Mind the gaps: Gender complementarities in migration and FDI

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If I were a country.....would I be a big one?

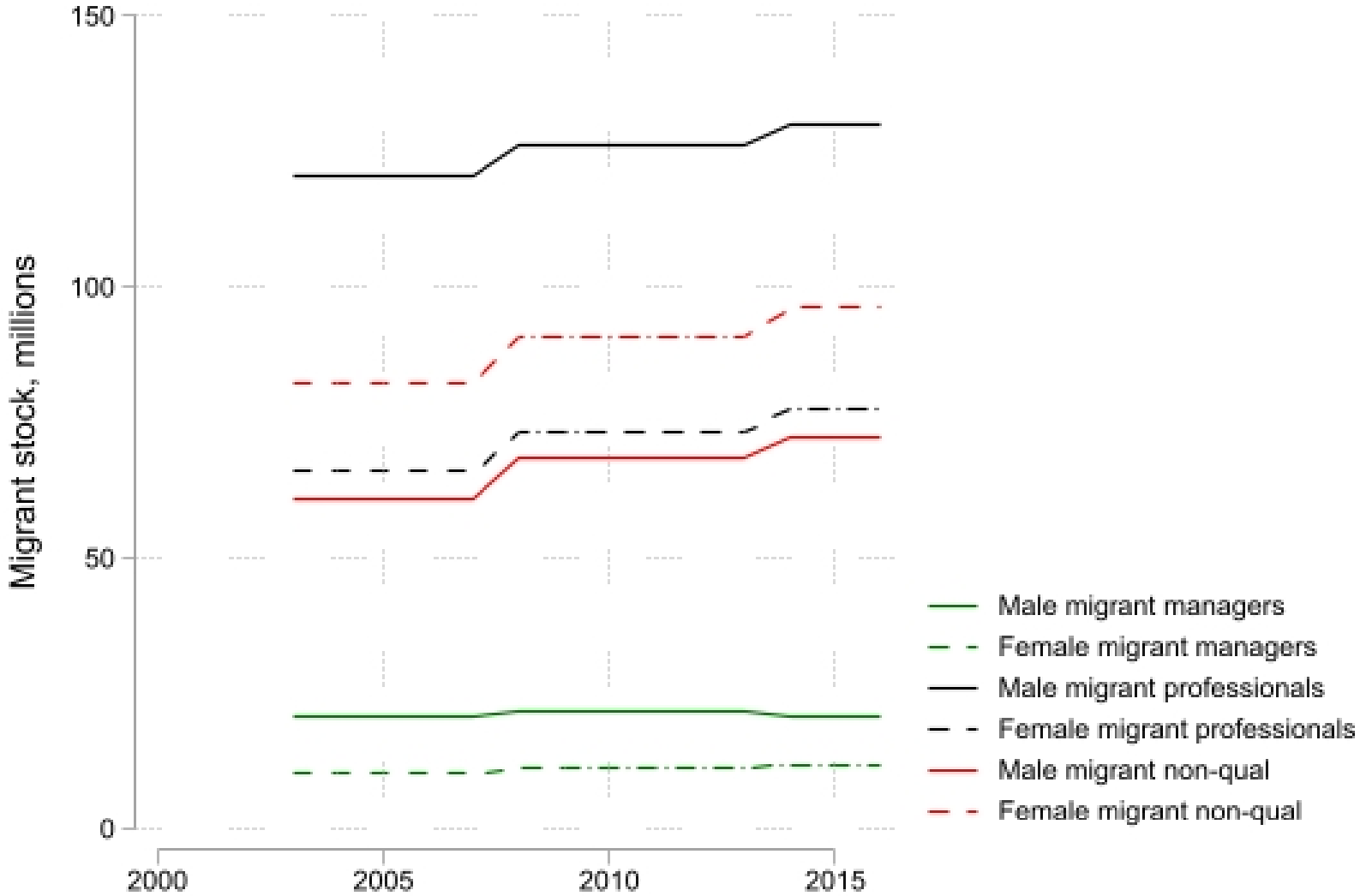
Population

1. China 1,366,900,000
2. India 1,249,620,000
3. United States 318,787,000
4. Indonesia 252,164,800
5. Migrants 215,000,000
6. Pakistan 188,020,000
7. Nigeria 178,517,000
8. Bangladesh 157,019,000
9. Russia 146,149,200
10. Japan 127,040,000
11. Mexico 119,713,203
12. Men or Woman 107,500,000

...

50. Migrants Managers 25,800,000
69. Men Managers 17,300,000
102. Woman managers 8,500,000

Male managers come from Holland and female managers from Togo



Migration in the 2030 Agenda

- "Achieving gender equality through migration governance: opportunities and solutions in support of the sustainable development agenda" (International Organization for Migration - The UN Migration Agency, 2017):
  - "migration policies in both countries of origin and destination are formulated, with due regard for the particular needs and experiences of migrant women and girls."
    - "by organizing programmes for admission of foreign workers specialized in particular fields."
    - "encourage and enable women to accede to areas such as corporate leadership"
- However, little is known of
  - the effects of gendered migration policies
  - the elasticity of substitution between men and women
    - less so for managers.

The first female Uber driver in Saudi Arabia

- Taxi drivers in Saudi Arabia were all men until June 2018
  - In September 2018, Uber launched a pilot program that allowing its female drivers the choice of selecting only female passengers
  - Careem, a Dubai-based Uber competitor, said that "after creating 100,000 jobs for Saudi men, Careem was now looking forward to creating 100,000 more for Saudi women"

1. According to our results, increasing by 1% female Uber drivers in S.A. is associated with:
   - similar taxis (0.1 % more capital)
   - decrease 3.9% male taxi drivers (the less productive)
2. In Sweden:
   - drive a larger taxi (0.38% more capital)
   - decrease of 0.3% male taxi drivers (the less productive)

Elasticity of Substitution

- Elasticity of substitution between men and female workers:
  - labor market, flexibility, technology (Goldin, 2014; Goldin & Katz, 2016)
  - Fertility and mortality rates (Soares and Falcao 2008)
  - 1.0-1.5 in Italy (De Giorgi et al., 2016); 2-3; 5 ages 25-35 (Acemoglu et al., 2004); 0.7 in Germany (Naurz, 2023), 1.85-2.20 (Johnson and Keane 2013)

  "The elasticity of substitution between male and female workers is defined as the percentage change in the relative demand for female (male) workers following a one percentage change in the relative price of male (female) workers" (De Giorgi et al., 2015)

- Ideal EoS estimates use individual-level wage data. Under certain assumptions, Kraay, & Van der Weide (JEG 2022) show that aggregate data provide a good approximation (for intergenerational mobility).

More lit.

Research questions & contributions

1. What is the effect of increasing female labor participation in the market outcomes?
2. What is the elasticity of substitution between male and female labor? What is the effect on male labor?

- Obtain comparable cross-country elasticity of substitution (EoS) between men and female workers using theoretical and empirical properties of structural gravity
- Estimates of the EoS for 27 OECD countries and three job types
  - Managers: [1.2, 3.2, 3.8], Professionals [1.1, 2.1, 3.9], Non-qual [4.3, 6.0, 5.9]
  - EoS positively correlated with gender inequality EoS
- New evidence FDI-migration link
  1. Labor channel using country-specific non-bilateral migration
  2. Gender channel

Outline

1. Motivation
2. Background
3. The model
   - Setup
4. Data & Empirics
   - Data
   - Empirics
5. Estimation results
   - Bilateral Migration
   - Country-specific migration
   - Robustness
   - Summary and cross-country EoS
6. Conclusions

Gender & Migration

1. Gender effects
   - Corporate governance (Huang & Kisgen, 2013)
   - Female entrepreneurs (Du Rietz & Henrekson, 2000)
   - Resource misallocation: Talent misallocation in high-skilled occupations (Hsieh et al., 2019)
   - Output Cost (Calvancanti & Tavares, 2015)
   - Job substitutability (Acemooglu et al., 2004; Goldin, 2014, 2021; De Giorgi et al., 2016)
2. Gender bias/discrimination in migration
   - Skilled migration (Docquier et al., 2012)
   - Migration intentions (Ruyssen and Salomone, 2018)
   - Quality and type of information networks (Curran and Rivero-Fuentes, 2003)
   - Brain drain (Dumont et al., 2007)

Migration & FDI: the 3 channels

1. Information $j \rightarrow i$ (Kugler and Rapoport, 2007)
2. Networks $j \rightarrow i, i \rightarrow j$ (Burchardi et al., 2019; Docquier & Lodigiani, 2010; Flisi and Murat, 2011; Javorcik et al., 2011)
   - Financial information (Cuadros et al., 2016)
3. Labor/jobs $i \rightarrow j$
   - Migrants increase the talent pool from which firms can hire individuals with specific abilities (language, culture).
     - Agglomeration (Buch et al., 2006)
     - Management (Cuadros et al., 2019)
     - Innovation (Cuadros et al., 2022)
     - Gender (?)

More lit.

The three building blocks of the model

- The model adapts migration & FDI models
- to labor models with male and female workers (Acemooglu et al., JPE 2004; De Giorgi et al., 2015; Goldin, AER 2014)
- and includes misallocation (Restuccia and Rogerson, JEP 2017) with gender discrimination (Calvancanti & Tavares, EJ 2015).

FDI

- Consider N countries with foreign producers of a homogeneous good Demand. Producer i in country j has the following production function:

$$x_{ij} = S_{ij}^{s}[K_{ij}^{k} L_{j}^{l}], \tag{1}$$

where K is capital, S_{ij} are workers with "ij" skills (i.e., common language) and L_j are workers with "j" skills

- With a $mc = \alpha(w_{ij}S_{ij} + r_j K_{ij} + w_j L_j)$, we can show that Firms:

$$K_{ij} = \left(\frac{1}{w_{ij}/r_j \cdot k/s}\right)^{\frac{s}{1-\eta}} (\alpha^*/\alpha)^{\frac{1}{1-\eta}} (1/\tau_{ij})^{\frac{\zeta}{1-\eta}} \left(K^{Dom}\right)^{\frac{\eta-1-s}{\eta-1}} \tag{2}$$

α^* refers to the productivity threshold required to enter the market, $\eta = l + k + s < 1$, $\zeta = \frac{\sigma(1-l-k)}{\sigma(1-l-k)+l+k}$, and K_j represents the optimal equilibrium for capital for domestic firms.

Multiple firms

$$\tilde{K}_{ij} = N_i \int_{\underline{\alpha}}^{\alpha^*} K_{ij}^{FDI} \frac{g(\alpha)}{G(\alpha)} d\alpha =$$

$$N_i \left(\frac{1}{w_{ij}/r_j \cdot k/s} \right)^{\frac{s}{1-\eta}} \left(K^{Dom} \right)^{\frac{\eta-1-s}{\eta-1}} \int_{\underline{\alpha}}^{\alpha^*} (\alpha^*/\alpha)^{\frac{1}{1-\eta}} \frac{g(\alpha)}{G(\alpha)} d\alpha,$$

$$\ln FDI_{ij} \equiv \ln \tilde{K}_{ij} = \lambda_i + \lambda_j - \ln \bar{w}_{ij} + \omega_{ij}, \tag{3}$$

Male and female labor

- Labor is composed of male and female workers:

$$L_{ij} = \left(\theta_M L_{ijM}^{\frac{\sigma_{MF}-1}{\sigma_{MF}}} + \theta_F L_{ijF}^{\frac{\sigma_{MF}-1}{\sigma_{MF}}} \right)^{\frac{\sigma_{MF}}{\sigma_{MF}-1}}, \tag{4}$$

  where M are male, and F are female workers, and $\theta_M + \theta_F = 1$ are a gender-dependent productivity parameters, σ_{MF} is the elasticity of substitution between female and male workers.

- The labor costs are $\bar{w}_{ij} = \bar{w}_{ijM}^{\theta_M} \bar{w}_{ijF}^{\theta_F} = \bar{w}_{ijM} \left(\frac{\bar{w}_{ijF}}{\bar{w}_{ijM}} \right) \theta_F$

  since $\ln \bar{w}_{ijM} = \ln \left(\frac{1/L_{ijM}}{1/L_{jM}} \right)$ and FOC (i.e., the marginal product of male and female labor) implies that:

$$\ln \left(\frac{\bar{w}_{ijF}}{\bar{w}_{ijM}} \right) = \ln \left(\frac{\theta_F}{\theta_M} \right) - \frac{1}{\sigma_{MF}} \ln \left(\frac{L_{ijF}}{L_{ijM}} \right) \tag{5}$$

Inefficient Allocation: gender gap at the country-level

- Allocation is inefficient if $\tau_j > 1$ for some j; i.e., face higher costs to hire women
  - $M'sMPL = w_{ijM}$ and $F'sMPL = w_{ijF}(\tau_j)$ jointly determine M and F.
  - Labor is not employed efficiently.
- Gender constrained countries have inefficiently low W:
  - $$F'sMPL = (\tau_j) w_{ijF}^{GP} > w_{ijF}^{*}$$

    w_F^* is the equilibrium wage in the absence of misallocation and w^{GP} is the gender-gap wage
  - w^{GP} falls so that other firms absorbs all the woman (market clears) and countries choose
    $$w_F^{GP} = \frac{w_F^*}{\tau_j} < w_F^*$$
    and women perceive lower wages.
- In gendered constrained countries, most firms are gender constrained and will have have inefficiently low F, affecting the estimates of σ:

$$\ln\left(\frac{\bar{w}_{ijF}}{\bar{w}_{ijM}}\right) = \ln\left(\frac{\theta_F}{\theta_M}\right) - \frac{1}{\sigma_{MF}} \ln\left(\frac{L_{ijF}}{L_{ijM}}\right) + \ln \tau_j$$

definition

Using gravity to estimate EoS

$$
\begin{aligned}
\ln FDI_{ij} &= \lambda_i + \lambda_j + \omega_{ij} - \ln \bar{w}_{ij} \\
&= \lambda_i + \lambda_j + \omega_{ij} + \ln\left(\frac{L_{ijM}}{L_{jM}}\right) - \theta_F \ln\left(\frac{\theta_F}{\theta_M}\right) + \frac{\theta_F}{\sigma_{MF}} \ln\left(\frac{L_{ijF}}{L_{ijM}}\right) - \ln \tau_j \\
&= \lambda_i + \lambda_j + \omega_{ij} + \ln\left(\text{MigraS}_{ijM}\right) - \ln\left(\frac{\theta_F}{\theta_M}\right) + \frac{\theta_F}{\sigma_{MF}} \ln \psi - \theta_F \ln \tau_j + {}_{ij}
\end{aligned}
$$

Where the F/M ratio is:

$$
\ln\left(\frac{L_{ijF}}{L_{ijM}}\right) = \ln \psi + e_{ij} = \ln\left(\frac{\text{Migra}_{ijF}}{\text{Migra}_{ijM}}\right) + e_{ij},
$$

and labor shares is:

$$
\ln\left(\frac{L_{ijM}}{L_{jM}}\right) = \ln\left(\frac{\text{Migra}_{ijM}}{L_{jM}}\right) \equiv \ln\left(\text{MigraS}_{ijM}\right)
$$

Data

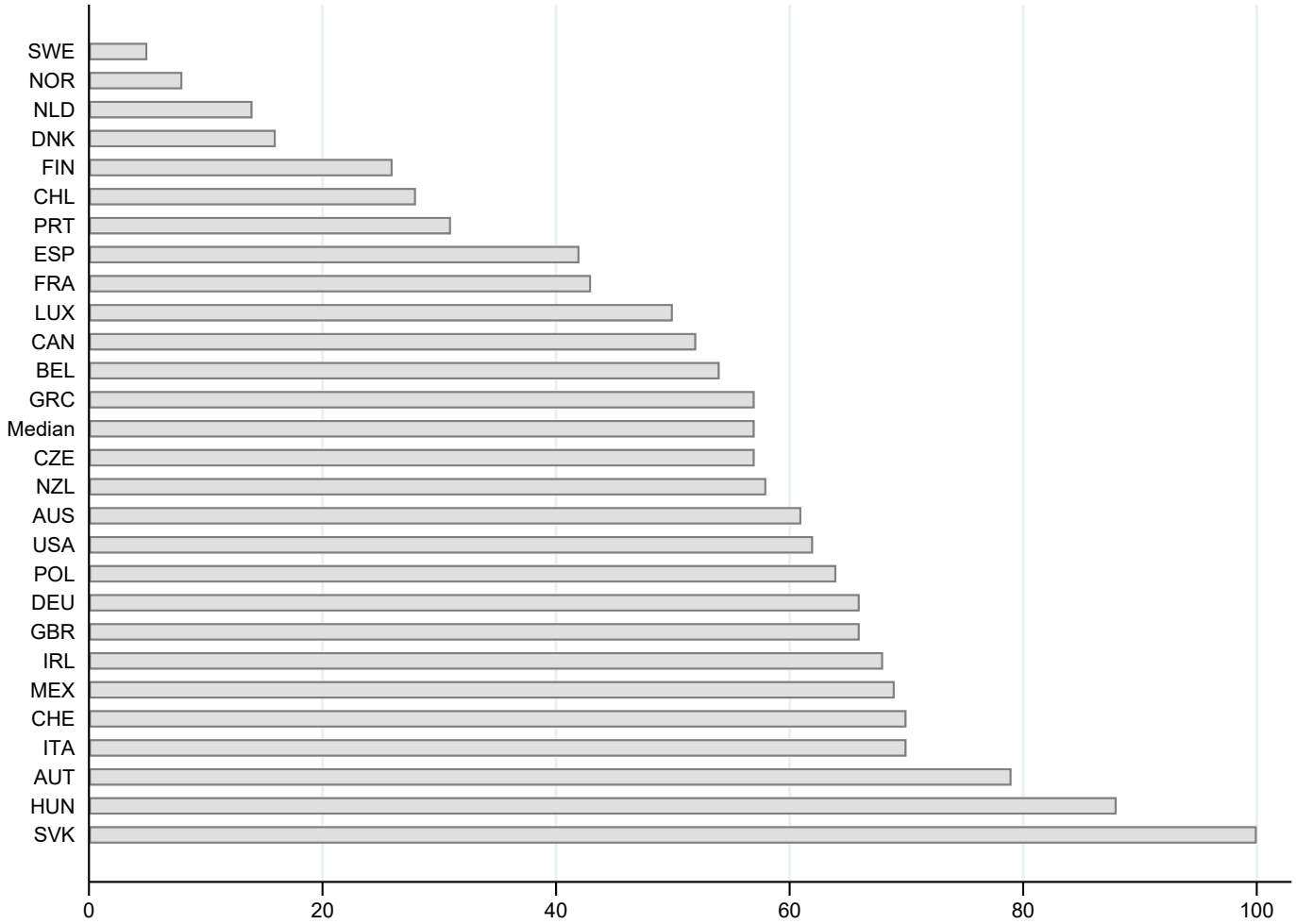
- FDIMarkets: covers firm level greenfield investments
- Source of greenfield investment for the UNCTAD & EIU.
  - 190 countries from 2003 to 2017
  - Firm-level data, that we aggregate by country
    - 4500+ firms
    - 44000+ investments
  - FDIMarkets allows to use unidirectional FDI data (i.e, $FDI_{ij} \neq FDI_{ji}$)
- DIOC-E data for migration which gives information on bilateral stocks by job position (manager, professional, non-qualified by gender) for years 2001, 2005, 2011 and OECD members

Table: Average share of female inward migrants stock by profession

	Manager	Professional	Non-qualified
AUS	0.356	0.379	0.625
AUT	0.261	0.336	0.654
BEL	0.311	0.325	0.595
CAN	0.381	0.408	0.608
CHE	0.233	0.319	0.677
CHL	0.470	0.272	0.535
CZE	0.332	0.396	0.652
DEU	0.276	0.354	0.662
DNK	0.268	0.427	0.625
ESP	0.304	0.317	0.582
FIN	0.296	0.388	0.733
FRA	0.371	0.342	0.712
GBR	0.354	0.333	0.664
GRC	0.296	0.345	0.516

	Manager	Professional	Non-qualified
HUN	0.369	0.407	0.599
IRL	0.409	0.326	0.646
ITA	0.257	0.331	0.544
LUX	0.302	0.338	0.608
MEX	0.333	0.221	0.482
NLD	0.271	0.375	0.639
NOR	0.261	0.341	0.728
NZL	0.366	0.387	0.616
POL	0.415	0.388	0.640
PRT	0.328	0.352	0.632
SVK	0.375	0.413	0.635
SWE	0.305	0.377	0.717
USA	0.377	0.442	0.519

Figure: Hofstede's masculinity-femininity index



coverage

The mystery of the shrinking tables

Recommendations for Estimating Structural Gravity (Yotov et al.,2016)

- **Recommendation 1:** *Use Panel Data*.
  - Estimation efficiency and pair-fixed-effects methods for endogeneity
- **Recommendation 2**: *Allow for Adjustment in Trade Flows (or not!!)*
  - adjustment in bilateral trade flows in response to trade policy
- **Recommendation 3**: *Include Intra-national Trade Flows.*
  - consistency with gravity theory & identification of the effects of bilateral trade policies
  - Identification of the effects of country-specific trade policies
    - The effects on international trade are measured relative to the effects on intra-national trade
- **Recommendation 4:** *Use Directional Time-varying Fixed Effects*
  - importer-time and exporter-time fixed effects
- **Recommendation 5**: *Employ Country-Pair Fixed Effects*
  - Endogeneity and all time-invariant bilateral trade costs
- **Recommendation 6:** Estimate Gravity with PPML
  - Heteroskedasticity, zero trade flows and ensures that the gravity fixed effects are identical to their corresponding structural terms)

Empirics: Bilateral migration

FDI and migration: the three channels

$$FDI_{ijt} = \exp\left(\underbrace{\beta_1 \ln \text{MigraS}_{jit-4}}_{\text{information}} + \underbrace{\beta_2 \ln \text{MigraS}^{\text{Job}}_{ijt-4M}}_{\downarrow\text{Network } \&\uparrow\text{labor}} + \underbrace{\beta_3 \ln \psi^{\text{Job}}_{ijt}}_{\text{gender}} + \lambda_{it} + \lambda_{jt} + \lambda_{ij} + \chi_{ijt} \right) \times e_{ijt}.$$

Endogeneity & Identifying country-specific effects in structural gravity

Heid et al. (2020) & Beverelli et al. (2018)

- $\texttt{BRDR}_{ij}$ is an exogenous dummy that identifies international flows
- $\ln \text{MigraS}^{\text{Job}}_{ijt-4M} \times \texttt{BRDR}_{ij}$ is an exogenous "shift-share" variable (Nizalova & Murtazashvili, 2016)
- $\ln \text{MigraS}^{\text{Job}}_{jt-4M} \times \texttt{BRDR}_{ij}$ is not collinear with MRT and can be used to identify the effect the total migration stock relative to domestic flows
- Domestic flows (new business) come from the World Bank

#	i	j	η_1	η_2	μ_1	μ_2	μ_3	$BRDR_{ij}$	$IQ_j \times BRDR_{ij}$
1	A	B	1	0	0	1	0	1	IQ_B
2	A	C	1	0	0	0	1	1	IQ_C
3	B	A	0	1	1	0	0	1	IQ_A
4	B	C	0	1	0	0	1	1	IQ_C
5	C	A	0	0	1	0	0	1	IQ_A
6	C	B	0	0	0	1	0	1	IQ_B
7	A	A	1	0	1	0	0	0	0
8	B	B	0	1	0	1	0	0	0
9	C	C	0	0	0	0	1	0	0

15+1 Reasons Why Gravity Should Be Estimated with Domestic Trade (Yotov, 2021)

- The use of domestic trade flows in gravity estimations is:

1. consistent with trade theory of the intensive margin of trade,
2. available and
   1. it does not matter much which to use! (Campos et al., 2021),
3. consistent with trade theory of the extensive margin of trade.
4. The use of domestic trade flows allows:
   - for estimation of the effects of international borders and home biases,
5. for estimation of heterogeneous domestic and regional trade costs,
6. for a systematic analysis of the determinants of domestic trade costs,
7. for country-specific asymmetries in the vector of international trade costs,
8. for identification of the trade-diversion effects of bilateral trade policies,
9. for identification of the effects of non-discriminatory trade policies on bilateral trade flows,
10. for identification of the effects of country-specific characteristics on bilateral trade flows,
11. for identification of the country-specific effects of trade policies,
12. to a solution to "The Distance Puzzle of International Trade",
13. for solving "The Missing Globalization Puzzle",
14. for solving the puzzle that "Larger Countries Should Be Richer than Smaller Countries",
15. for solving the puzzle of "The Missing WTO Effects".

Empirics: internal & country-specific migration

$$FDI_{ijt} = \exp\left(\left(\begin{array}{c} \beta_1 \underbrace{\ln \text{MigraS}_{jit-4}}_{\text{information}} + \beta_2 \underbrace{\ln \text{MigraS}^{\text{Job}}_{ijt-4M}}_{\downarrow\text{Network } \&\uparrow\text{labor}} \\ \beta_3 \underbrace{\ln \text{MigraS}^{\text{Job}}_{j\neq it-4M}}_{\text{labor}} + \beta_4 \underbrace{\ln \psi^{\text{Job}}_{i\neq jt-4}}_{\text{gender}} \end{array}\right) \times BRDR_{ij} + \lambda_{it} + \lambda_{jt} + \lambda_{ij} + \chi_{ijt} + BRDR_{ij} \times t\right) \times e_{ijt}$$

	(1) Total	(2) Managers	(3) Professional	(4) Non-qual
$\ln \text{MigraS}_{jit-4} \times BRDR_{ij}$	0.001	0.050	0.029	0.049
	(0.06)	(0.04)	(0.04)	(0.05)
$\ln \text{MigraS}^{\text{Job}}_{ijt-4M} \times BRDR_{ij}\text{T}$	0.072			
	(0.13)			
$\ln \text{MigraS}^{\text{Job}}_{ijt-4F} \times BRDR_{ij}$	0.166			
	(0.11)			
$\ln \text{MigraS}^{\text{Job}}_{ijt-4M} \times BRDR_{ij}$		0.047		
		(0.05)		
$\ln \text{MigraS}^{\text{Job}}_{ijt-4F} \times BRDR_{ij}$		0.030		
		(0.05)		
$\ln \text{MigraS}^{\text{Job}}_{ijt-4M} \times BRDR_{ij}$			-0.020	
			(0.06)	
$\ln \text{MigraS}^{\text{Job}}_{ijt-4F} \times BRDR_{ij}$			0.188***	
			(0.06)	
$\ln \text{MigraS}^{\text{Job}}_{ijt-4M} \times BRDR_{ij}$				-0.064
				(0.05)
$\ln \text{MigraS}^{\text{Job}}_{ijt-4F} \times BRDR_{ij}$				0.116**
				(0.05)
num_n	3259	6566	6902	6650
r2	1.000	1.000	1.000	1.000
OriginxYearFE	Yes	Yes	Yes	Yes
DestinationxYearFE	Yes	Yes	Yes	Yes

	(1) Total	(2) Manager	(3) Professional	(4) Non-qual
$\hat{\sigma}_{MF}$	1.3	3.2	2.1	6.0
$\ln \text{MigraS}_{jit-4} \times BRDR_{ij}$	0.035	0.034	0.050	0.072
	(0.05)	(0.04)	(0.05)	(0.05)
$\ln \text{MigraS}^{\text{Job}}_{ijt-4M} \times BRDR_{ij}$	0.225***	0.168***	0.147***	0.037
	(0.06)	(0.04)	(0.05)	(0.05)
$\ln \psi^{\text{Job}}_{ijt} \times BRDR_{ij}$	0.335***	0.109**	0.186***	0.096**
	(0.08)	(0.05)	(0.06)	(0.05)
Observations	6479	6479	6479	6479
CountryxYear FE	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes

PPML, Robust s.e. in (), clustured by CP. Controls: BIT, FTA, BRDBxYear

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Border effect

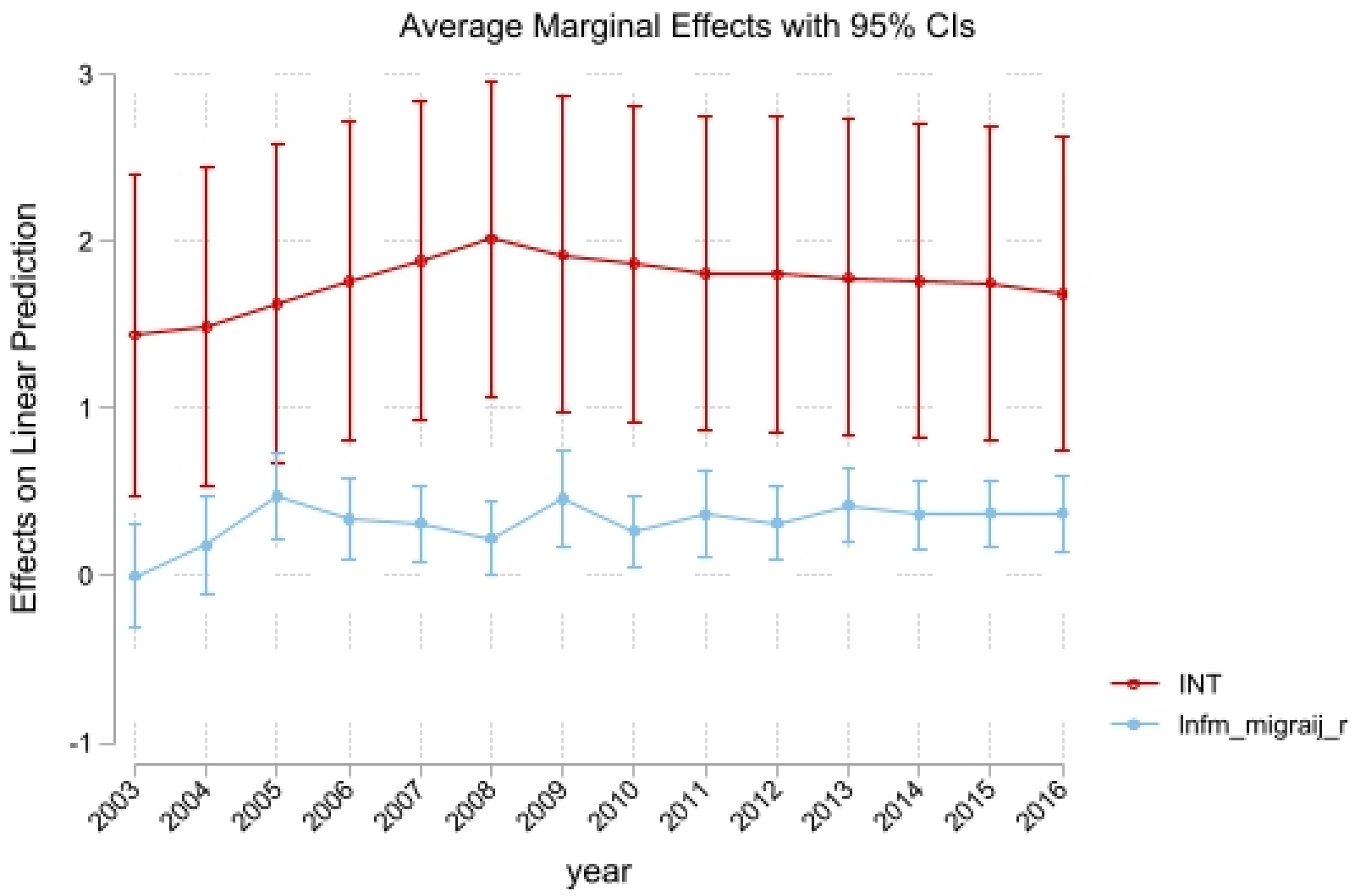
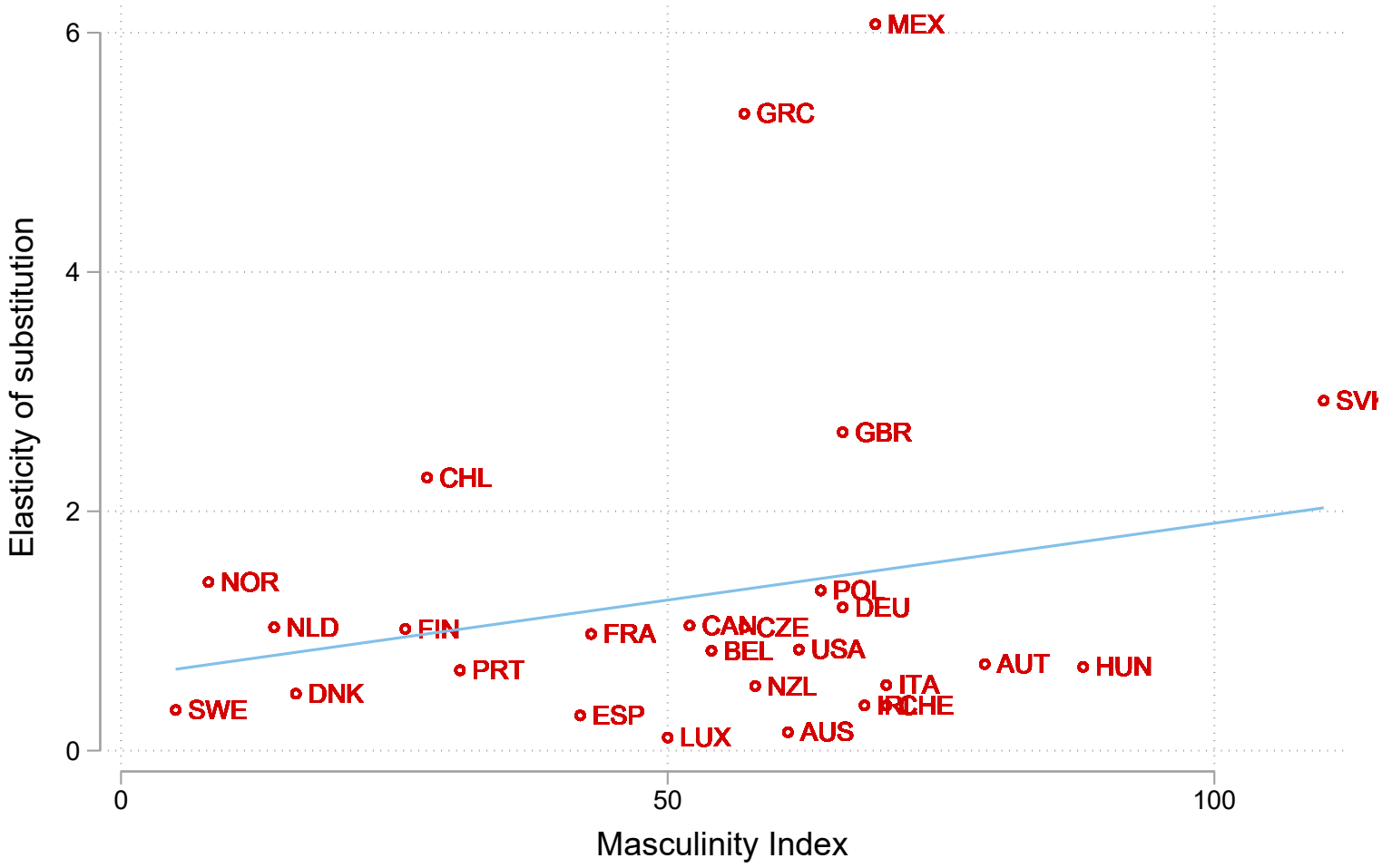


Table: Elasticities of substitution by country

Country	iso3-code	EoS	Country	iso3-code	EoS
Australia	AUS	0.2	Ireland	IRL	0.4
Austria	AUT	0.7	Italy	ITA	1.0
Belgium	BEL	0.8	Luxembourg	LUX	0.1
Canada	CAN	1.0	Mexico	MEX	6.1
Chile	CHL	2.3	Netherlanders	NLD	1.4
Czech Republic	CZE	1.0	Norway	NOR	1.4
Denmark	DNK	0.5	New Zeland	NZL	0.5
Finland	FIN	1.0	Poland	POL	1.3
France	FRA	1.0	Portugal	PRT	0.7
Greece	GRC	5.3	Switzerland	CHE	0.4
Great Britain	GBR	2.7	Slovakia	SVK	2.9
Germany	DEU	1.2	Spain	ESP	0.3
Hungary	HUN	0.7	Sweden	SWE	0.3
			United States	USA	0.8


Elasticity of substitution
6
4
2
0
0
50
100
Masculinity Index
MEX
GRC
SVK
GBR
CHL
NOR
POL
DEU
NLD
FIN
FRA
CAN
CZE
BEL
USA
AUT
HUN
PRT
NZL
ITA
DNK
SWE
ESP
CHE
LUX
AUS

MAS	(1) Total	(2) Manager	(3) Professional	(4) Non-qual
$\hat{\sigma}_{MF}$	0.7	1.2	1.1	4.3
$\hat{\sigma}_{MF} \times \tau_j$	2.8	3.8	3.9	5.9
$\ln \mathrm{MigraS}^{\mathrm{Job}}_{ijt-4M} \times BRDR_{ij}$	0.212***	0.211***	0.147***	0.031
	(0.06)	(0.06)	(0.05)	(0.05)
$\ln \psi^{\mathrm{Job}}_{ijt} \times BRDR_{ij}$	0.628***	0.283***	0.379***	0.134**
	(0.14)	(0.10)	(0.10)	(0.06)
$\ln \psi^{\mathrm{Job}}_{ijt} \times BRDR_{ij} \times \tau_j$	-0.465***	-0.192*	-0.277**	-0.035*
	(0.16)	(0.05)	(0.12)	(0.02)
Observations	6479	6479	6479	6479
CountryxYear FE	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes

PPML, Robust s.e. in (), clustured by CP. Controls: BIT, FTA, BRDBxYear $\ln \mathrm{Migra}_{jit-4}$

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	(1)	(2)	(3)	(4)
	Total	Manager	Professional	Non-qual
$\ln \text{MigraS}^{\text{Job}}_{jt-4} \times BRDR_{ij}$	0.485^{***}	0.529^{***}	0.522^{***}	0.391^{***}
	(0.06)	(0.09)	(0.06)	(0.05)
$\ln \text{MigraS}^{\text{Job}}_{ijt-4} \times BRDR_{ij}$	0.140^{**}	0.161^{***}	0.093^{*}	0.030
	(0.06)	(0.05)	(0.05)	(0.05)
$\ln \text{MigraS}^{\text{Job}}_{j \neq it-4} \times BRDR_{ij}$	0.321^{***}	0.399^{***}	0.345^{***}	0.306^{***}
	(0.06)	(0.09)	(0.07)	(0.05)
Observations	6479	6479	6479	6479
CountryxYear FE	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes

PPML, Robust s.e. in (), clustured by CP. Controls: BIT, FTA, BRDBxYear $\ln \text{Migra}_{jit-4}$

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	(1) Total	(2) Manager	(3) Professional	(4) Non-qual
$\hat{\sigma}_{MFj}$	0.9	0.8	0.8	0.9
$\ln \text{MigraS}^{\text{Job}}_{ijt-4} \times BRDR_{ij}$	0.127*	0.151***	0.310***	0.018
	(0.06)	(0.04)	(0.12)	(0.05)
$\ln \text{MigraS}^{\text{Job}}_{j\neq it-4} \times BRDR_{ij}$	0.284***	0.139	0.094*	0.275***
	(0.07)	(0.11)	(0.05)	(0.05)
$\ln \psi^{\text{Job}}_{jt} \times BRDR_{ij}$	0.484*	0.470**	0.489	0.621***
	(0.26)	(0.20)	(0.35)	(0.21)
Observations	6479	6479	6479	6479
CountryxYear FE	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes

PPML, Robust s.e. in (), clustured by CP. Controls: BIT, FTA, BRDBxYear $\ln \text{Migra}_{jit-4}$

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	(1) Manager	(2) Professional	(3) Skilled
$\hat{\sigma}_{MF}$	3.1	3.4	
$\hat{\sigma}_{S}$			1.4
$\ln \text{MigraS}_{ijt-4M} \times BRDR_{ij}$	0.262^{***}	0.192^{***}	0.597^{***}
	(0.07)	(0.07)	(0.13)
$\ln \text{Share}^{\text{Job}}_{ijt-4M} \times BRDR_{ij}$	0.136^{**}	0.389^{**}	
	(0.06)	(0.17)	
$\ln \psi^{\text{Job}}_{ijt} \times BRDR_{ij}$	0.111^{*}	0.117^{*}	
	(0.05)	(0.06)	
$\ln {}^{\text{Skilled}}/_{\text{No Qual}_{ijt}} \times BRDR_{ij}$			0.472^{***}
			(0.15)
Observations	6479	6479	6479
CountryxYear, CP FE	Yes	Yes	Yes

PPML, Robust s.e. in (), clustured by CP. Controls: BIT, FTA, BRDBxYear $\ln \text{Migra}_{jit-4}$

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Summary

	(1) Total	(2) Manager	(3) Professional	(4) Non-qual
$\hat{\sigma}_{MF}$	1.3 ***	3.2 *	2.1***	6.0**
$\hat{\sigma}_{MF} \times \tau_j = 0$	0.7 ***	1.2**	1.1***	4.3**
$\hat{\sigma}_{MF} \times \tau_j = 1$	2.8 ***	3.8 **	3.9 **	5.9**
$\hat{\sigma}_{MFj}$	0.9*	0.8**	0.8	0.9***

- Robustness: GII | No border | Years

Take-aways

1. We develop a new way to estimate elasticity of substitution without wage data.
   1. Aggregation bias
   2. Discrimination / gender gap bias
2. We provide comparable cross-country estimates of EoS
   1. calibration
   2. Additional insights on EoS
3. Information-independent, labor-related channel behind the effect of migration and FDI using country-specific migration.
4. Policies: Gender equality policies in discriminating countries will be very effective at reducing the gender gap,
   1. but with *less* effect on economic output (e.g., FDI).
   2. However, we expect frictions from the *high* number of incumbent men that are substituted.

Related literature

STUDY	COUNTRY / PERIOD	MAIN RESULTS
Kugler and Rapoport (2007)	United States 1990 and 2000	Higher unskilled emigration in 1990 is associated with higher growth of total FDI inflows over the following decade.
Docquier and Lodigiani (2010)	Cross section 114 countries. Panel data/ 83 countries	Strong network externalities mainly associated with the skilled diaspora
Ivlevs and De Melo (2010)	1990-2000 103 migration-sending countries	If exports are low skill intensive, emigration of high-skilled labour leads to positive FDI
Flisi and Murat (2011)	Immigrant networks for France, Germany, UK, Italy and Spain	Skilled immigrants increase bilateral FDI in UK, France and Germany. In Italy and Spain, FDI is influenced by their emigrant diaspora network. Negative impact for unskilled migrants: substitution effect between low-skilled immigration and investment abroad
Javorcik et al. (2011)	United States 1990 and 2000	Outward FDI (stock) positively related with the presence of migrants in US (stock). Stronger effect for the share of tertiary educated migrants
Leblang (2011)	26 OECD reporting countries and 120 destination countries 2000 and 2001	Migrant networks encourage cross-border investments (FDI and portfolio). The effect on FDI is substantially larger. Stronger for migrants with tertiary education
Foad (2012)	50 US states, 10 source countries 1990 and 2000 for immigration	Presence of immigrants leads to new FDI from immigrants' native countries. This effect is stronger for skilled migrants and might take a few years to occur
Gheasi et al. (2013)	United Kingdom 2001-2007	FDI abroad positively related with the presence of migrants. More educated migrants have a higher positive effect on FDI.
Tomohara (2017b)	Japan 1996-2011	FDI inflows become more dominant compared to imports when skilled immigration flows increase and less dominant when unskilled immigration flows increase
Tomohara (2017a)	Japan 1996-2011	Contemporaneous negative relationship between low-skilled migration and FDI
Cuadros et al. (2019)	OECD 2004-2008	Positive effect of migrant managers

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No border	(1) Total	(2) Manager	(3) Professional	(4) Non-qual
$\hat{\sigma}_{MF}$	2.3	3.2	3.0	18.6
$\ln \text{MigraS}_{jit-4}$	0.024	0.024	0.043	0.067
	(0.05)	(0.04)	(0.05)	(0.05)
$\ln \text{MigraS}^{\text{Job}}_{ijt-4M}$	0.210***	0.171***	0.135**	0.015
	(0.06)	(0.04)	(0.05)	(0.05)
$\ln \psi^{\text{Job}}_{ijt}$	0.194**	0.111**	0.134**	0.031
	(0.08)	(0.05)	(0.06)	(0.05)
Observations	6479	6479	6479	6479
CountryxYear FE	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes

PPML, Robust s.e. in (), clustured by CP. Controls: BIT, FTA, BRDBxYear

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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GII	(1) Total	(2) Manager	(3) Professional	(4) Non-qual
$\hat{\sigma}_{MF}$	0.5	5.2	2.1	6.1
$\hat{\sigma}_{MF} \times \tau_j$	1.8	6.8	2.2	6.0
$\ln \text{MigraS}^{\text{Job}}_{ijt-4M} \times BRDR_{ij}$	0.208***	0.146***	0.147***	0.037
	(0.06)	(0.04)	(0.05)	(0.05)
$\ln \psi^{\text{Job}}_{ijt} \times BRDR_{ij}$	0.830***	0.067	0.194*	0.096*
	(0.23)	(0.07)	(0.10)	(0.06)
$\ln \psi^{\text{Job}}_{ijt} \times BRDR_{ij} \times \tau_j$	-0.574**	-0.015	-0.011	0.000
	(0.24)	(0.09)	(0.11)	(0.02)
Observations	6479	6479	6479	6479
CountryxYear, CP FE	Yes	Yes	Yes	Yes
BRDRxYear	Yes	Yes	Yes	Yes

PPML, Robust s.e. in (), clustured by CP. Controls: BIT, FTA, BRDBxYear $\ln \text{Migra}_{jit-4}$

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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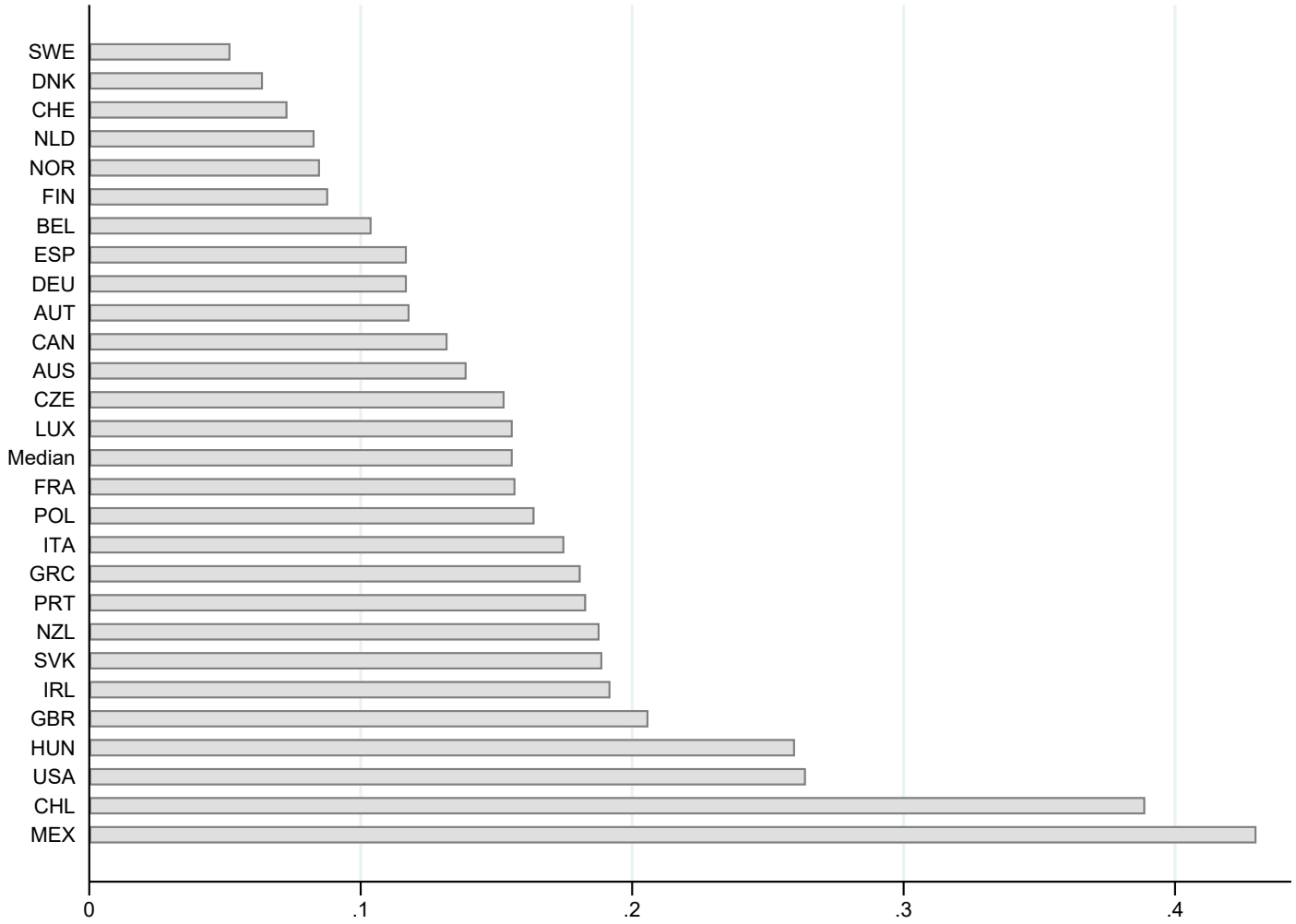
Figure: United Nations Development Programme Gender Inequality Index (GII) in 2005



EoS per country, GII

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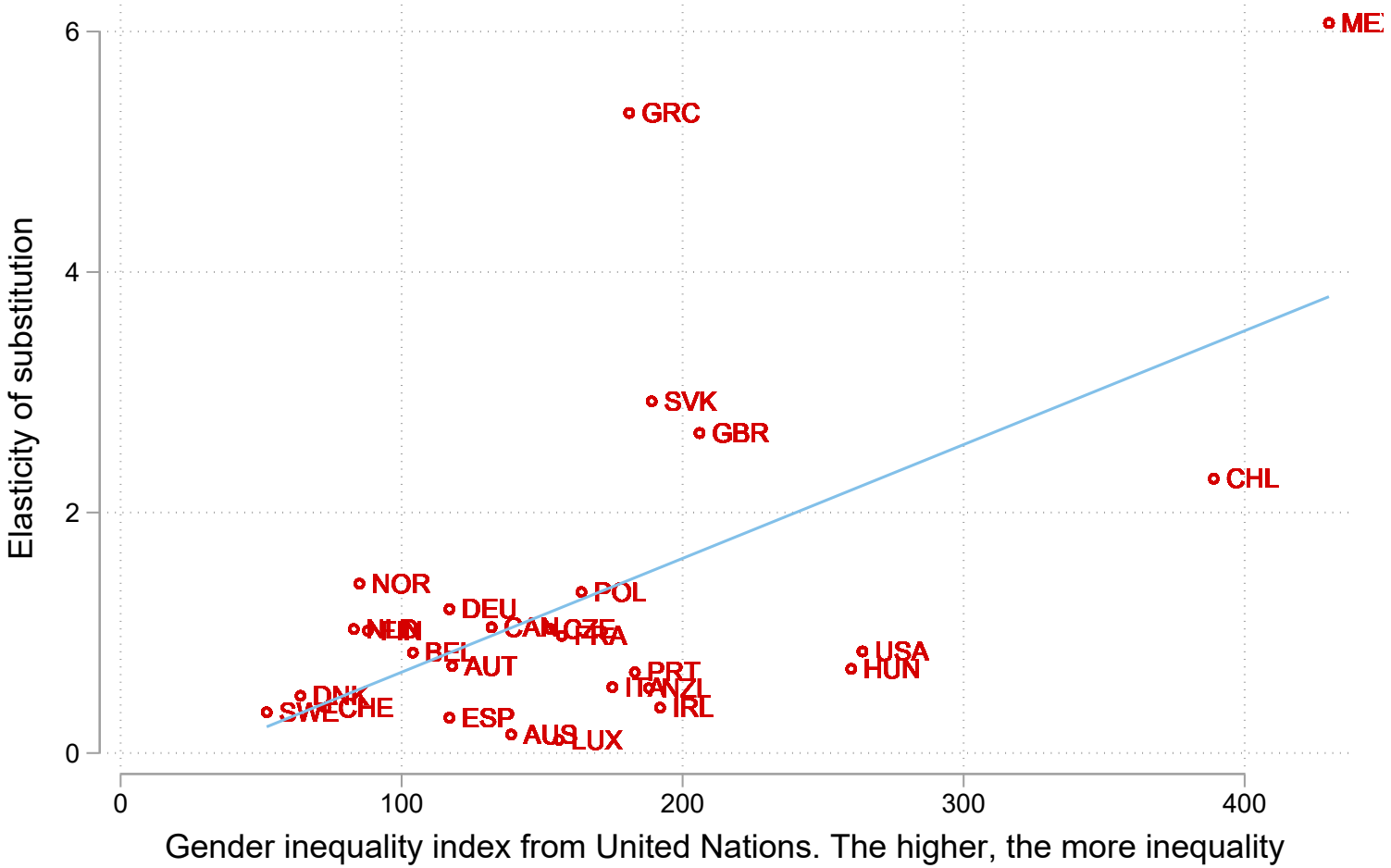

Yearly variation in EoS

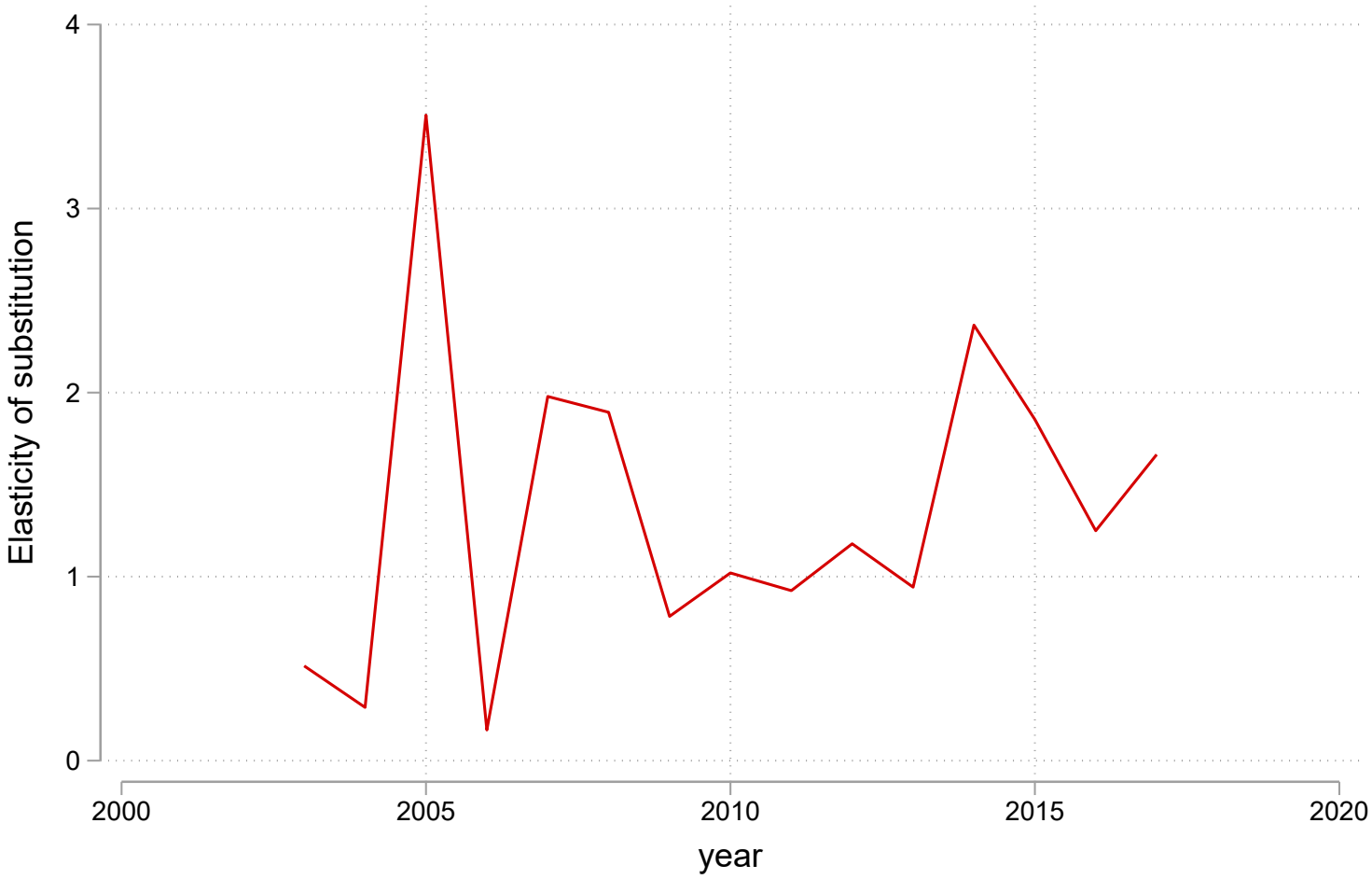

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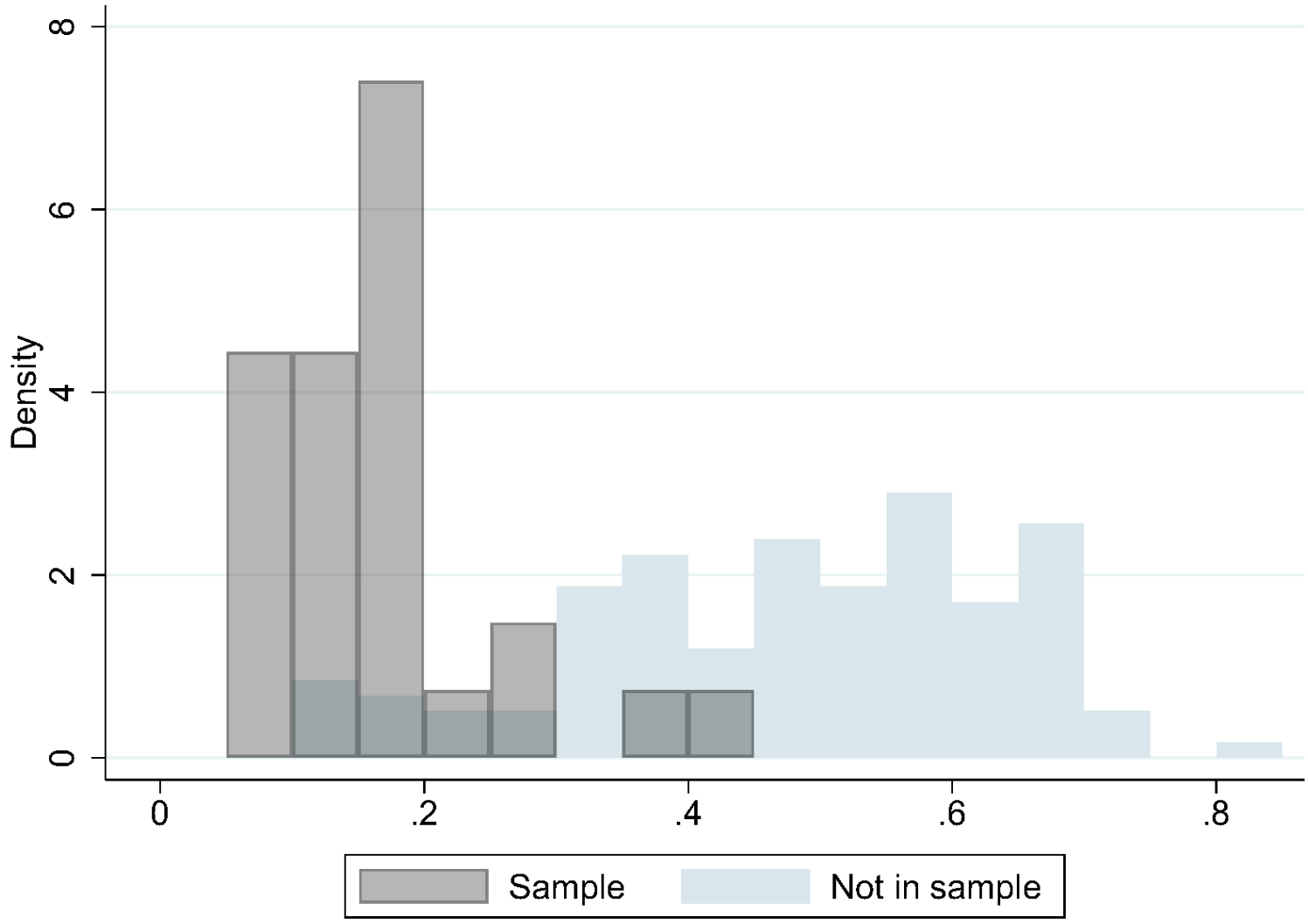
Figure: Country coverage



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Demand

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The economy is assumed to consist of J countries, with a Cobb-Douglas utility function for a representative consumer in country j given by $U_j = X_{NTj}^{\mu} X_{Tj}^{1-\mu}$. The economy is divided into two sectors: non-traded (NT) and traded (T) goods. The parameter μ represents the share of total spending R_j in each industry, composed of a continuum of differentiated products. The aggregate consumption in the traded sector is the sum of all goods produced. The term X_{Tj} is a standard constant elasticity of substitution (CES) aggregator across the continuum of products (I): $X_j = [\int x_j(n)^{\iota} dn]^{1/\iota}$, where $\sigma \equiv (1-\iota)^{-1} > 1$ is the elasticity of substitution between any two products. The demand for the variety n is maximized by the following equation:

$$x_j(n) = \frac{p_j^{-\sigma} Y_j}{P_j^{1-\sigma}}, \tag{6}$$

where $Y_j \equiv (1-\mu)R_j$ represents the income of the representative consumer, p_j is the price of the good, P_j is the price index in the traded sector, and R_j is the total spending in each industry, which consists of a continuum of differentiated products.

Firm's problem

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We start by deriving the first-order conditions of the firm's problem:

$$\max_{S,K,L} \pi_j = \max\{p_j S^s K^k L^l - \alpha(w_{ij} S + r_j K + w_j L) - f_j\}.$$

Which are:

$$\frac{\partial \pi_j}{\partial S} = s p_j S^{s-1} K^k L^l = \alpha w_{ij} \tag{7}$$

$$\frac{\partial \pi_j}{\partial K} = k p_j S^s K^{k-1} L^l = \alpha r_j \tag{8}$$

$$\frac{\partial \pi_j}{\partial L} = l p_j S^s K^k L^{l-1} = \alpha w_j \tag{9}$$

Domestic capital

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For domestic firms $s = 0$ and $\alpha = \alpha^*$ awe obtain an expression for domestic capital:

$$K_j = \left(\frac{p_j}{\alpha^*} (k/r_j)^{1-l} (l/w_j)^l \right)^{\frac{1}{1-l-k}}. \tag{10}$$

solving for prices:

$$p_{ij} = \frac{\tau_{ij}^{-1} Y_j^{1/\sigma}}{P_j^{(1-\sigma)/\sigma} (S^s K^k L^l)^{1/\sigma}} \tag{11}$$

we obtain:

$$K_j = \left(\frac{\tau_{jj}^{-1} Y_j^{1/\sigma}}{P_j^{(1-\sigma)/\sigma} (\frac{l r_j}{k w_j})^{l/\sigma}} \frac{1}{\alpha^*} (k/r_j)^{1-l} (l/w_j)^l \right)^{\frac{\zeta}{1-l-k}}. \tag{12}$$