A gendered assessment of the brain drain

Frédéric Docquier, Abdeslam Marfouk & B Lindsay Lowell

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1. **Introduction - background and motivation**
2. Stocks - absolute measure
3. Rates - relative measure
4. Summary and extensions

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- New data sets available after 1998 (based on a general and broad definition of the brain drain: post-secondary educated emigrants as % of post-secondary educated natives)
- Strong need to improve their quality and to extend their coverage (structure of the BD, time series, host countries)

I.b. Introduction - Existing data sets

Carrington-Detragiache (1998-99)

- Source data: OECD immigration data (under-reporting problem) + US Census data on education structure (transposition problem)
- Aggregate emigration stocks over destinations and compare the total skilled emigration stock to the total number of skilled natives (Barro-Lee)
- Brain drain rates for 60 countries in 1990

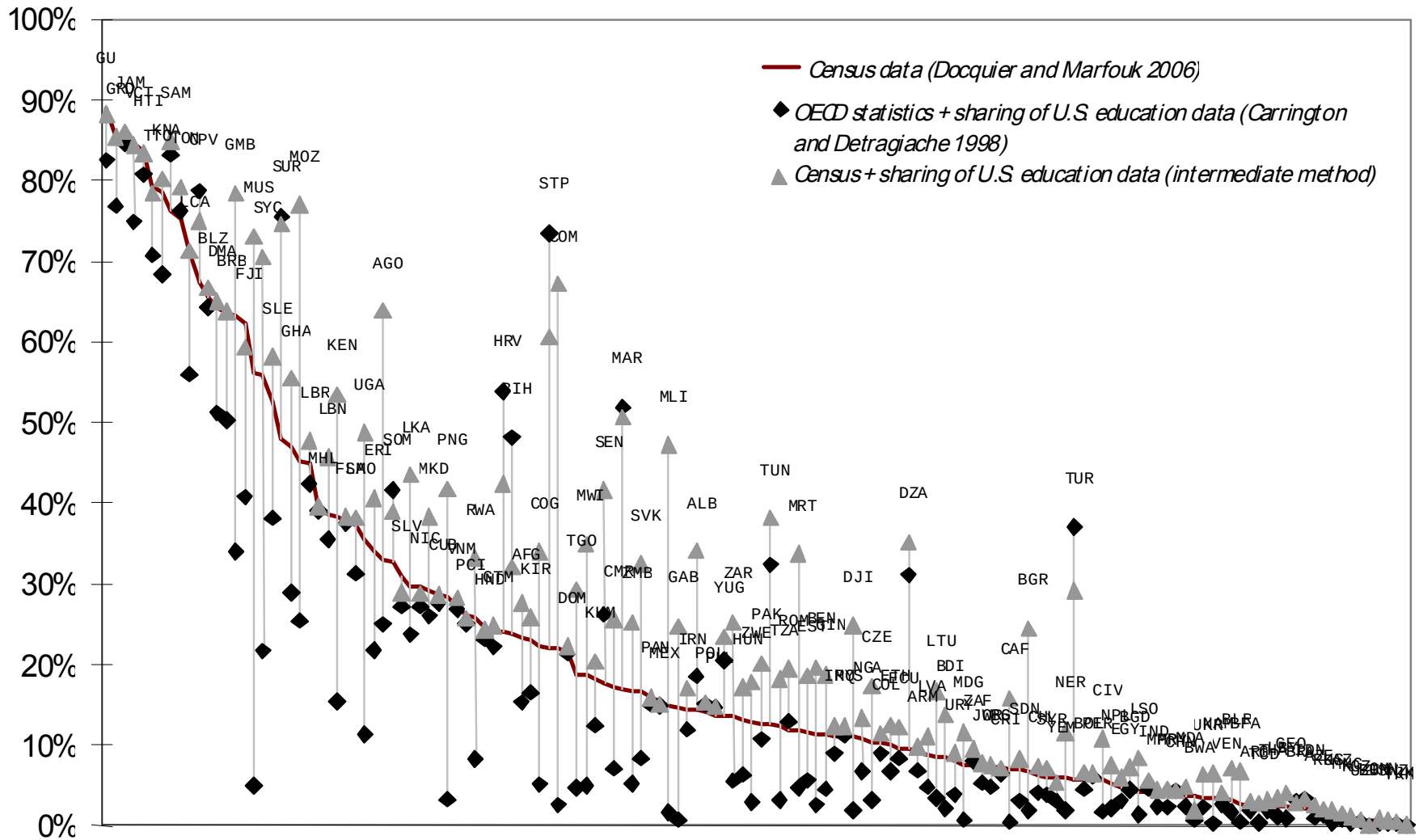
I.b. Introduction - Existing data sets

Docquier-Marfouk (2006) "generalization"

- Source data: immigration data by education level and CoB from all OECD countries
- Same methodology (combining different sources on human capital)
- Brain drain rates for 175/195 countries in 1990/2000

I.b. Introduction - Existing data sets

Comparison - CD versus DM



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- Brain drain and Institutions: McHale and Lee (Mimeo, 2005)

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- Data sets are publicly available at:
  http://www.ires.ucl.ac.be/CSSSP/home_pa_pers/Docquier/oxlight.htm

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- United Nations data: the share of women in international migration increased from 46.8 to 49.6 between 1960 and 2005
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- Traditional demand-side explanations: rising demand for women in health care and other services, family reunion programs

I.f. Introduction - The gender dimension (issues at stake)

- Women's human capital as a fundamental ingredient for growth: women's education complements children investment, quality-quantity tradeoff, greater command of resources (*Societies that have a preference for not investing in girls or that loose a high proportion of skilled women through emigration may experience slower growth and reduced income*)

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- Specific consequences: remittances, economic activities at origin
- Specific determinants (response to push/pull factors): social networks more important

I.g. Introduction - Purpose

- Use new sources, update DM06, homogenize 1990 and 2000 data
- Introduce gender breakdown
- Descriptive analysis of women's brain drain between 1990 and 2000

1. Introduction - background and motivation
2. **Stocks - absolute measure**
3. Rates - relative measure
4. Conclusion

II.a. Stocks - General methodology

- Collection of Census/Register data on $M^{i,j}_{t,g,s}$ = stock of immigrants 25+ born in i, of gender g, skill s living in country j at the census year t.
- Estimates are used for a small subset of countries (labor force survey, household survey, use of regional educational shares); samples used for some destination countries

Table 1. Data sources

Receiving country	Definition	1990	2000
Australia	Foreign Born	Australian Bureau of Statistics	Australian Bureau of Statistics
Austria	Foreign Born	Statistik Austria	Statistik Austria
Belgium	Foreign Born	Institut National de Statistiques	Institut National de Statistiques
Canada	Foreign Born	Statistics Canada	Statistics Canada
Czech Rep	Foreign Born	Estimates (a,c)	Czech Statistical Office
Denmark	Foreign Born	Statistics Denmark	Statistics Denmark
Finland	Foreign Born	Statistics Finland	Statistics Finland
France	Foreign Born	INSEE	INSEE
Germany	Foreign citizens	Microsensus + Federal Statistical Office	Microsensus + Federal Statistical Office
Greece	Foreign Born	Estimates (a,c)	National Statistical Service of Greece
Hungary	Foreign citizens	Estimates (a,c)	IPUMS-International
Iceland	Foreign Born	Statistics Iceland + Estimates	Statistics Iceland + Estimates (c)
Ireland	Foreign Born	Central Statistics Office Ireland	Central Statistics Office Ireland
Italy	Foreign citizens	Estimates (a,c)	Istituto Nazionale di Statistica
Japan	Foreign citizens	Estimates (b,c)	Statistics Japan + Estimates (c)
Korea	Foreign citizens	Estimates (b,c)	Statistics Korea + Estimates (c)
Luxemburg	Foreign Born	STATEC Luxemburg	STATEC Luxemburg
Mexico	Foreign Born	IPUMS-International	IPUMS-International
Netherland	Foreign Born	Statistics Netherlands + Estimates (c)	Statistics Netherlands + Estimates (c)
New Zealand	Foreign Born	Statistics New Zealand	Statistics New Zealand
Norway	Foreign Born	Statistics Norway	Statistics Norway
Poland	Foreign Born	Estimates (a,c)	Poland Statistics
Portugal	Foreign Born	Instituto Nacional de Estatistica	Instituto Nacional de Estatistica
Slovak Rep	Foreign Born	Statistical Office of the Slovak Republic	Statistical Office of the Slovak Republic
Spain	Foreign Born	Estimates (b,c)	IPUMS-International
Sweden	Foreign Born	Statistics Sweden	Statistics Sweden
Switzerland	Foreign Born	Swiss Statistics	Swiss Statistics
Turkey	Foreign Born	Turkish Statistical Institute	Turkish Statistical Institute
United Kingdom	Foreign Born	Office for National Statistics	Office for National Statistics
United States	Foreign Born	Bureau of Census + IPUMS	Bureau of Census + IPUMS

(a) Immigration stocks are estimated using the SOPEMI data set by country of citizenship (adjusted to match foreign-born definition)

(b) Immigration stocks are estimated using the United Nations Population Division data set

(c) Education levels are estimated using household survey and/or the average changes observed in other OECD countries

II.b. Stocks - Specific methodological choices

- 195 origin countries in 1990 and 2000
- 30 OECD destination countries in 1990 and 2000 (5,850 bilateral obs per year)
- Excluding students by considering population aged 25+ (no data by age of entry)
- When available, "foreign born" concept
- Distinguish Upper-Secondary, less than Up-Sec, post-secondary

II.b. Stocks - Women's share in OECD

Aggregation of these numbers over origin countries $i \Longrightarrow$ stock of immigrants in country j: $M^{\cdot j}_{t,g,s} = \sum_i M^{i,j}_{t,g,s}$.

- Average share of women in the total//skilled stock = 50.9 // 49.3 percent in 2000
- Bilateral share in total immigrants (ranges from 41.8 to 59.8 percent in 2000)
- Bilateral share in skilled immigrants (ranges from 39.8 to 56.4 percent in 2000)
- Average share of women in the total//skilled stock = 50.6 // 46.7 percent in 1990

Figure 1.1. Women's share in total immigration

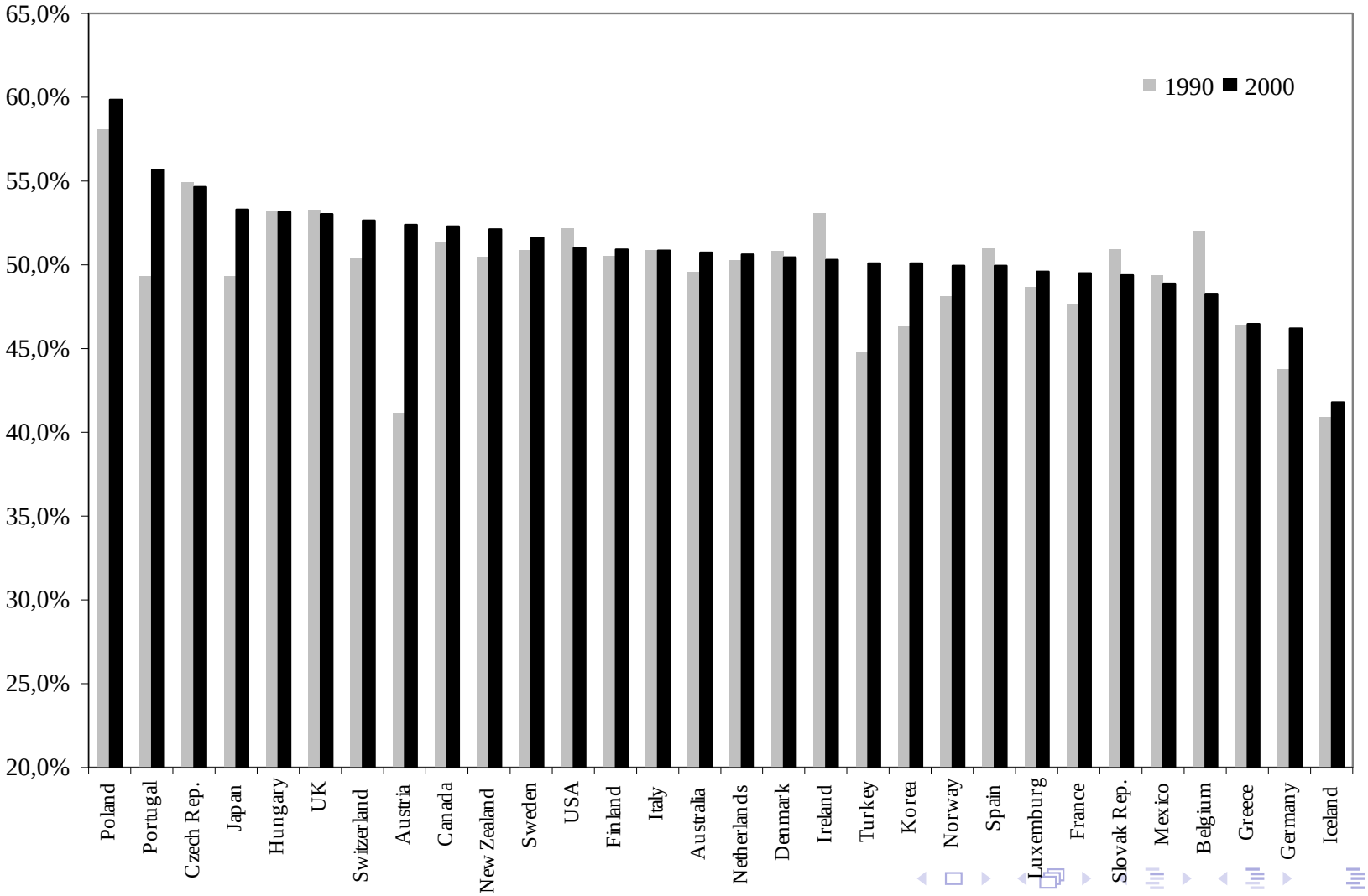
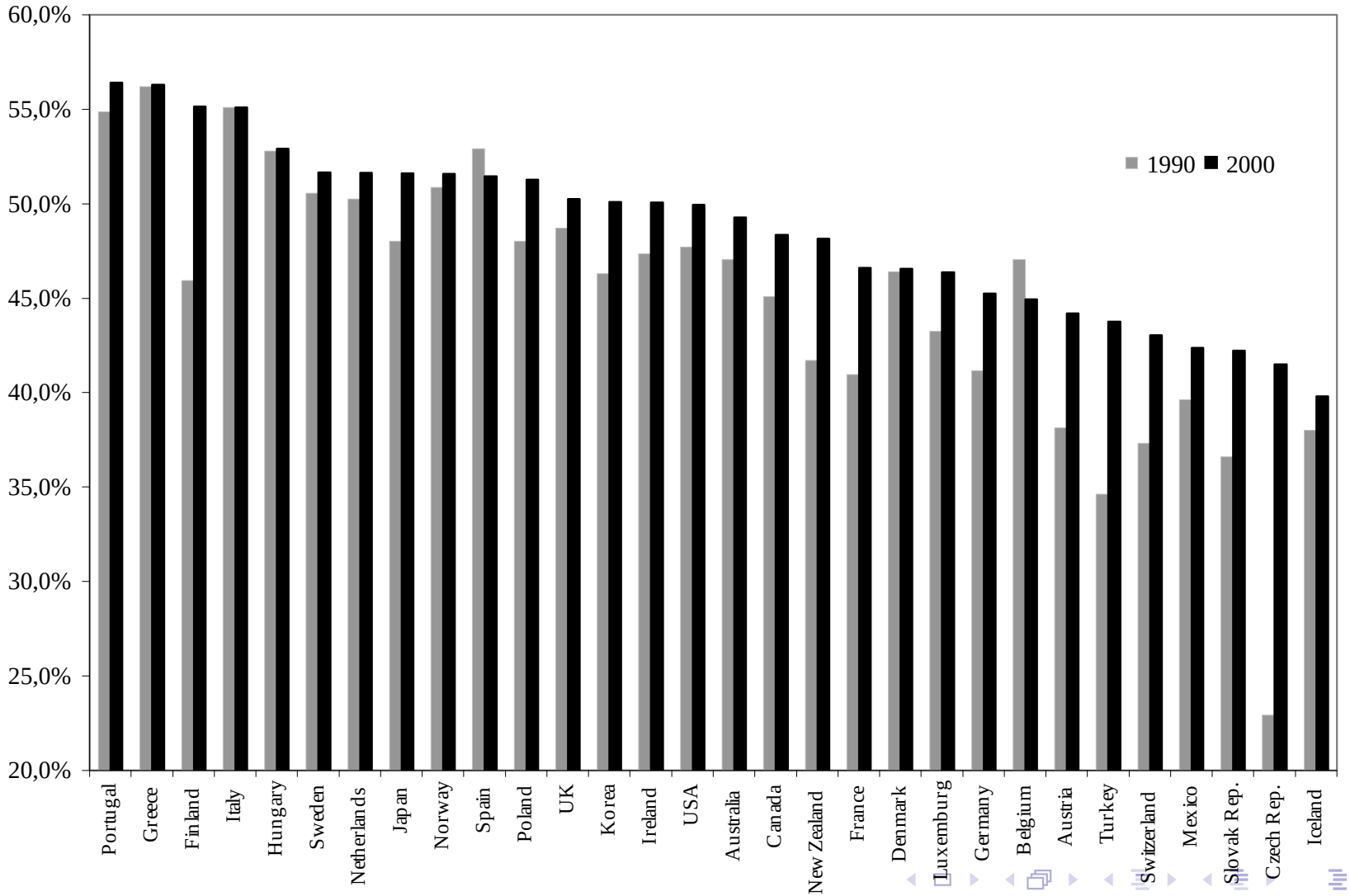


Figure 1.2. Women's share in skilled immigration



II.d. Stocks - Emigration stocks by education/gender

- What are the losses for origin countries?
- Aggregation of $M^{i,j}_{t,g,s}$ over destinations $j \Longrightarrow$ stock of emigrants from country i: $M^{i,\cdot}_{t,g,s} = \sum_j M^{i,j}_{t,g,s}$.
- Results by region and groups of particular interest

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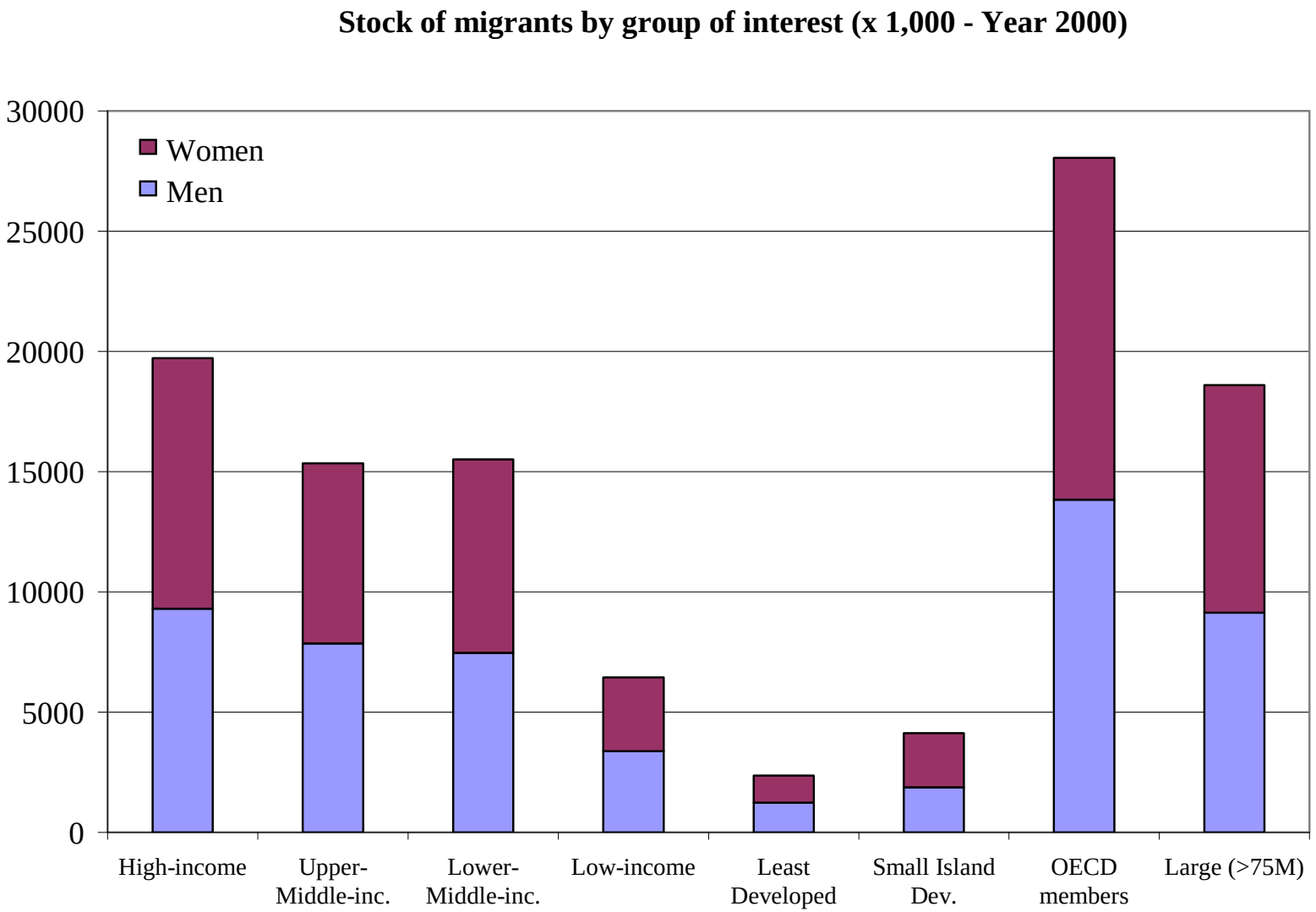

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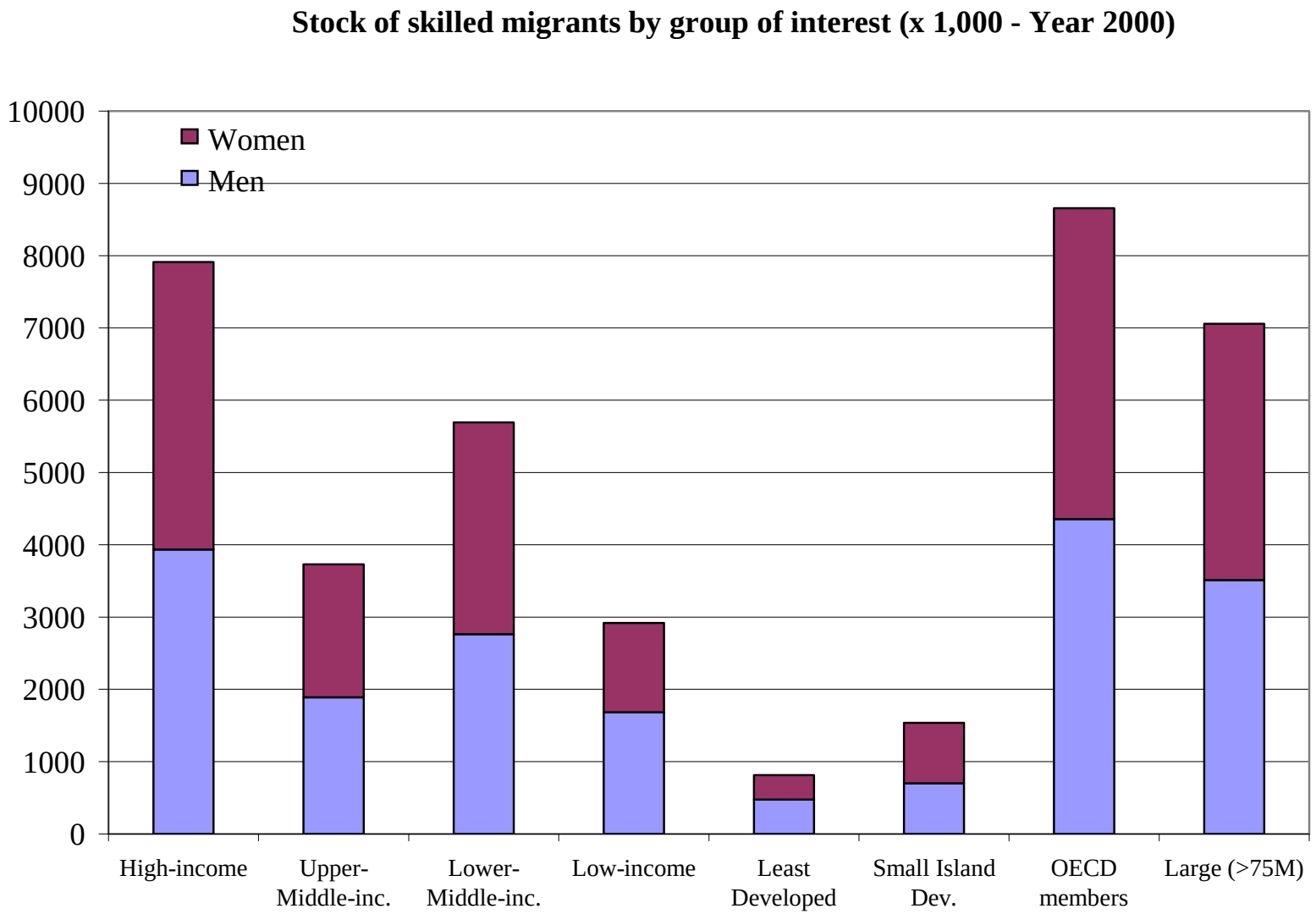

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Annual growh rate of skilled migrants by group of interest (1990-2000)

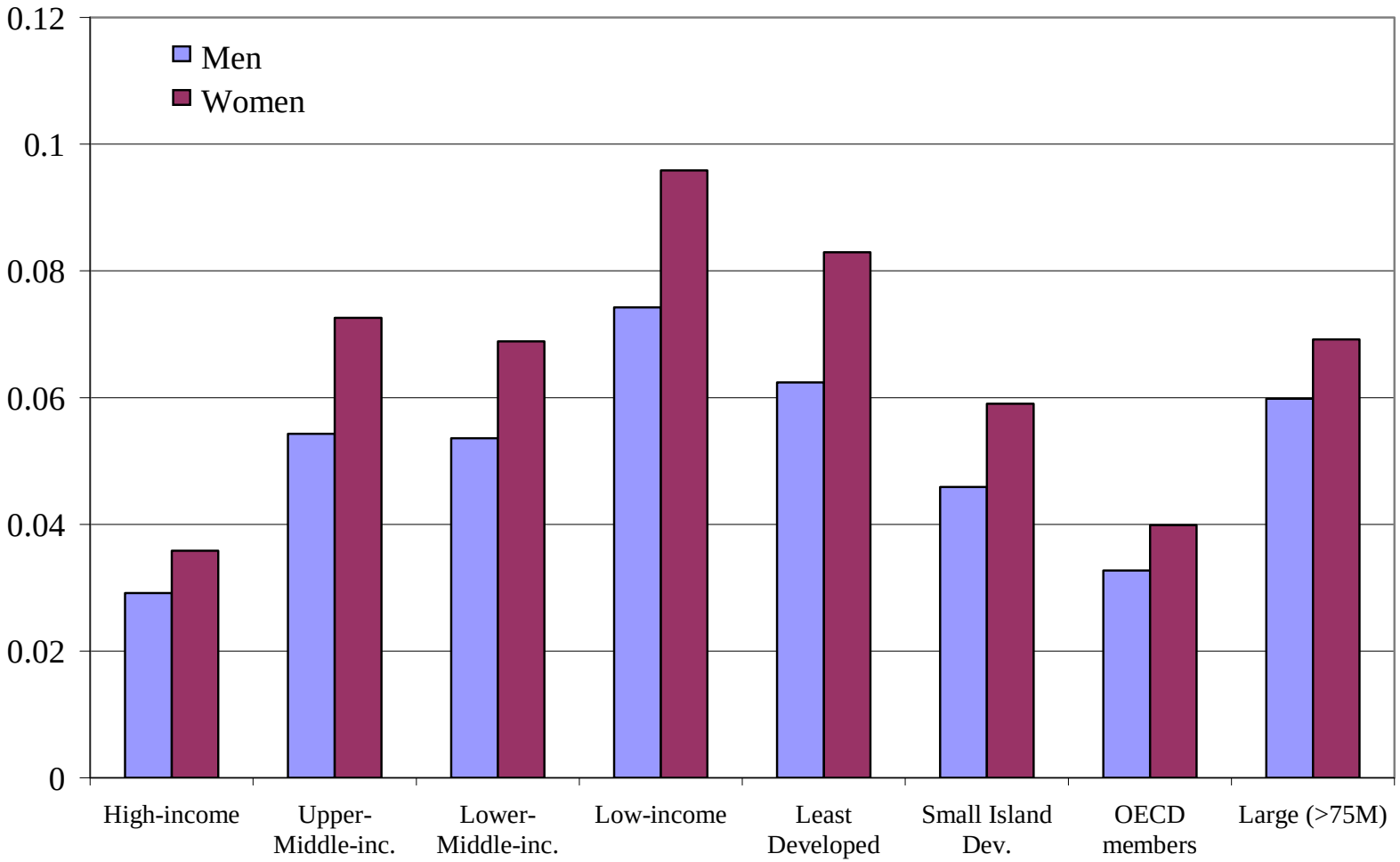

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Figure 2. Annual average growth rates of total/skilled stock of emigrants
Data by region (1990-2000)

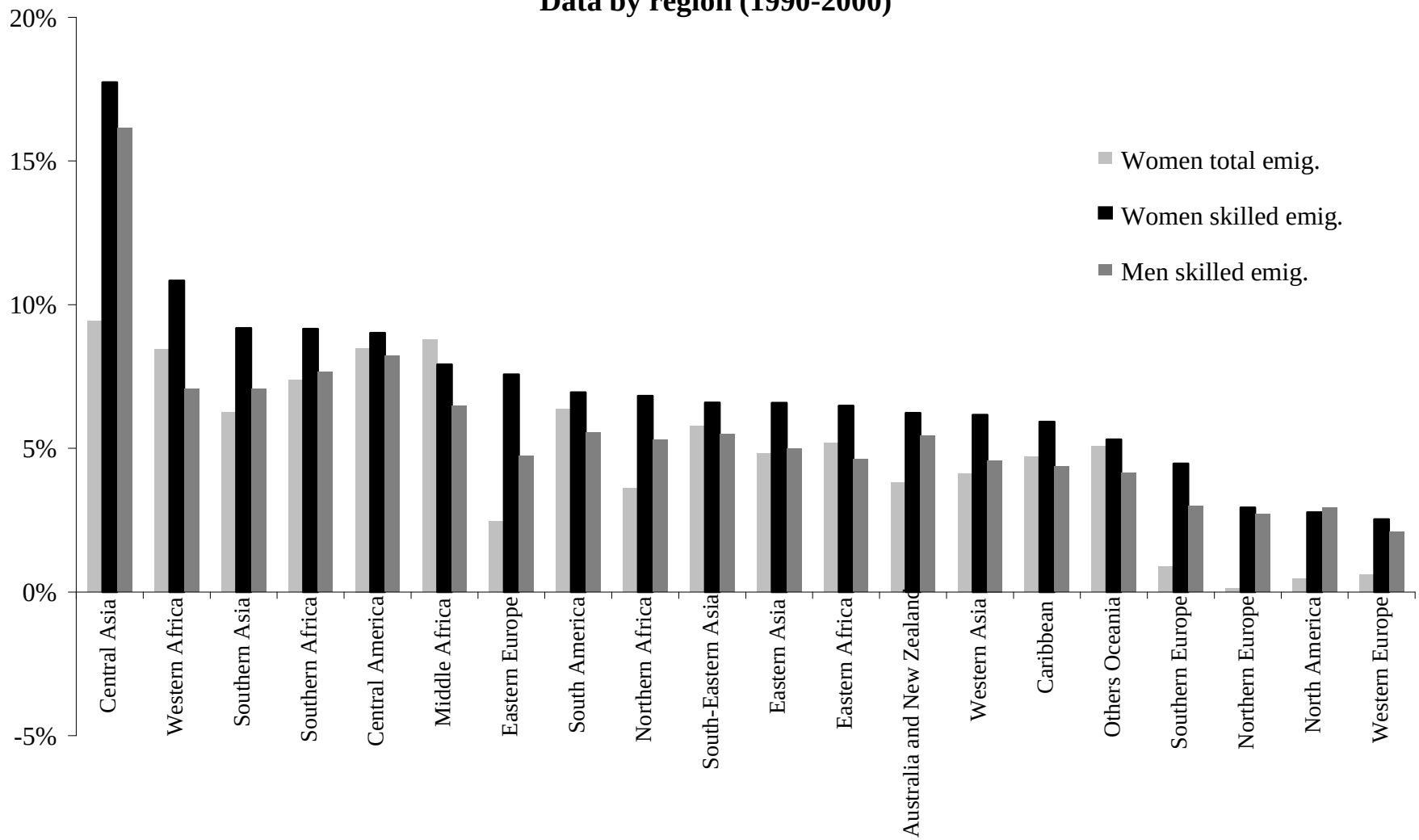
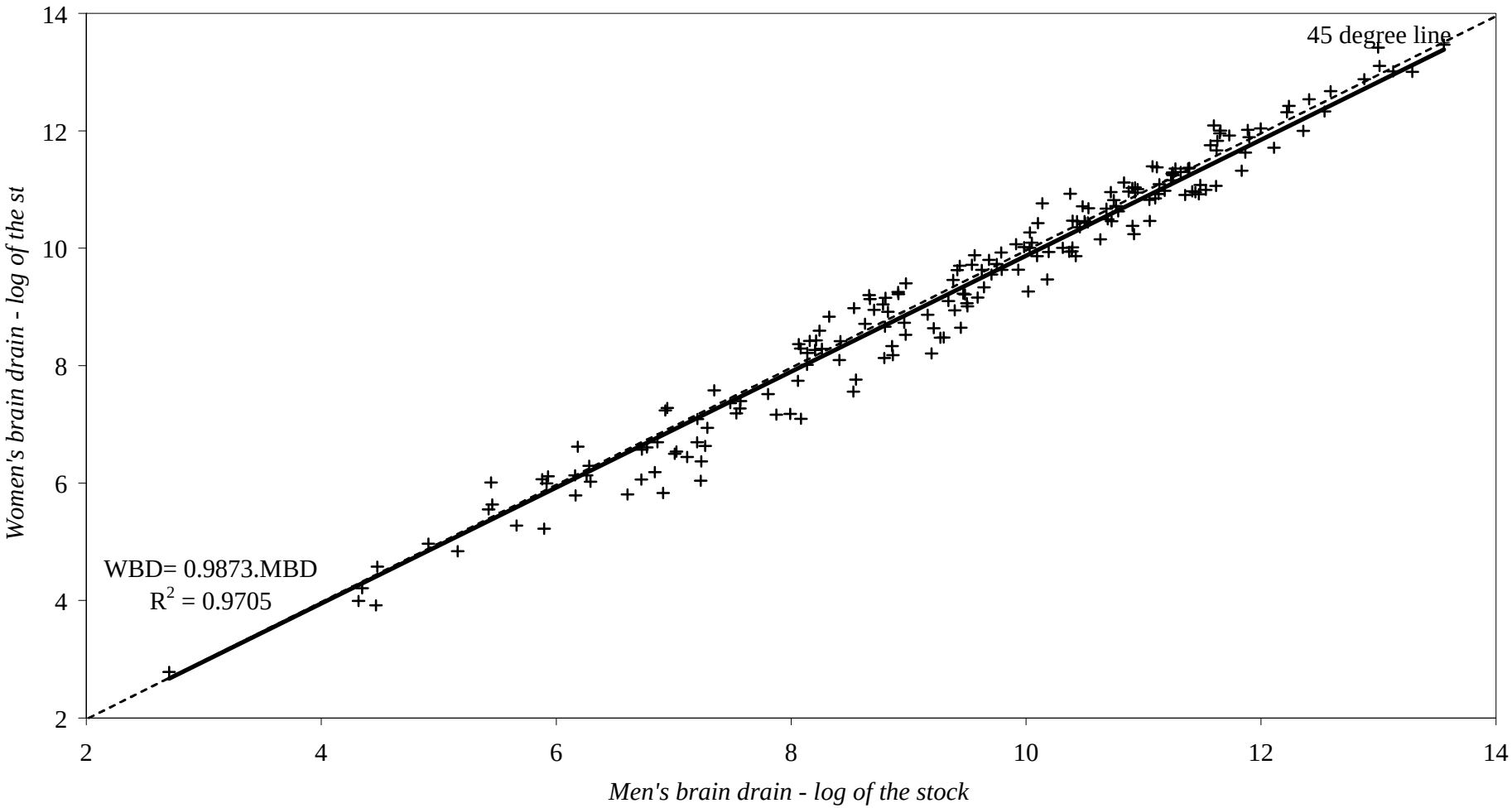


Table 3. Top-30 total and skilled emigration stocks in 2000

Total migration					Skilled				
Country	**Both**	**Men**	**Women**	**Fem%**	**Country**	**Both**	**Men**	**Women**	**Fem%**
Mexico	6434391	3518573	2915818	45,3%	United Kingdom	1478477	771923	706553	47,8%
United Kingdom	2990352	1443664	1546688	51,7%	Philippines	1111075	441227	669848	60,3%
Italy	2336966	1242585	1094381	46,8%	India	1034373	590412	443960	42,9%
Germany	2299491	978663	1320828	57,4%	Mexico	949334	501324	448010	47,2%
Turkey	1942452	1055113	887339	45,7%	Germany	936523	446085	490438	52,4%
India	1695646	896624	799022	47,1%	China	783369	391455	391914	50,0%
Philippines	1677762	634329	1043434	62,2%	Korea	612939	294123	318816	52,0%
China	1675535	787353	888182	53,0%	Canada	523463	244693	278770	53,3%
Vietnam	1261395	622004	639391	50,7%	Vietnam	505503	279239	226264	44,8%
Portugal	1209175	619630	589545	48,8%	Poland	454560	206348	248213	54,6%
Korea	1205118	523637	681480	56,5%	United States	426103	202872	223231	52,4%
Poland	1122078	492106	629972	56,1%	Italy	395233	232840	162393	41,1%
Morocco	1067016	616834	450182	42,2%	Cuba	331908	162359	169549	51,1%
Cuba	871708	417785	453923	52,1%	France	310754	145310	165444	53,2%
Canada	853941	374095	479846	56,2%	Iran	303385	181744	121642	40,1%
France	796016	357298	438717	55,1%	China, Hong Kong SAR	292575	146980	145595	49,8%
Ukraine	747673	308590	439083	58,7%	Jamaica	286932	108865	178068	62,1%
Greece	713826	381491	332335	46,6%	Japan	278272	115096	163176	58,6%
Spain	710653	336202	374451	52,7%	Taiwan	274168	124078	150089	54,7%
Serbia and Montenegro	683512	358190	325322	47,6%	Russia	270445	114504	155940	57,7%
Jamaica	681075	293053	388022	57,0%	Netherlands	254734	142438	112296	44,1%
Ireland	680459	312741	367719	54,0%	Ukraine	249015	112195	136821	54,9%
United States	679598	322456	357141	52,6%	Colombia	233073	105745	127328	54,6%
El Salvador	664942	328652	336290	50,6%	Ireland	228144	111497	116646	51,1%
Algeria	609099	357386	251713	41,3%	Pakistan	220591	138144	82447	37,4%
Pakistan	581903	329264	252638	43,4%	New Zealand	174872	88391	86481	49,5%
Dominican Republic	578987	245058	333930	57,7%	Turkey	174689	110977	63712	36,5%
Colombia	574924	240415	334509	58,2%	South Africa	173021	87561	85461	49,4%
Netherlands	570984	293226	277758	48,6%	Peru	163931	78561	85371	52,1%
Russia	552731	224711	328019	59,3%	Romania	162904	82107	80797	49,6%

II.d. Stocks - correlation by gender

Figure 4.1. Comparison between women's and men's brain drain in 2000 - Stocks



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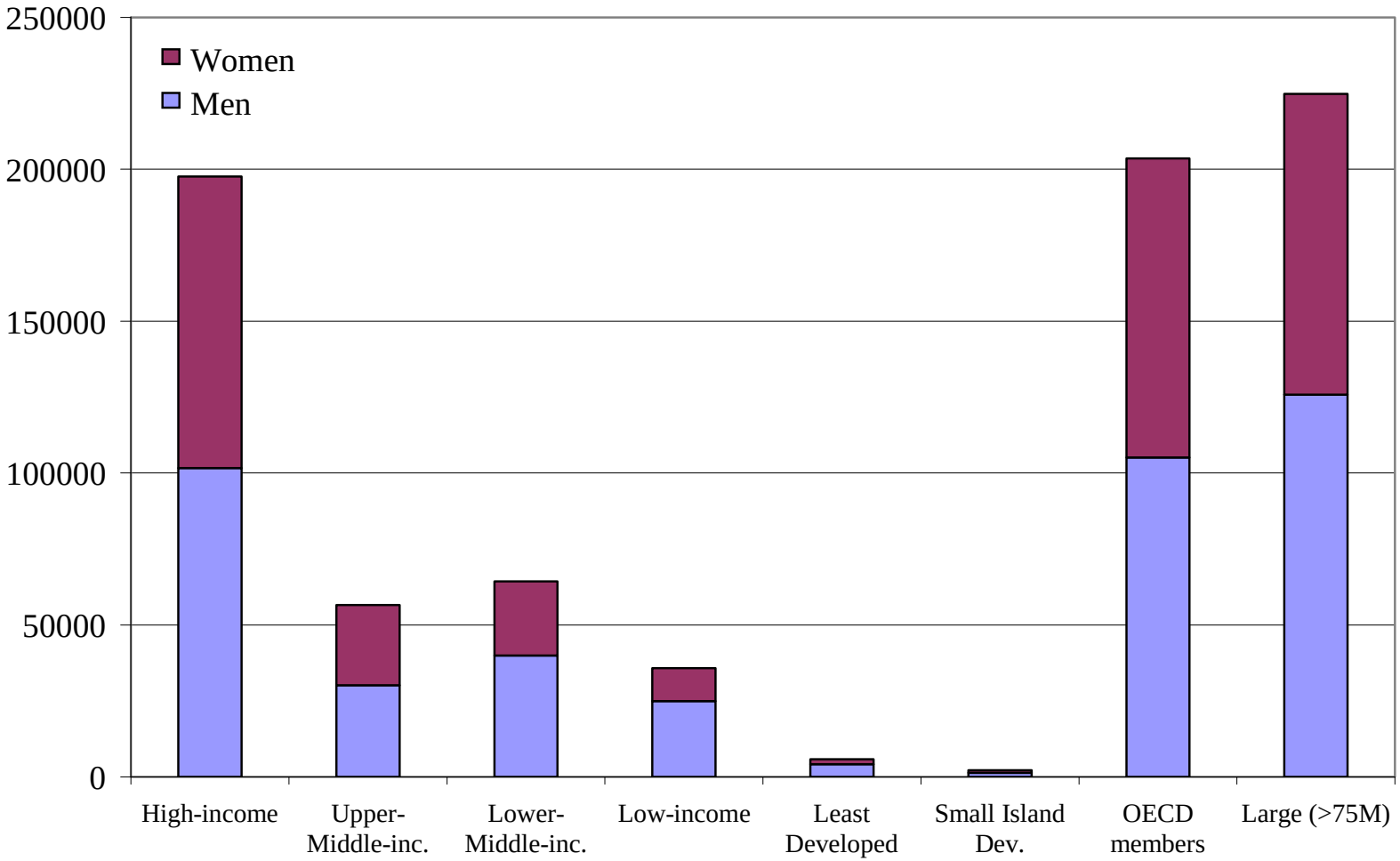
2. Stocks - absolute measure
3. **Rates - relative measure**
4. Conclusion

III.a. Rates - Methodology

- Purpose: relative measure of the brain drain intensity (in proportion of the skilled native population): $m^i_{t,g,s} = \frac{M^{.i}_{t,g,s}}{N^i_{t,g,s}+M^{.i}_{t,g,s}}$
- Gender-disaggregated population 25+ data: United Nations
- Gender-disaggregated human capital indicators: Barro-Lee, Cohen-Soto, De la Fuente-Domenech + Assumptions (transpose the skill sharing/gender gap of the neighboring country with the closest enrolment rate/gap in secondary/tertiary education or the closed GDP per capita)

III.b. Human Capital - Data by gender

Skilled resident labor force by group of interest (x 1,000 - Year 2000)



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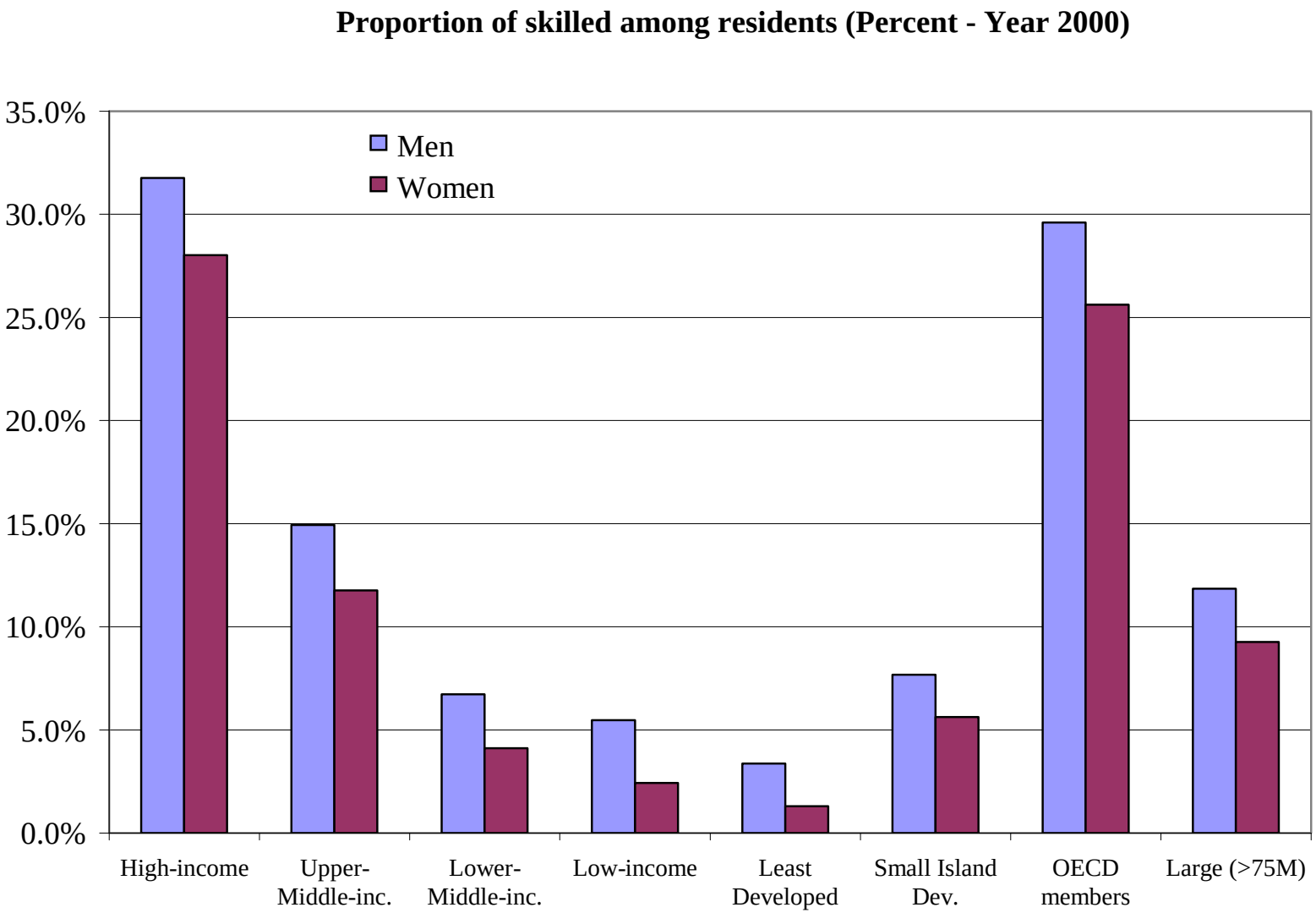

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Growth rate of the skilled resident labor force by group of interest (1990-2000)

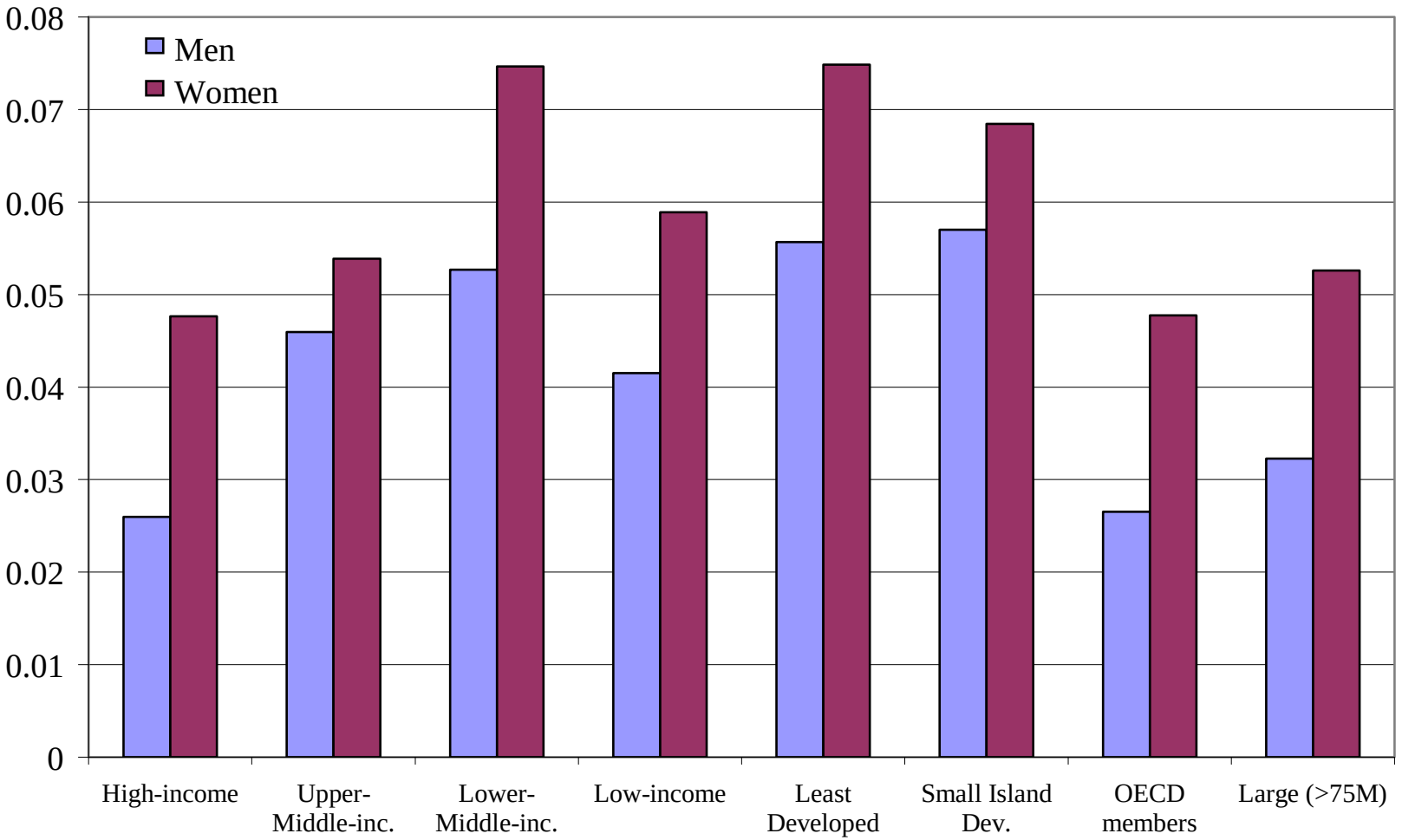

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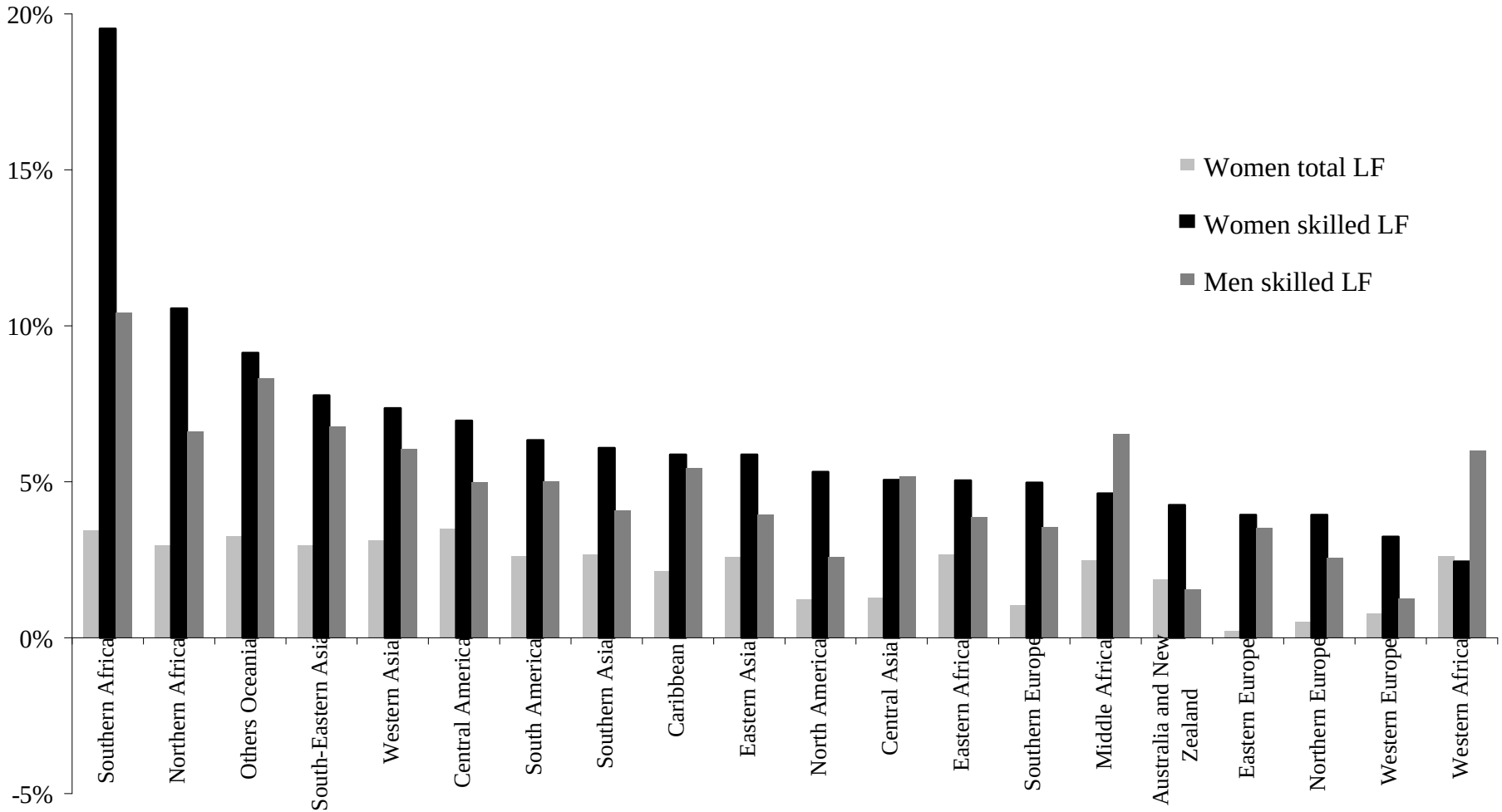
Figure 3. Annual average growth rates of total/skilled labor force
Data by region (1990-2000)



III.c. Rates - Emigration rates by education/gender

- Updated skilled migration rates (both sexes) strongly correlated with DM06 (94%)
- Brain drain is strong in small countries (more opened), in poor countries with low human capital (supply effect)

- Unskilled and skilled emigration rates: different patterns (stronger unskilled em. rates from rich countries, stonger skilled em. rates from poor countries)

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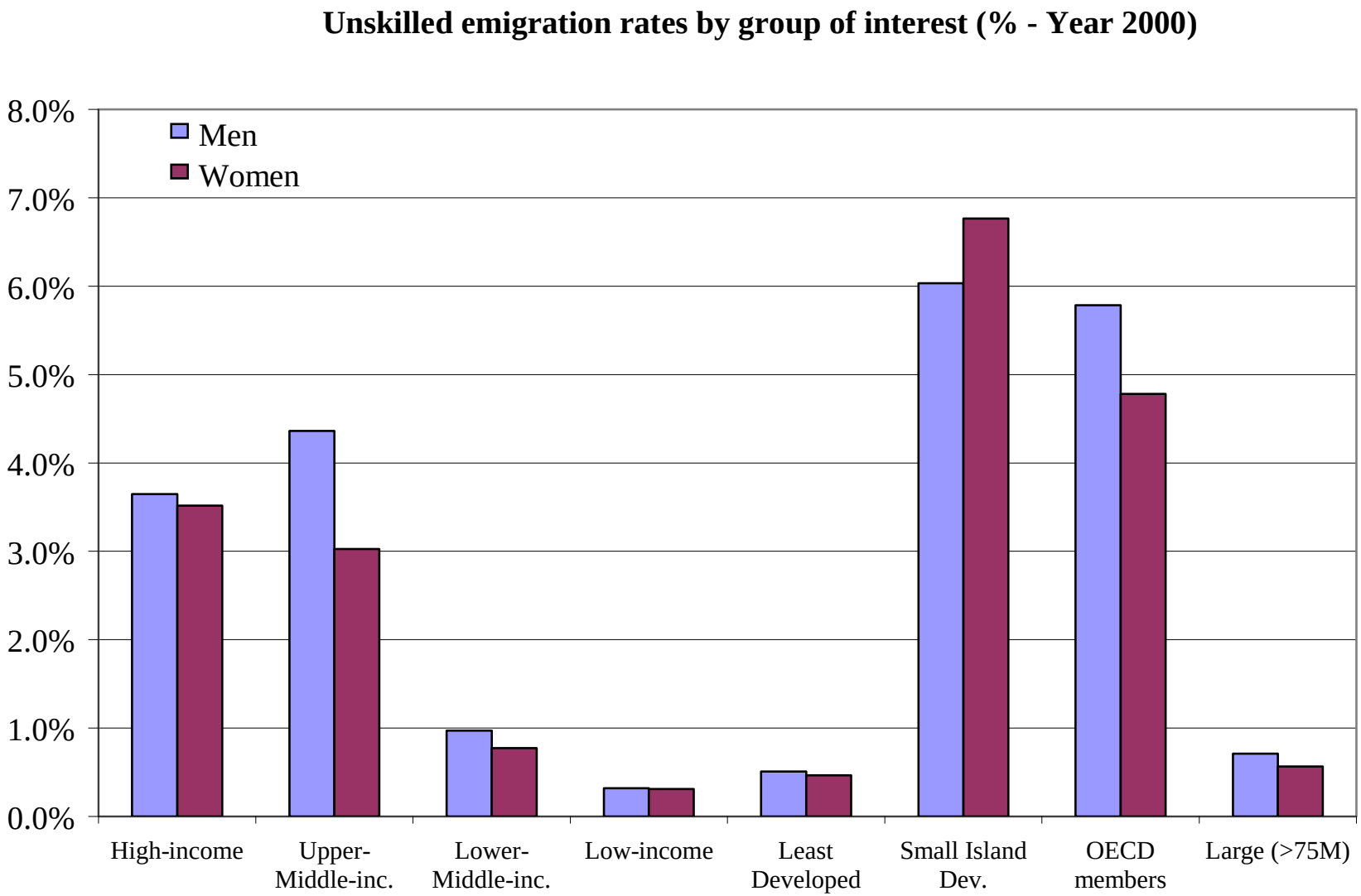

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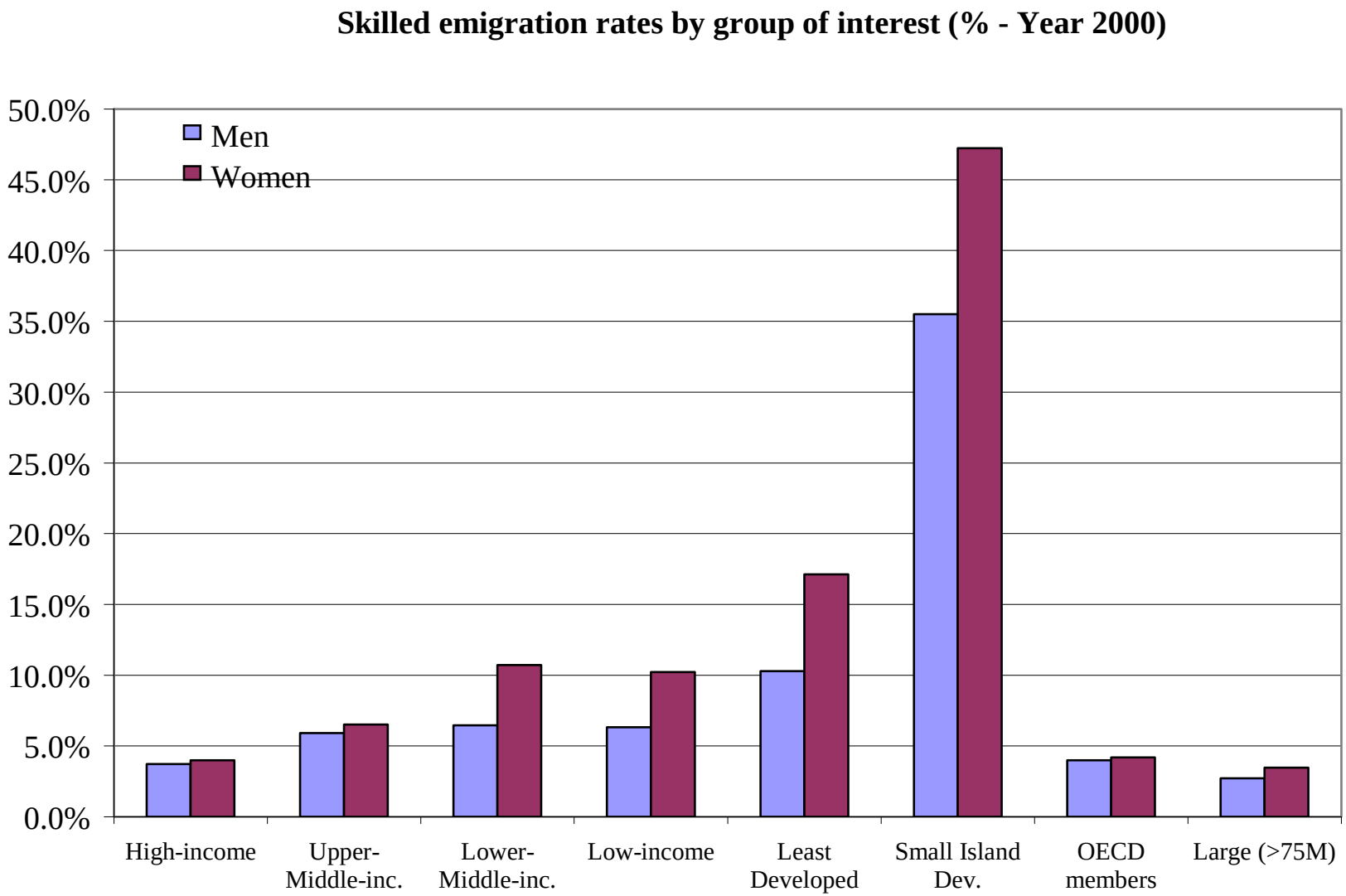

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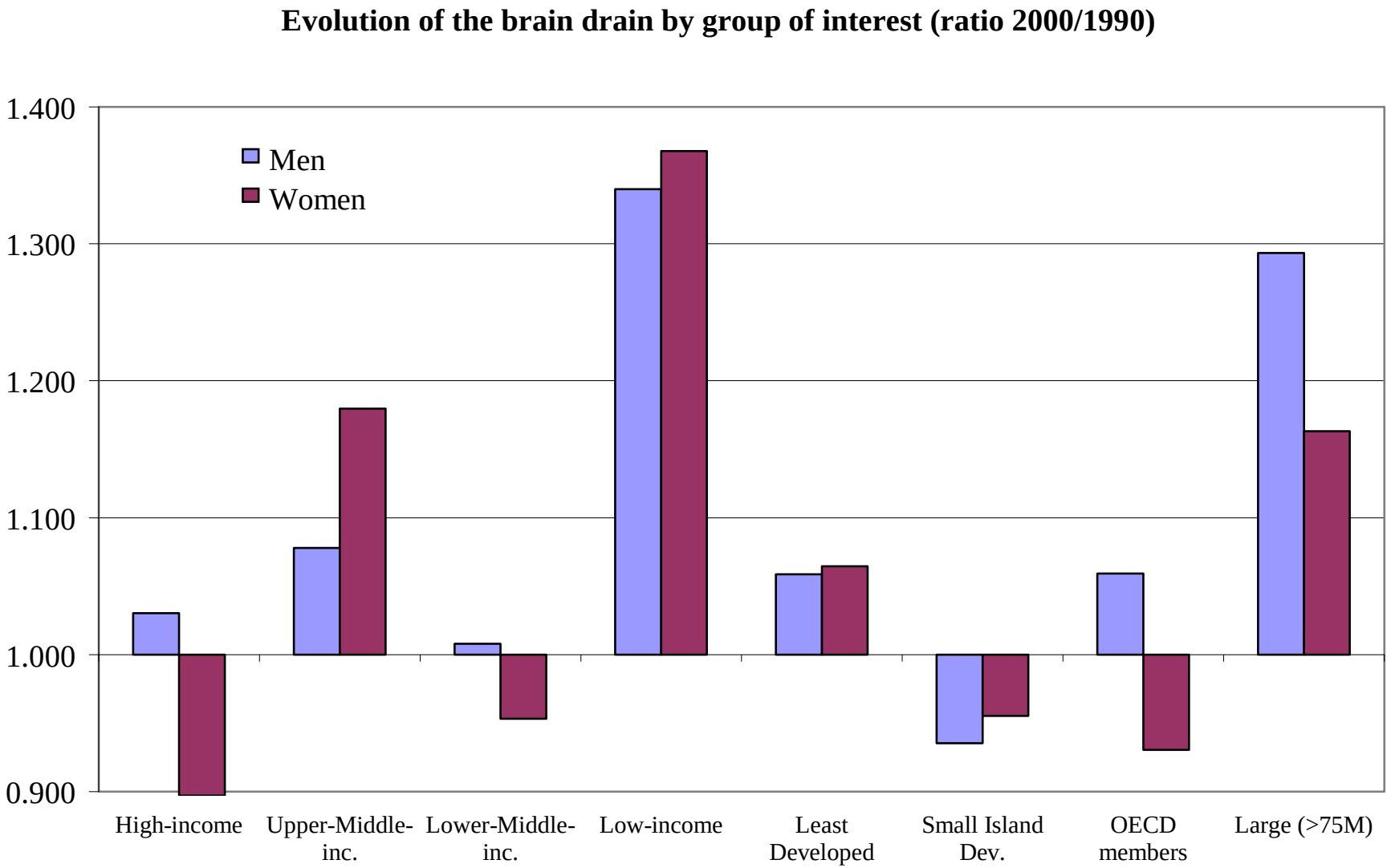

III.d. Rates - Gender gap in the brain drain

- Reminder: strong correlation between women's and men's emigration stocks (women 1.3% below)
- Things are differents in relative terms:
- Weighted average (one individual-one vote) female/male ratio of skilled emigration rates = 1.2
- Unweighted average (one country-one vote) female/male ratio = 1.17

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Figure 4.2. Comparison between women's and men's brain drain in 2000 - Rates

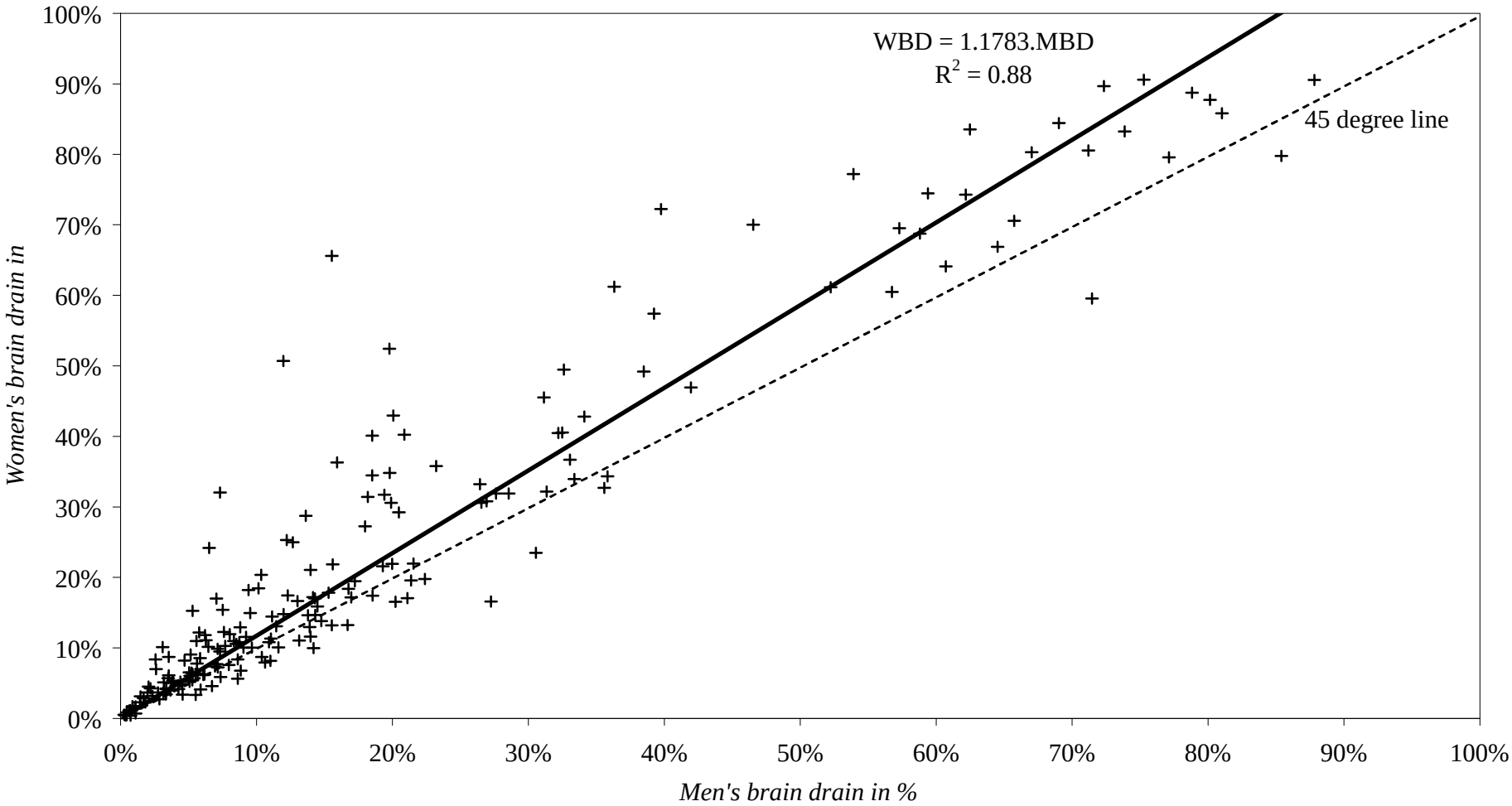

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Figure 5.1. Gender gap in skilled emigration and human capital

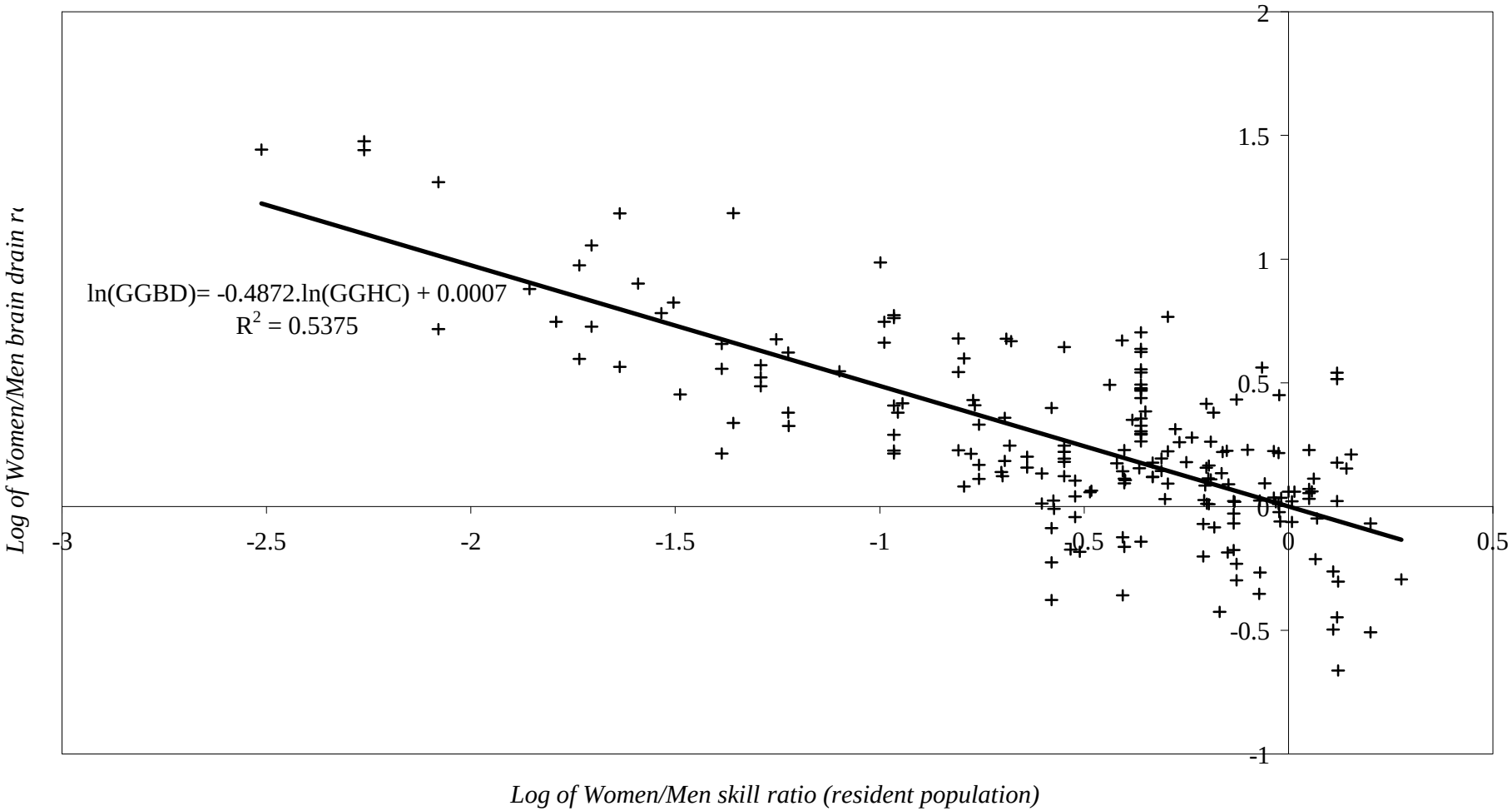

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Figure 5.2. Gender gap in skilled emigration and women political power

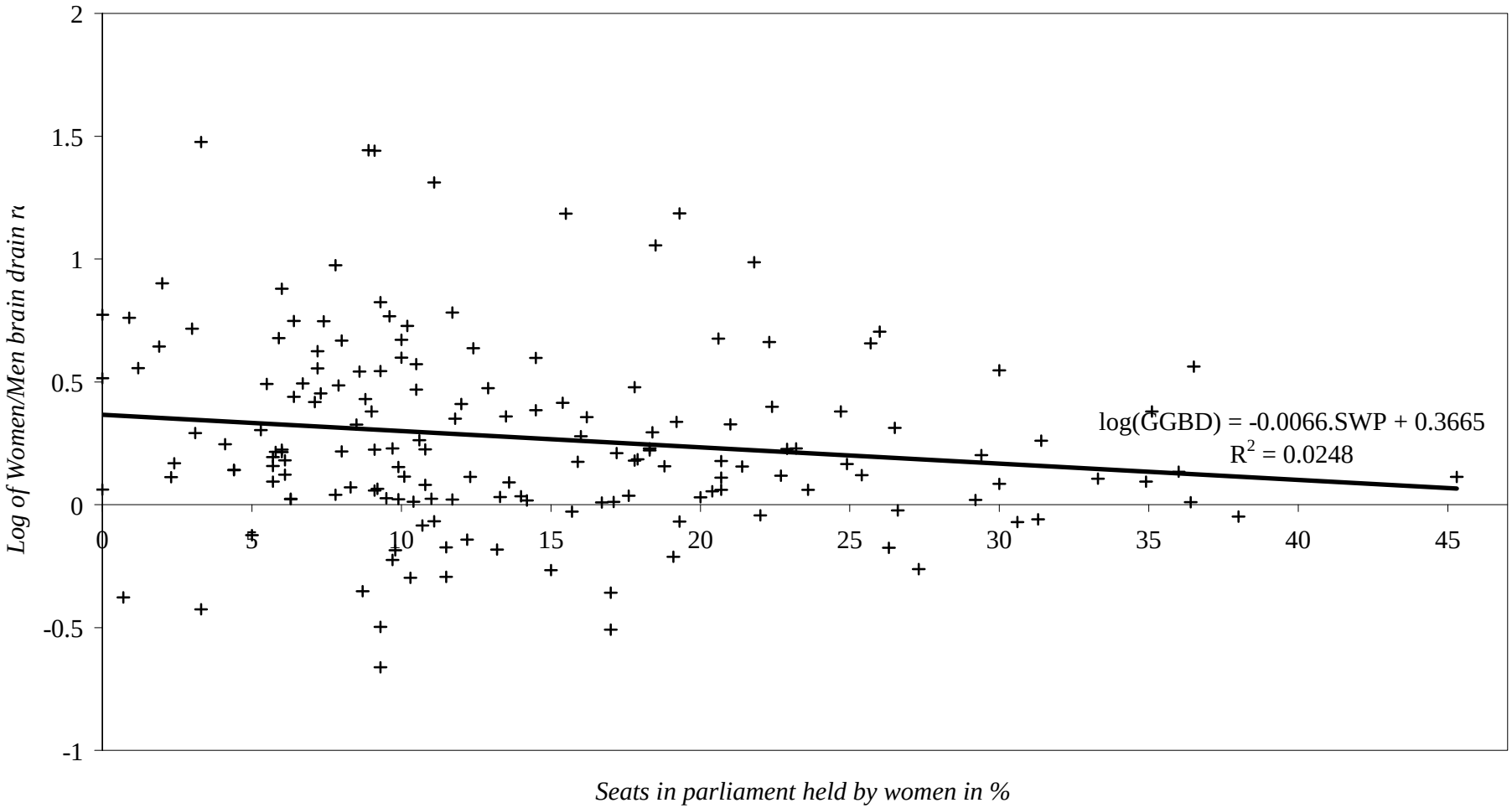


Table 6. Top-30 skilled emigration rates in 2000

Skilled migration (all countries)					Skilled migration (excluding small countries)				
Country	**Both**	**Men**	**Women**	**F/M**	**Country**	**Both**	**Men**	**Women**	**F/M**
Guyana	89,2%	87,8%	90,5%	1,031	Haiti	83,4%	81,0%	85,8%	1,059
Jamaica	84,7%	80,2%	87,7%	1,095	Sierra Leone	49,2%	39,8%	72,2%	1,817
Saint Vincent and the Grenadin	84,6%	78,8%	88,7%	1,126	Ghana	44,6%	39,3%	57,4%	1,462
Grenada	84,3%	75,3%	90,6%	1,203	Kenya	38,5%	32,6%	49,5%	1,518
Haiti	83,4%	81,0%	85,8%	1,059	Laos	37,2%	34,1%	42,8%	1,255
Cape Verde	82,4%	85,4%	79,8%	0,934	Uganda	36,0%	31,1%	45,5%	1,461
Palau	80,9%	72,4%	89,7%	1,239	Somalia	34,5%	33,1%	36,7%	1,110
Trinidad and Tobago	78,9%	73,9%	83,3%	1,127	El Salvador	31,7%	31,3%	32,2%	1,026
Saint Kitts and Nevis	78,5%	77,1%	79,6%	1,032	Nicaragua	30,2%	28,6%	31,9%	1,116
Seychelles	77,2%	69,0%	84,4%	1,223	China, Hong Kong SAR	29,6%	27,6%	31,9%	1,154
Tonga	75,6%	71,2%	80,5%	1,131	Cuba	28,8%	26,9%	30,8%	1,144
Samoa	73,4%	67,0%	80,3%	1,198	Sri Lanka	28,2%	26,5%	30,6%	1,153
Nauru	72,0%	62,5%	83,5%	1,337	Papua New Guinea	27,8%	20,1%	43,0%	2,141
Saint Lucia	68,6%	62,2%	74,3%	1,195	Vietnam	26,9%	30,5%	23,5%	0,769
Antigua and Barbuda	68,5%	65,7%	70,6%	1,073	Rwanda	26,3%	20,9%	40,3%	1,929
Gambia, The	67,8%	71,5%	59,5%	0,833	Honduras	24,8%	19,4%	31,7%	1,635
Suriname	65,8%	64,5%	66,9%	1,037	Croatia	24,6%	20,5%	29,2%	1,427
Belize	65,5%	53,9%	77,2%	1,432	Guatemala	23,9%	19,9%	30,6%	1,537
Tuvalu	64,9%	59,4%	74,5%	1,254	Afghanistan	22,6%	18,5%	34,5%	1,863
Dominica	63,9%	58,8%	68,8%	1,170	Mozambique	22,5%	18,2%	31,4%	1,727
Fiji	62,8%	57,3%	69,5%	1,213	Dominican Republic	22,4%	18,0%	27,2%	1,515
Barbados	62,6%	60,7%	64,1%	1,056	Cambodia	21,4%	27,3%	16,6%	0,608
Malta	58,3%	56,7%	60,5%	1,066	Malawi	20,9%	15,9%	36,3%	2,281
Mauritius	55,8%	52,2%	61,1%	1,170	Portugal	18,9%	21,1%	17,1%	0,809
Kiribati	55,7%	46,5%	70,0%	1,504	Morocco	18,0%	17,2%	19,5%	1,130
Sierra Leone	49,2%	39,8%	72,2%	1,817	Cameroon	17,1%	12,0%	50,7%	4,231
Ghana	44,6%	39,3%	57,4%	1,462	Senegal	17,1%	15,6%	21,8%	1,401
Liberia	44,3%	36,3%	61,2%	1,686	United Kingdom	17,1%	17,0%	17,2%	1,012
Lebanon	43,8%	42,0%	46,9%	1,118	Zambia	16,4%	14,0%	21,0%	1,506
Marshall Islands	42,8%	38,5%	49,2%	1,279	Togo	16,3%	13,6%	28,7%	2,110

Table 7. Ratio of women to men in skilled migration (year 2000)

	Country	Stock ratio	Country	Rate ratio
Highest ratio Top-20	Finland	1,873	Nigeria	4,376
	Andorra	1,758	Cameroon	4,231
	Thailand	1,735	Sao Tome and Principe	4,224
	Grenada	1,707	Congo, Dem. Rep. of the	3,711
	Bahamas, The	1,667	Guinea	3,273
	Jamaica	1,636	Angola	3,269
	Georgia	1,589	Burundi	2,874
	Saint Vincent and the Grenadines	1,562	China	2,682
	Turkmenistan	1,544	Guinea-Bissau	2,651
	Estonia	1,527	Bangladesh	2,462
	Philippines	1,518	Benin	2,409
	Antigua and Barbuda	1,423	Malawi	2,281
	Belize	1,422	Burkina Faso	2,186
	Japan	1,418	Solomon Islands	2,167
	Kazakhstan	1,412	Thailand	2,152
	Seychelles	1,392	Papua New Guinea	2,141
	Panama	1,383	Madagascar	2,111
	Dominican Republic	1,376	Togo	2,110
	Barbados	1,376	Mali	2,069
	Tajikistan	1,362	Mauritania	2,047
Lowest ratio Bottom-20	Nepal	0,515	Bulgaria	0,839
	Burkina Faso	0,511	Gambia, The	0,833
	Djibouti	0,508	Hungary	0,830
	Bangladesh	0,507	Liechtenstein	0,817
	Saudi Arabia	0,503	Portugal	0,809
	Mali	0,493	Sudan	0,798
	Tunisia	0,490	San Marino	0,793
	Jordan	0,470	Vietnam	0,769
	Togo	0,456	Israel	0,766
	Congo, Rep. of the	0,451	Uruguay	0,745
	Sudan	0,450	Italy	0,742
	Niger	0,449	Burma (Myanmar)	0,739
	Benin	0,443	Greece	0,703
	Senegal	0,441	Botswana	0,699
	Central African Republic	0,421	Yemen	0,685
	Yemen	0,378	Jordan	0,653
	Gambia, The	0,372	Saudi Arabia	0,639
	Cote d'Ivoire	0,372	Cambodia	0,608
	Chad	0,340	Lesotho	0,602
	Mauritania	0,304	Bhutan	0,516

1. Introduction - background and motivation
2. Stocks - absolute measure
3. Rates - relative measure
4. **Summary and extensions**

IV.a Main results

- Skilled emigration stocks: strong correlation between men and women
- Access to education: despite convergence, women are still lagging far behind men
- Skilled emigration rates: women are much more affected
- Increased women's brain drain from low-income and least developed countries
- Important losses for poor countries
- On average, equating men and women's access to education would strongly reduce the average gender gap in skilled migration

IV.b Main output

New bilateral data set publicly available soon (195 x 31 x 2 = 12,090 obs)

ORI	DES	Y	MSP	MSS	MST	FSP	FSS	FST	Rates
AFG	AUS	90	x	x	x	x	x	x	x%
	AUS	90	x	x	x	x	x	x	x%
ZIM	AUS	90	x	x	x	x	x	x	x%
...	...	...	...	...	...	...	...	...	...
AFG	USA	00	x	x	x	x	x	x	x%
	USA	00	x	x	x	x	x	x	x%
ZIM	USA	00	x	x	x	x	x	x	x%
...	OECD	00	x	x	x	x	x	x	x%

Possibility to analyze the causes of the gender gap and the consequences of women's brain drain on source countries

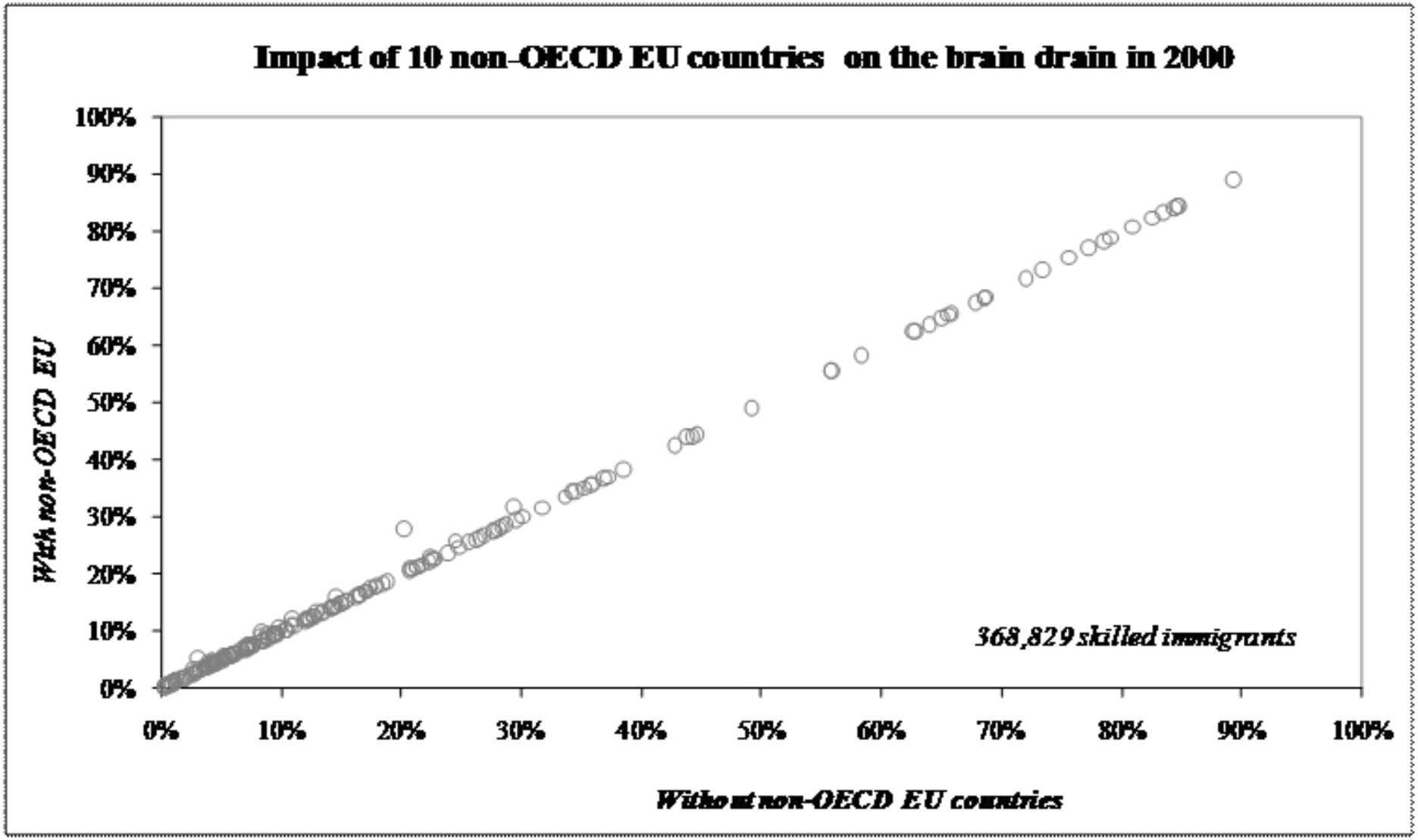
IV.c. Assessing the gender gap

- Analysis of the determinants of men's and women's brain drain - Is there a gender gap?
- Separate regressions with country characteristics and gender characteristics: educated women still seems to be more mobile than educated men
- System with interdependencies between men's and women's mobility and choice of appropriate instruments: educated women and men have the same propensity to move (no gender gap)

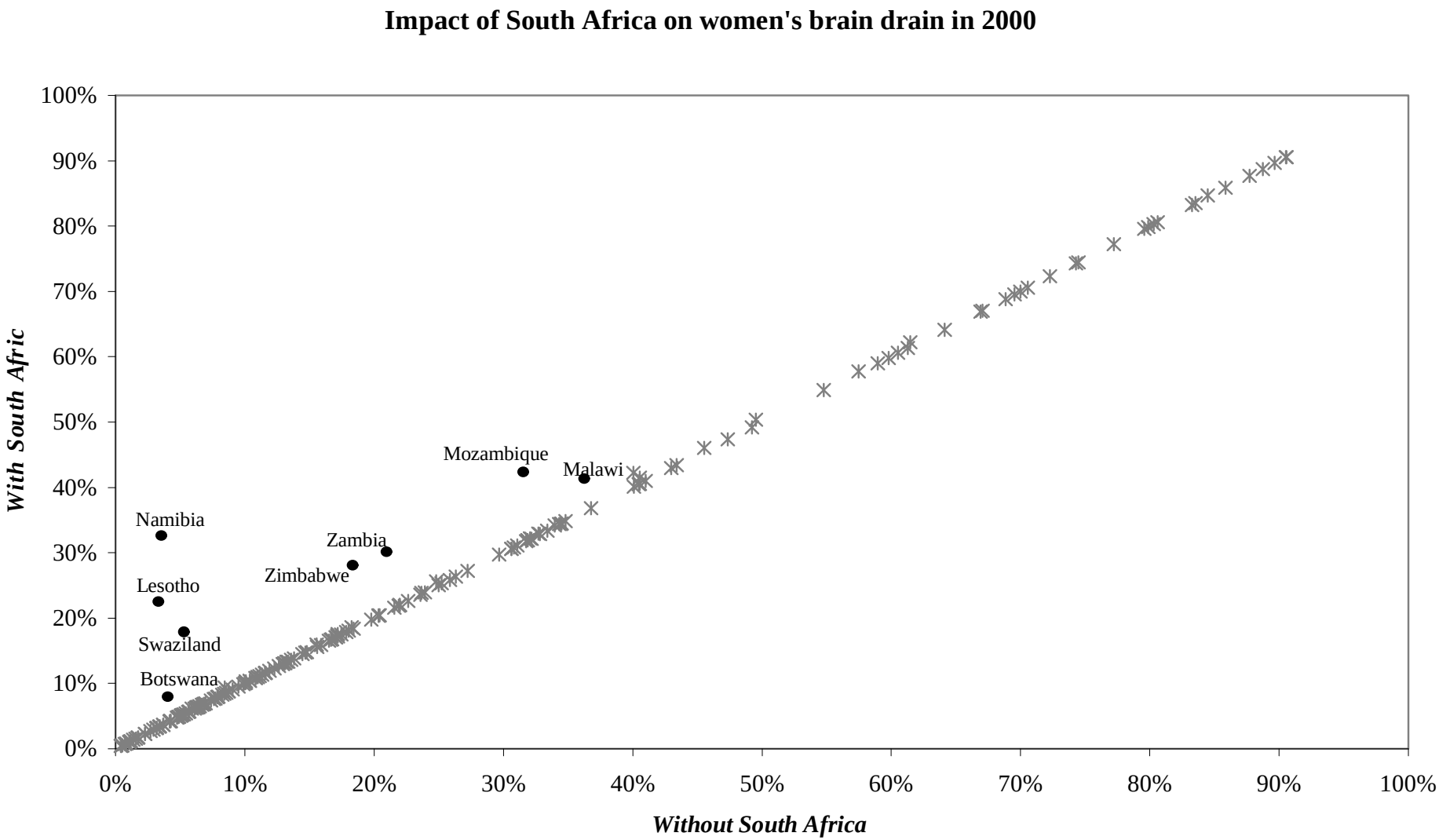
IV.c. Extensions

- Adding 10 EU countries (Bulgaria, Croatia, Cyprus, Estonia,Latvia, Lithuania, Macedonia, Malta, Romania, Slovenia): almost no effect except for ex-USSR countries (Belarus)
- Adding 6 Latin American countries (Argentina, Brazil, Chile, Colombia, Costa Rica, Venezuela): local effect (Bolivia, Paraguay, Uruguay)
- Adding South-Africa strongly affects the results for 8 countries
- Adding Singapore strongly affects the result for Malaysia
- Adding estimates for Saudi Arabia strongly affects the results for 5-6 countries
- Adding poor countries (African and Asian countries): small effect

IV.c. Extensions



IV.c. Conclusion - Extensions



IV.c. Conclusion - Extensions