higher unemployment reduces skill selection of incoming migrants.

**Migrant networks:** reduce selection, benefit both types of workers but low skilled more

**Other migration costs:** contiguous borders, common language and freedom of movement, exert greater effects on non-high skilled workers, thereby reducing migrant skill selection.

**Distance:** opposite effect, deter both types of workers but high skilled less, such that greater geographic distances are associated with an improved selection on skills.

# Conclusion

- High-skilled migration policies are en vogue
- Business-driven labour migration policies not new, main difference: employers increasingly demand skill sets that require tertiary education/expertise
- Government's responses = skill-specific/selective regimes
- First assessment of such these policies: 10 major OECD destinations, 185 origins, 2000-2012.
- Strong evidence that supply-led systems, increase both the absolute numbers of high skill migrants and the skill composition of international labour flows.



# Conclusion

- Demand-driven systems based on principle of job contingency shown to have rather little, and potentially even a negative effect.
- Pinch of salt? Points-based systems initially introduced with the idea that ‘there can never be enough of a good thing’
- Other countries’, for example those largely used across Europe preoccupied with integration that prioritise labour market outcomes over the numbers recruited.
- Employability? The need for low skill migration?