A Global View of Cross-Border Migration

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Rising International Migration

- 57.4 million migrants age 25+ in OECD in year 2000. A 40% increase since 1990. About one in three are college graduates (Docquier et al, 2010)
- Between 2000 and 2010, number of international migrants worldwide rose by 23 percent

Simultaneous Rise in Remittances

- In 2010 Remittances to Developing countries amounted to $ 325 billion (World Bank).
- Four times larger than in 2000.
- Almost 3 times as large as development assistance from OECD countries. About as large as FDI flows.

What are the Welfare Effects?

- Context of large and rising international migration and remittances
- Very few studies of the welfare effects of international migration
- None paying attention to international trade and remittances

> *Unfortunately, policy makers would be hard pressed to infer the effects of international migration on global welfare from the existing literature. [...] the problem is that the empirical literature tends to eschew* ***a global general equilibrium perspective****. [...] If we want policy makers to make informed choices about migration policy, we have a lot more work to do.*

G. Hanson, "The Economic Consequences of the International Migration of Labor," *Ann. Rev. of Econ.*(Sept. 2009)

Main Features Model

1. Labor productivity differences between countries
2. Heterogeneous firms and endogenous varieties (a la Melitz 2003)
3. Heterogeneous workers (Trefler 1993, Hendricks 2002)
4. Trade in goods and non-traded sector
5. Remittances
6. Input linkages both within and between sectors
7. “Dynamics”
   - Short run: Fixed number potential firms (Chaney 2008, EKK 2011)
   - Long run: Free entry (Krugman 1980, Melitz 2003)

Counterfactual

- Calibrate to 60 countries
- We send all immigrants living in OECD countries (in 2006) back to their origin countries.
- Compare baseline to equilibrium after repatriation in terms of welfare of stayers and migrants.
- Short and long run effects.

Main Results

1. North: small initial welfare loss due to firm exit. Rising substantially over time (2.4% on average).
2. South: large initial loss due to end of remittances. Over time small improvement due to firm entry (2.1% on average).
3. Ignoring trade we would overestimate the welfare effects of migration.
4. Ignoring remittances we would (wrongly) predict large welfare gains for South.
5. Large income gains for migrants. Move from low to high TFP country.

Literature

- Quantitative New-trade Models: Melitz (2003), Eaton, Kortum and Kramarz (2011), di Giovanni and Levchenko (2010)
- Agglomeration, Productivity, Migration: Ciccone and Hall (1996), Epifani and Gancia (2005), Moretti (YEAR), etc.
- Welfare Effects of Migration: Klein and Ventura (2007,2009), Benhabib and Jovanovic (2012). With trade Davis and Weinstein (2002) and Iranzo and Peri (2009)
- Response of Firms to Immigration: Lewis (2011), Dustmann and Glitz (2011)

The Model

Labor and Productivity

- $i, j = 1, \ldots, \mathcal{C}$ countries; each country endowed with L_i efficiency units of labor
- N_{ji}^{e} are workers born in country i that migrated to country j, with education $e = \ell, h$.
- Total **effective labor** in country j:

$$L_j = \sum_{i=1}^{\mathcal{C}} A_{ji}^{\ell} N_{ji}^{\ell} + A_{ji}^{h} N_{ji}^{h}$$

Trefler (1993)

Preferences

- Two broad sectors, N non-tradeable, T tradeable
- Consumers maximize

$$\max_{\{y_i^N(k), y_i^T(k)\}} \left(\int_{J_i^N} y_i^N(k)^{\frac{\varepsilon-1}{\varepsilon}} dk \right)^{\frac{\alpha\varepsilon}{\varepsilon-1}} \left(\int_{J_i^T} y_i^T(k)^{\frac{\varepsilon-1}{\varepsilon}} dk \right)^{\frac{(1-\alpha)\varepsilon}{\varepsilon-1}}$$

$$s.t.$$

$$\int_{J_i^N} p_i^N(k)\, y_i^N(k)\, dk + \int_{J_i^T} p_i^T(k)\, y_i^T(k)\, dk = Y_i,$$

- Consumption expenditure on N is αY_i, on T is $(1-\alpha) Y_i$

Technology and Market Structure

- Monopolistic competition.
- Mass n_j^s of potential firms/varieties; heterogeneous unit input requirement $a(k)$
- Input bundle costs:

$$c_j^s = w_j^{\beta_s} \left[\left(P_j^N \right)^{\eta_s} \left(P_j^T \right)^{1-\eta_s} \right]^{1-\beta_s}$$

- Iceberg costs $\tau_{ij} > 1$ in T (infinite in N)
- Fixed cost f_{ij} of accessing market i
- The cutoff for serving i from j is

$$a_{ij}^s = \frac{\varepsilon - 1}{\varepsilon} \frac{P_i^s}{\tau_{ij} c_j^s} \left(\frac{X_i^s}{\varepsilon c_j^s f_{ij}^s} \right)^{\frac{1}{\varepsilon - 1}}$$

Autarky Cost Cutoffs

Long run - Free Entry

- The solution (only traded sector):

$$a_1^A = \frac{1}{b}\left[\frac{f_E}{f}\frac{\theta-(\sigma-1)}{\sigma-1}\right]^{\frac{1}{\theta}}$$

$$n = \frac{L}{f_E \overline{m}\theta}$$

- Comparative static: increase L
  - Scale effect.
  - Increases the measure of **potential** entrepreneurs (n), without affecting the cutoff.
  - Thus increases the total number of **actual** entrepreneurs $nG(a_1^A)$, without reducing their average productivity.

Autarky Cost Cutoffs

Short run - Fixed n

- The equilibrium threshold (only traded sector):

$$a_2^A = \frac{1}{b}\left[\frac{L}{\sigma f \bar{n}}\frac{\theta-(\sigma-1)}{\theta\sigma-(\sigma-1)}\right]^{\frac{1}{\theta}}$$

- Comparative static: increasing L
  - Raises the threshold.
  - Increase in actual firms $nG(a_2^A)$. Lower average productivity.
  - Quantitative effect depends on firm-level productivity distribution (di Giovanni and Levchenko 2010).

Short-Run Equilibrium

Given country endowments L_i and n_i^s, a *short-run equilibrium* is a set of prices $\left\{w_i, P_i^N, P_i^T\right\}_{i=1}^{\mathcal{C}}$, and factor allocations such that
(i) consumers maximize utility,
(ii) firms maximize profits,
(iii) all goods and factor markets clear.

Long-Run Equilibrium

Given country endowments L_i, a *long-run equilibrium* is a set of prices $\left\{w_i, P_i^N, P_i^T\right\}_{i=1}^{\mathcal{C}}$, measures of potential projects $\left\{n_i^N, n_i^T\right\}_{i=1}^{\mathcal{C}}$, and factor allocations such that
(i) consumers maximize utility,
(ii) firms maximize profits,
(iii) all goods and factor markets clear, and
(iv) worldwide net profits equal zero, that is, n_i^s adjusts to satisfy free entry condition

$$\sum_{j=1}^{\mathcal{C}} \int_0^{a_{ji}} \left(\pi_{ji}^{V,s}(a) - c_i^s f_{ji}\right) dG(a) = c_i^s f_e$$

Calibration

Data

- 60 countries (98% of world GDP); top 49 by total GDP + 11 additional countries with more than 10% emigration rate
- Migration Flows: aggregate from OECD-IMD for 2006 and breakdown by education for 2000 from Docquier et al (2009, 2010).
- Remittances: Ratha and Shaw (2007)
- Population, GDP, bilateral trade, fixed costs production and exporting, PPP-adjusted per capita income: standard sources (World Bank, IMF, PWT)
- Skilled if some post-secondary education

Some Facts 2006

The North (OECD)

- Largest immigration shares: New Zealand, Australia, Canada, ranging 18-25%.
- Outgoing Remittances/GDP are generally small.

The South

- Largest emigration rates: Jamaica, El Salvador, Trinidad and Tobago, ranging 18-32%.
- Remittances/GDP highest for Dom. Rep., Philippines and Jamaica, ranging 14-20%.
- Some countries have high emigration rates but low remittances (Mexico). Opposite in others (Philippines).

OECD Countries

Country	Share Immigrants	Share Emigrants	Pop. Chg. in Counterfactuals	Remittances /GDP	Sh. skilled Stayers	Sh. skilled Immigrants	Sh. skilled Emigrants
			Featured as Destination and Source Countries				
Australia	0.242	0.015	-0.226	-0.009	0.29	0.45	0.55
Austria	0.108	0.046	-0.062	0.001	0.23	0.12	0.33
Belgium	0.108	0.030	-0.078	0.014	0.28	0.19	0.34
Canada	0.185	0.032	-0.154	-0.016	0.49	0.58	0.60
Czech Rep.	0.023	0.026	0.003	0.005	0.10	0.11	0.34
Denmark	0.058	0.038	-0.019	0.001	0.21	0.17	0.41
Finland	0.034	0.053	0.019	0.002	0.26	0.23	0.27
France	0.076	0.017	-0.060	-0.001	0.24	0.16	0.33
Germany	0.064	0.033	-0.031	-0.004	0.25	0.21	0.39
Greece	0.014	0.066	0.052	-0.002	0.15	0.15	0.20
Hungary	0.034	0.030	-0.005	-0.003	0.12	0.13	0.39
Ireland	0.129	0.156	0.026	-0.007	0.17	0.40	0.33
Italy	0.025	0.042	0.018	-0.002	0.18	0.15	0.16
Japan	0.015	0.005	-0.010	-0.001	0.23	0.28	0.61
Korea, Rep.	0.011	0.038	0.028	-0.001	0.25	0.37	0.50
Netherlands	0.101	0.047	-0.055	-0.002	0.21	0.22	0.43
New Zealand	0.251	0.128	-0.122	0.003	0.21	0.41	0.48
Norway	0.086	0.030	-0.056	-0.002	0.21	0.28	0.38
Poland	0.001	0.046	0.045	0.012	0.11	0.13	0.37
Portugal	0.023	0.134	0.111	0.010	0.12	0.18	0.10
Slovak Rep.	0.005	0.041	0.036	0.006	0.11	0.27	0.18
Spain	0.116	0.016	-0.100	-0.003	0.15	0.18	0.18
Sweden	0.106	0.022	-0.083	-0.005	0.17	0.25	0.46
Switzerland	0.137	0.035	-0.103	-0.007	0.20	0.21	0.40
United Kingdom	0.084	0.060	-0.024	-0.003	0.18	0.34	0.46
United States	0.119	0.003	-0.116	-0.008	0.52	0.42	0.58

Non-OECD Countries

	Share Emigrants	Remittances /GDP		Share Emigrants	Remittances /GDP
Algeria	0.025	0.023	Malaysia	0.010	-0.006
Argentina	0.012	-0.004	Mexico	0.107	0.031
Belarus	0.005	0.001	Nigeria	0.003	0.031
Brazil	0.005	0.005	Pakistan	0.005	0.044
Bulgaria	0.037	0.082	Philippines	0.030	0.155
Chile	0.016	-0.002	Romania	0.070	0.058
China	0.003	0.012	Russian Federation	0.008	0.001
Colombia	0.023	0.034	Saudi Arabia	0.004	-0.049
Croatia	0.103	0.020	Serbia and Montenegro	0.106	0.191
Dominican Republic	0.097	0.143	South Africa	0.011	0.001
Ecuador	0.068	0.050	Thailand	0.006	0.002
Egypt, Arab Rep.	0.004	0.042	Trinidad and Tobago	0.179	0.006
El Salvador	0.190	0.178	Turkey	0.038	-0.001
India	0.003	0.030	Ukraine	0.019	-0.010
Indonesia	0.002	0.007	United Arab Emirates	0.003	–
Iran, Islamic Rep.	0.011	0.006	Venezuela, RB	0.011	-0.004
Israel	0.021	-0.023			
Jamaica	0.317	0.200	Mean	0.046	0.038

Calibration

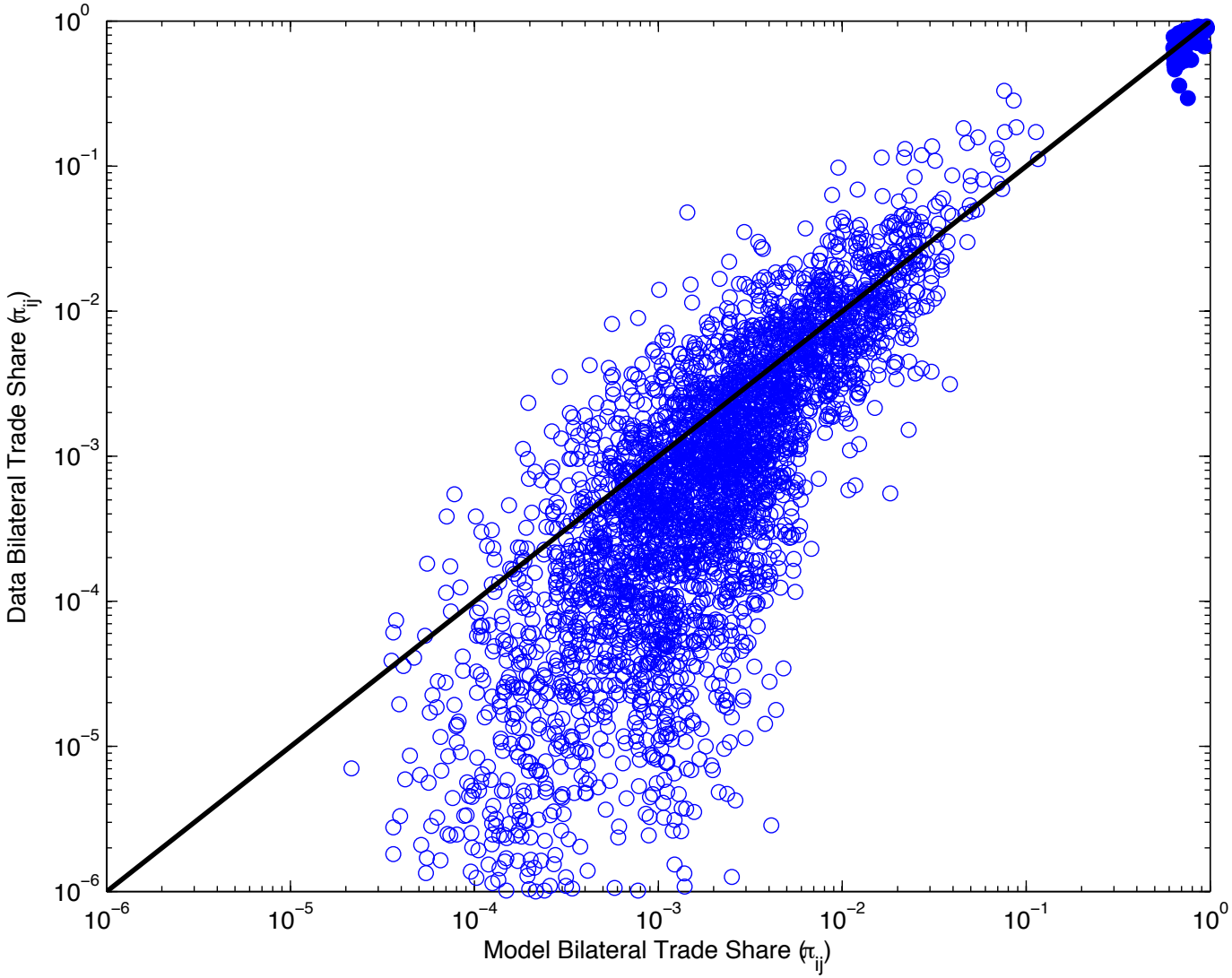
Parameter	Baseline	Source
ε	6	Anderson and van Wincoop (2004)
θ	5.3	Axtell (2001): $\frac{\theta}{\varepsilon-1} = 1.06$
α	0.65	Yi and Zhang (2010)
$\{\beta_N, \beta_T\}$	$\{0.65, 0.35\}$	1997 U.S. Benchmark Input-Output Table
$\{\eta_N, \eta_T\}$	$\{0.77, 0.35\}$	
τ_{ij}	2.30	Helpman, Melitz, and Rubinstein (2008)
f_{ii}	14.24	Doing Business Indicators
f_{ij}	7.20	
f_e	34	To match 7,000,0000 firms in the U.S. (U.S. Economic Census)
μ_j	1.5	Skilled-unskilled wage premium in US
ϕ_i^ℓ, ϕ_i^h	1	Alternatively, native-immigrant wage gaps US Census 2000

Solution

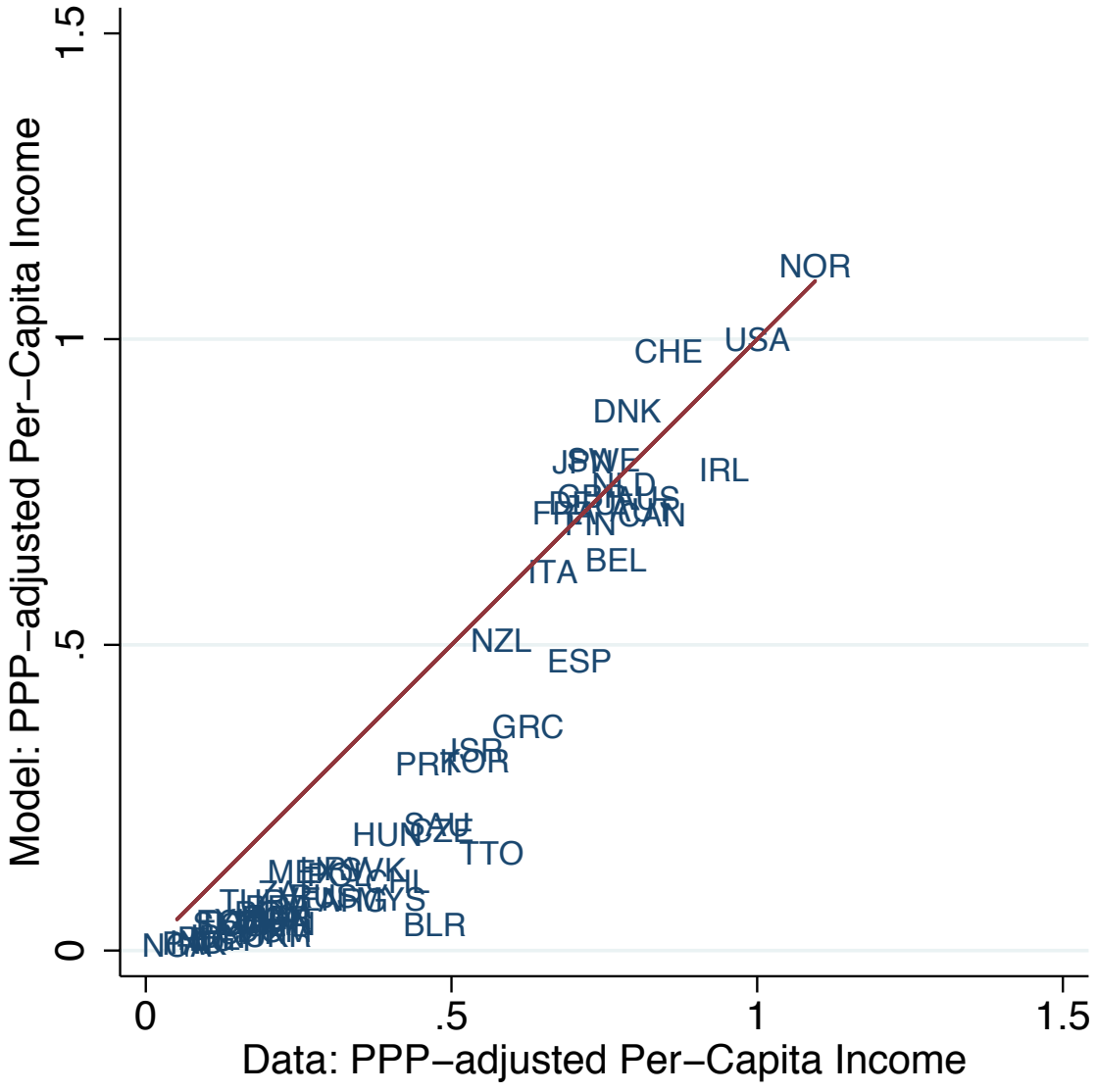
- Solution following Alvarez and Lucas (2007)
- We solve for the $\{L_i, w_i\}$ such that the equilibrium conditions are satisfied and we match GDP in the data for all countries
- Iterative solution method initialized with a guess for $\{L_i^0\}$. Find equilibrium wages conditional on $\{L_i^0\}$. Update $\{L_i^1\}$ so as to match GDPs. Iterate to convergence.
- Having obtained equilibrium $\{L_i, w_i\}$ we then infer labor productivity:

$$A_{jj} = \frac{L_j}{\sum_{i=1}^{C} \phi_i^{\ell} N_{ji}^{\ell} + \mu_j \phi_i^{h} N_{ji}^{h}}.$$

Model Fit: Trade Shares



Model Fit: Real Per Capita Incomes



Counterfactual

Counterfactual

- We compare the equilibrium under existing migration in year 2006 (Baseline)
- To the equilibrium when all migration to the OECD is undone
  - For OECD countries, all their immigrants are sent home. All their emigrants come back home.
  - For South countries, all their OECD emigrants return home.
- Three scenarios regarding Labor:
  1. Homogeneous labor, given education ($\phi_i^e = 1$)
  2. Imperfect skill transferability ($\phi_i^e = 0.75$)
  3. Origin-specific selection (ϕ_i^e as in Hendricks (2000))

Welfare Baseline

- Utility average stayer in country j:

$$W_{jj} = \frac{w_j A_{jj}[(1-\omega_{jj}) + \omega_{jj}\mu_j] + (\Pi_j^N + \Pi_j^T)/\sum_{k=1}^{\mathcal{C}} N_{jk} + R_j^{in}/N_{jj}}{P_j}$$

- Utility average immigrants (born in i) in country j:

$$W_{ji} = \frac{w_j A_{jj}[(1-\omega_{ji})\phi_i^{\ell} + \omega_{ji}\phi_i^{h}\mu_j)] + (\Pi_j^N + \Pi_j^T)/\sum_{k=1}^{\mathcal{C}} N_{jk} - R_{ji}^{out}/N_{ji}}{P_j}$$

Welfare Counterfactual

- Labor in the no-migration counterfactual:

$$\widetilde{L}_j = A_{jj} \sum_{i=1}^{\mathcal{C}} N_{ij}^{\ell} + \mu_j N_{ij}^{h}$$

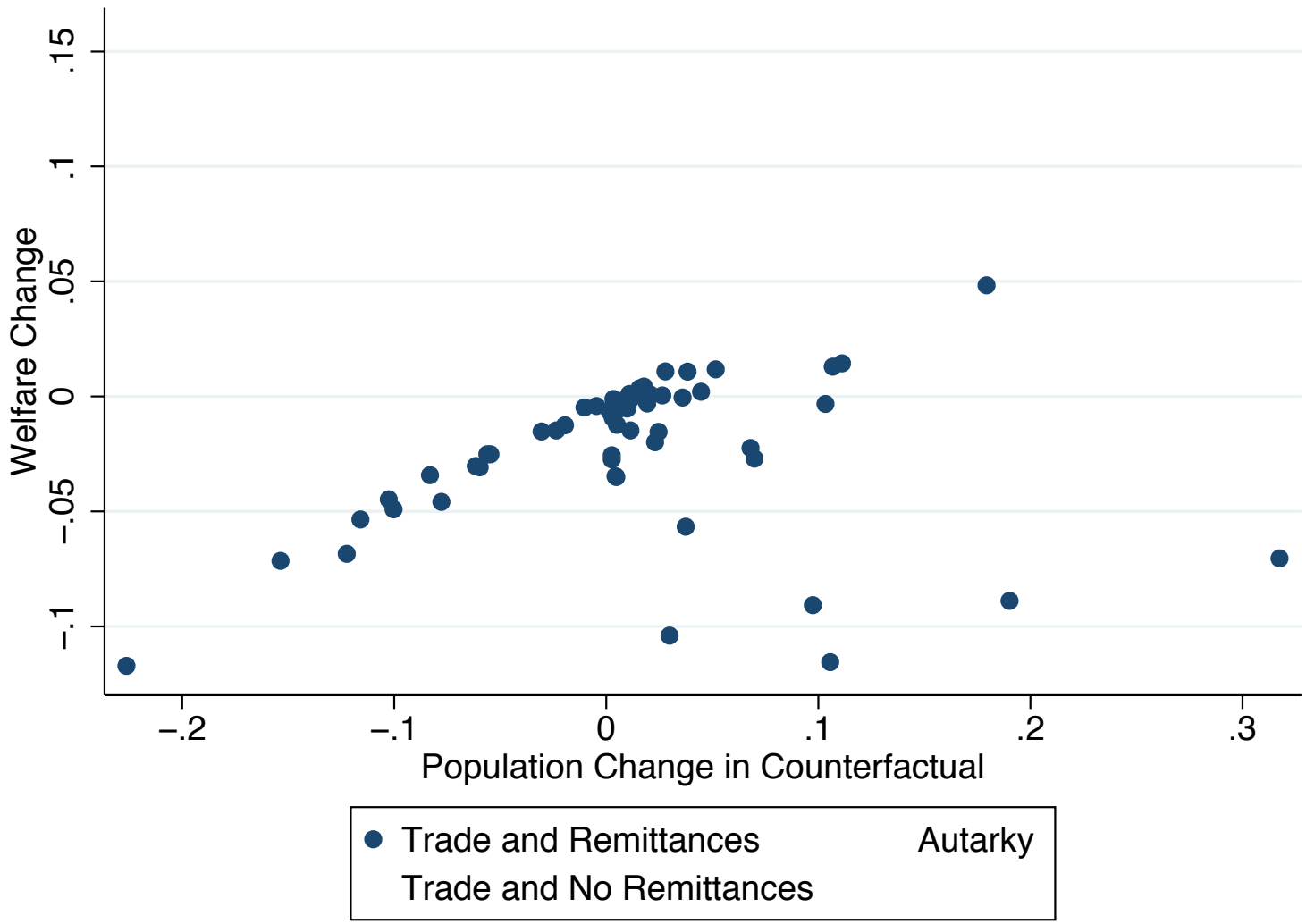
- Utility average stayers in country j:

$$\widetilde{W}_{jj} = \frac{\widetilde{w}_j A_{jj} [(1 - \omega_{jj}) + \omega_{jj} \mu_j] + (\widetilde{\Pi_j^N} + \widetilde{\Pi_j^T}) / \sum_{k=1}^{\mathcal{C}} N_{kj}}{\widetilde{P}_j}$$

Results

The Long Run

Scale effect vs. Remittances



Long-run effects

- Practically all North countries would be worse off. On average welfare change -2.4%.
  Australia -12%, Canada -7%, Spain -5%, US -5%
- Most countries in the South would be worse off. On average welfare change -2.2% with large dispersion.
  Dominican Rep., El Salv., Jamaica, Phil. around -9%
- A few South countries would be a bit better off.
  Mexico and Turkey's welfare would have been 1% higher.

Country	Long Run	Short Run	Country	Long Run	Short Run
	Destination and Source Countries			*Source Only Countries*	
Country	Long Run	Short Run	Country	Long Run	Short Run
Australia	-0.1172	-0.0072	Algeria	-0.0154	-0.0214
Austria	-0.0303	-0.0039	Argentina	0.0007	-0.0019
Belgium	-0.0459	-0.0134	Belarus	-0.0124	-0.0103
Canada	-0.0715	0.0020	Brazil	-0.0026	-0.0042
Czech Republic	-0.0094	-0.0080	Bulgaria	-0.0566	-0.0659
Denmark	-0.0126	-0.0029	Chile	0.0035	-0.0010
Finland	-0.0012	-0.0055	China	-0.0079	-0.0090
France	-0.0308	-0.0036	Colombia	-0.0200	-0.0274
Germany	-0.0153	-0.0008	Croatia	-0.0033	-0.0328
Greece	0.0118	-0.0059	Dominican Republic	-0.0908	-0.1159
Hungary	-0.0042	-0.0010	Ecuador	-0.0225	-0.0442
Ireland	0.0004	-0.0047	Egypt, Arab Rep.	-0.0347	-0.0339
Italy	0.0043	-0.0015	El Salvador	-0.0889	-0.1419
Japan	-0.0048	-0.0001	India	-0.0256	-0.0256
Korea, Rep.	0.0108	-0.0004	Indonesia	-0.0066	-0.0064
Netherlands	-0.0251	-0.0007	Iran, Islamic Rep.	-0.0014	-0.0052
New Zealand	-0.0685	-0.0117	Israel	0.0008	-0.0006
Norway	-0.0251	-0.0004	Jamaica	-0.0704	-0.1587
Poland	0.0020	-0.0130	Malaysia	-0.0053	-0.0052
Portugal	0.0144	-0.0199	Mexico	0.0129	-0.0260
Slovak Republic	-0.0005	-0.0108	Nigeria	-0.0274	-0.0259
Spain	-0.0491	-0.0042	Pakistan	-0.0350	-0.0348
Sweden	-0.0343	0.0017	Philippines	-0.1040	-0.1147
Switzerland	-0.0447	0.0002	Romania	-0.0271	-0.0488
United Kingdom	-0.0148	-0.0024	Russian Federation	-0.0016	-0.0037
United States	-0.0535	0.0016	Saudi Arabia	-0.0030	0.0063
			Serbia and Montenegro	-0.1155	-0.1447
			South Africa	-0.0004	-0.0030
			Thailand	-0.0055	-0.0059
			Trinidad and Tobago	0.0483	-0.0137
			Turkey	0.0107	-0.0030
			Ukraine	-0.0031	-0.0056
			United Arab Emirates	-0.0011	-0.0010
			Venezuela, RB	0.0010	-0.0014
Mean	-0.0237	-0.0045	Mean	-0.0209	-0.0335
Std. Dev.	0.0309	0.0055	Std. Dev.	0.0358	0.0463

The Long run: Mechanisms

Scale Effect versus Remittances

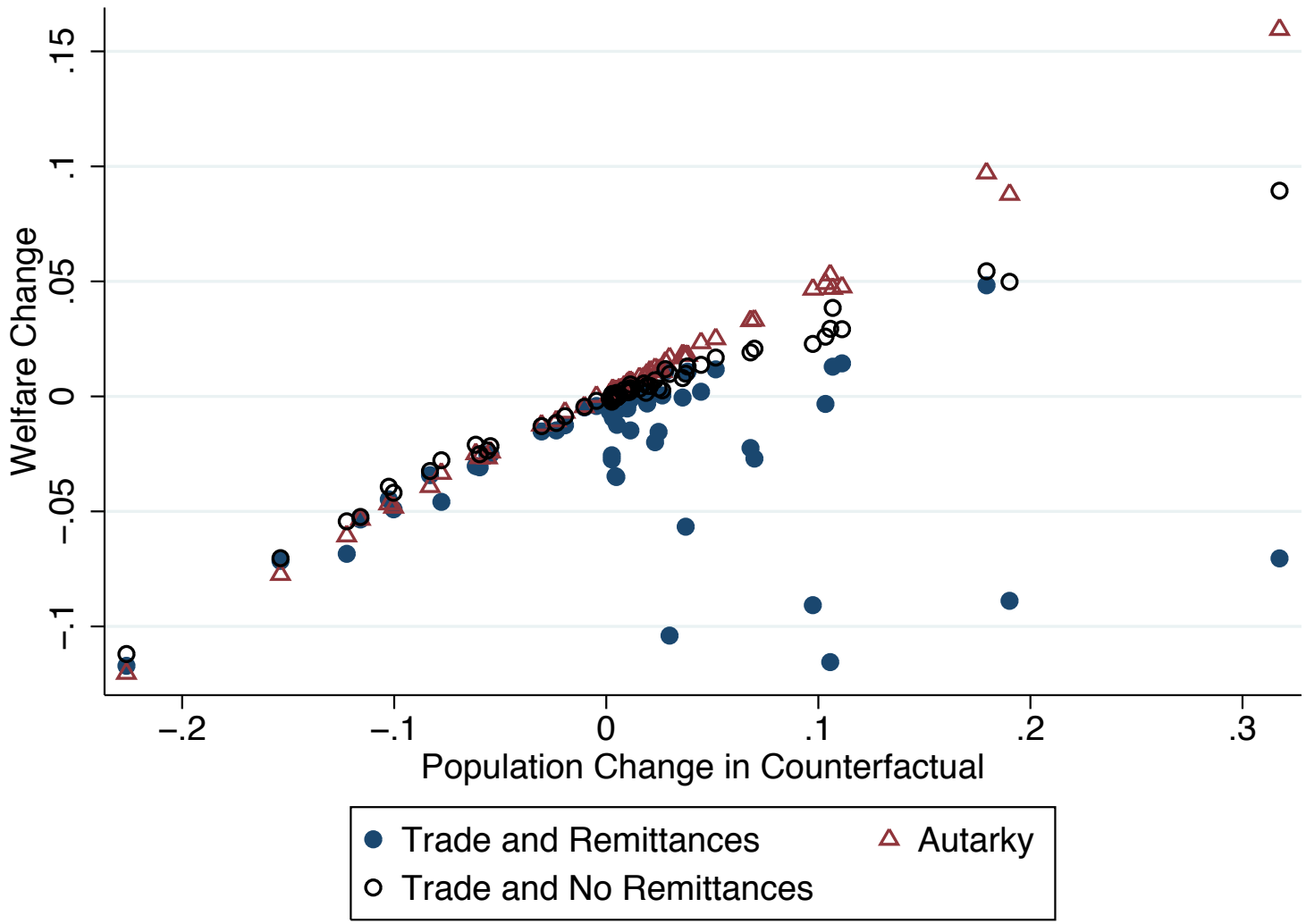
- In North, reduction in labor force reduces domestically produced varieties. Mainly by lowering the measure of potential entrepreneurs.

$$n_i^s G(a_{ii}^s)$$

- In South, increase in domestic varieties and fewer imported varieties (as in Iranzo and Peri 2009). Cannot offset the loss of remittances (TFP differences).

Decomposition - Long Run

The roles of Remittances and Trade



The Long run

Trade mitigates the effect of Migration

- Accounting for international trade is important for the long-run welfare effects of immigration
- Let's hold remittances constant in baseline and counterfactual. Then
  - In Autarky, elasticity of welfare to immigration is 0.49.
  - Under Trade, falls to 0.35 (with concave shape).

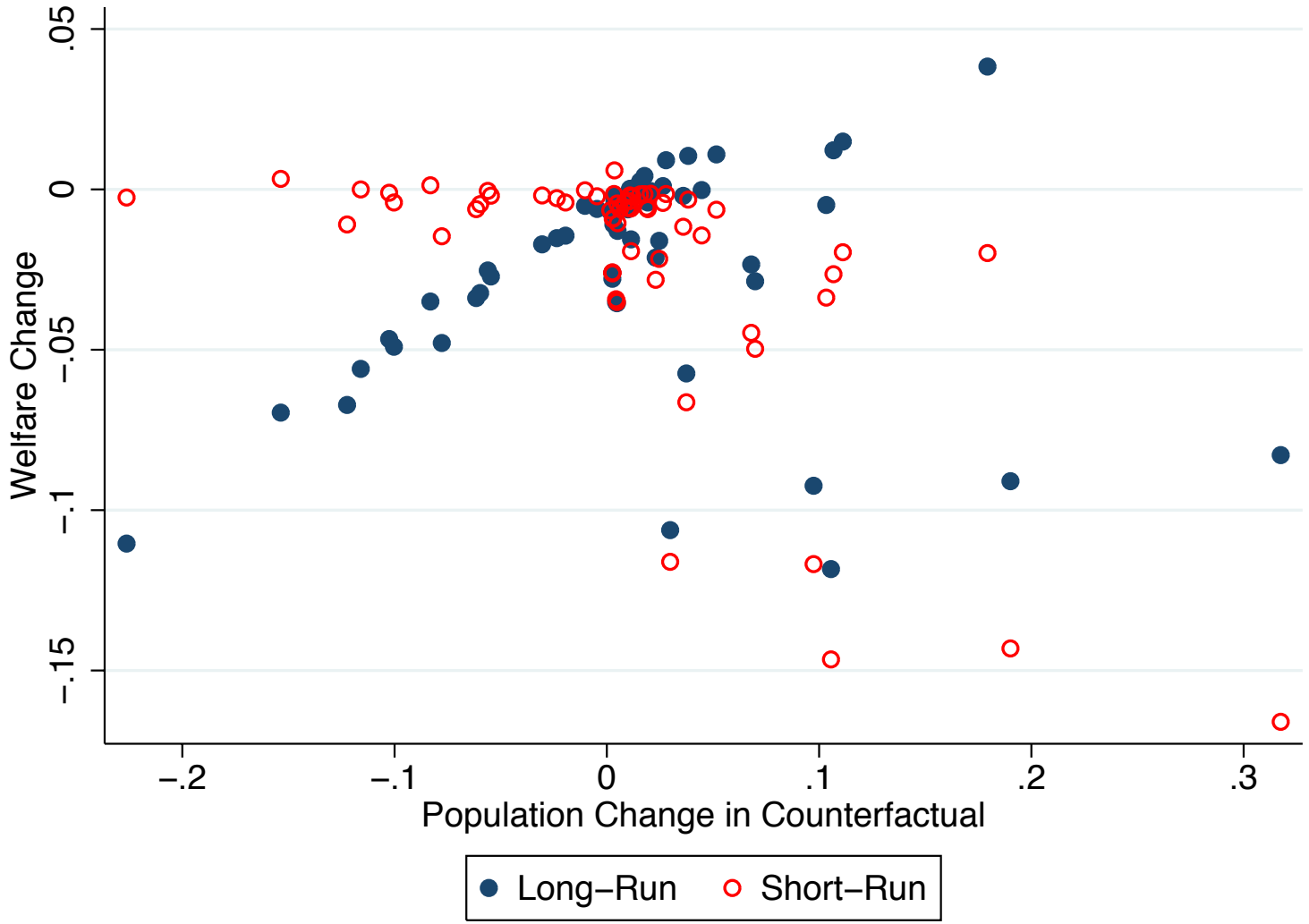
The Scale Effect

- In monopolistic competition models with free entry, an increase in labor force leads to increased variety and welfare (Romer, 1990, Krugman, 1980):

$$\frac{w_j}{P_j} = constant \times N_j^{\gamma}.$$

- Empirical estimates: $\gamma \in [0.25, 1]$ (Jones (2002, Jones and Romer, 2004). Cross-sectional regression within our model: $\gamma = 0.17$ (or $\gamma = 0.38$ wrt L)
- Hummels and Klenow (2005): larger countries export more *goods*, elasticity wrt income around 0.6. Our model: 0.8 wrt *firms*.
- More micro evidence: Handbury and Weinstein (2011) estimate that the variety-city size elasticity is around 0.25, Mazzolari and Neumark (2012) find that immigration associated with increased diversity in restaurants.

"Dynamics"


Welfare Change
.05
0
−.05
−.1
−.15
−.2
−.1
0
.1
.2
.3
Population Change in Counterfactual
Long−Run
Short−Run

The Short run

- Welfare in North countries would be practically unchanged,
  On average welfare change -0.4%.
- All countries in the South would be substantially worse off.
  On average welfare change -3.3%.

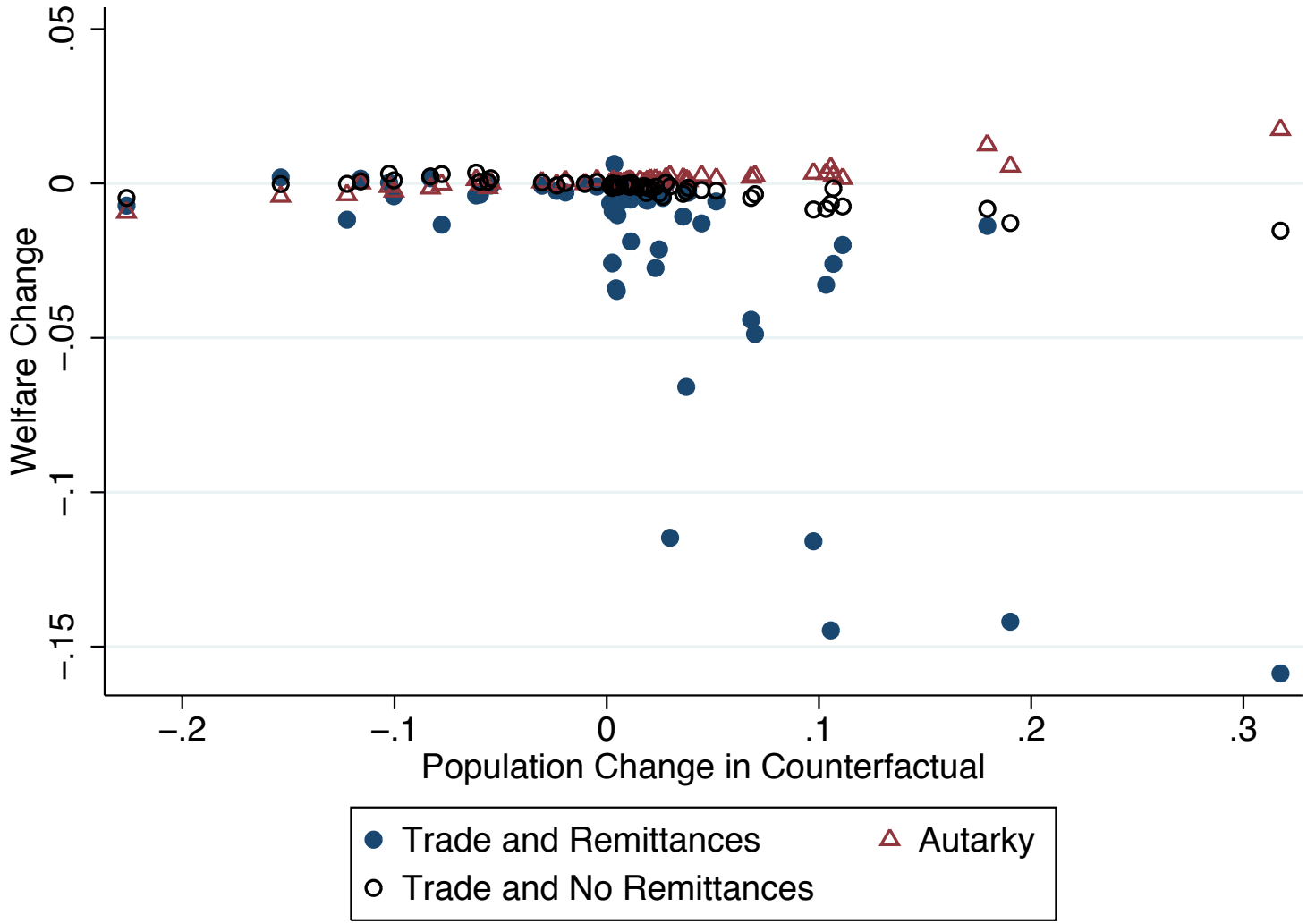
The short run: Mechanisms

- In the North, the exit of firms triggered by return migration affects only the lowest-productivity firms. So the reduction in variety hardly affects welfare.

$$n_i G(a_{ii})$$

- In South, return migrants are employed in new, low-productivity firms.
- However, loss of remittances swamps gains from increased domestic variety.

The Short Run



The role of Trade

Short run

- Keep **remittances constant** in baseline and counterfactual
- In Autarky return migration would increase welfare (slightly) in receiving country. Quantitatively, small effect reflects fat-tailed distribution in firm size (Axtell 2001, di Giovanni and Levchenko 2010).
- Under Trade the gains from increased domestic variety are smaller than the loss due to fewer import varieties. Worldwide reduction in efficiency units of labor.

Alternative Scenarios Efficiency of Labor

- Imperfect skill transferability
- Migrant Selection

Scenario 2: Imperfect Skill Transferability

- Previous results suggest a large worldwide increase in welfare as a result of international migration
- Migrants overwhelmingly go from low to high TFP countries. This raises the world's efficiency units of labor.
- Biased upward if migration entails skill loss.
- Let's assume that one immigrant equals $\phi_i = 0.75$ natives in terms of efficiency units of labor (Hendricks 2002).
- By reducing the gains from in-migration, welfare loss associated to return migration is now smaller in the North.
- No noticeable changes in South.

Scenario 3: Migrant Selection

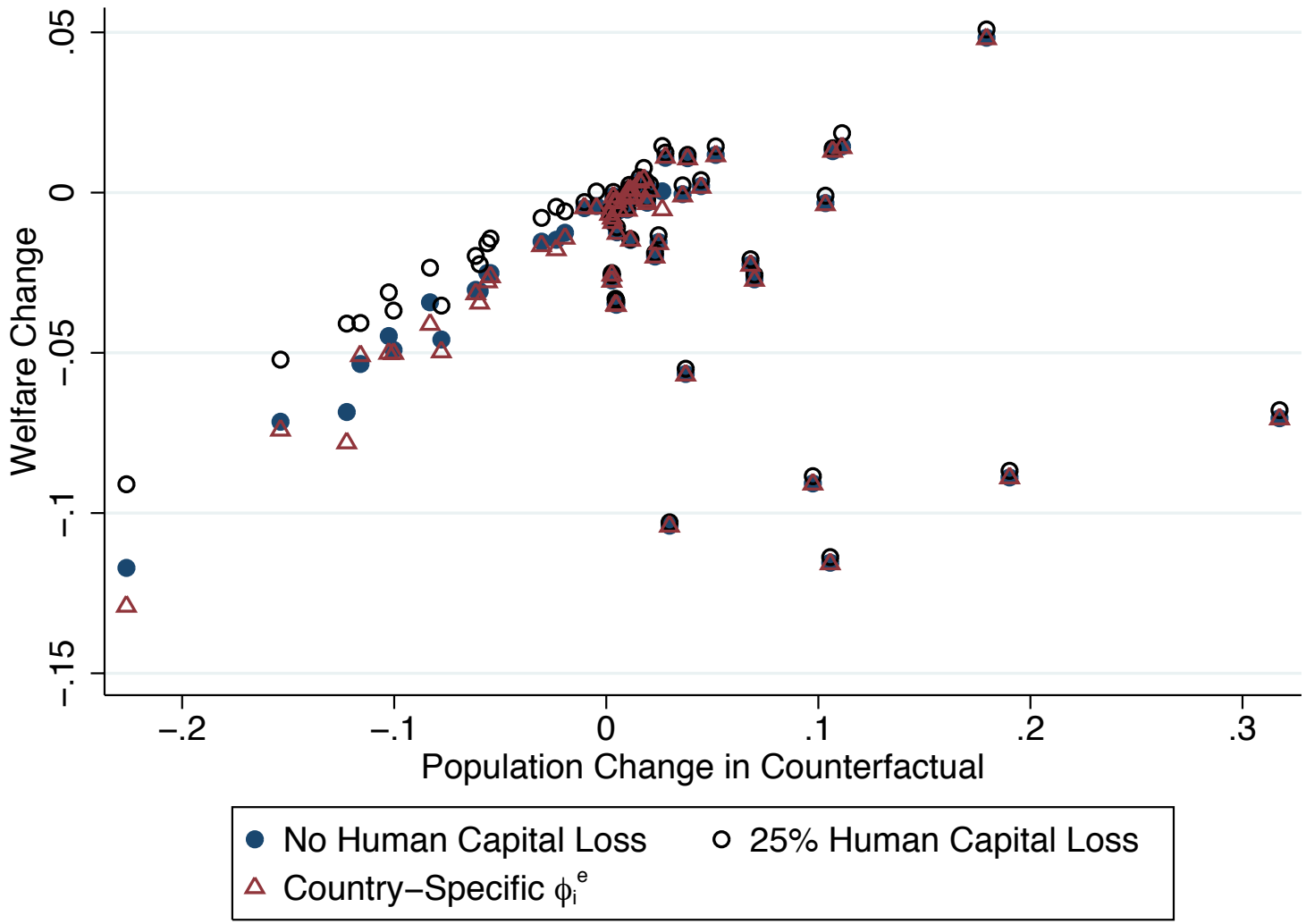
- US data shows that some immigrant groups earn more than comparable natives while other groups earn less. Suggestive of positive and negative selection, respectively (Borjas 1987).
- We allow for origin-specific selection. Following Hendricks (2002), we measure on the basis of US earnings data:

$$\phi_i^e = \frac{W_{US,i}^e}{W_{US,US}^e}, \text{ for } e = \ell, h$$

- Assumption: relative native-immigrant productivity for, say, Mexicans is the same in the US and in Canada.
- Negative selection for MEX, positive for ITA and NZL
- Slightly larger losses for North. Reflects average positive selection observed in data.

Selection vs. Imperfect Transferability

Long run



Conclusion

- International migration is welfare-enhancing for practically all countries in the world.
  - For migrants themselves, very large welfare gains. Probably higher than cost of migration.
- The North benefits from the increase in domestically produced varieties (scale effect).
- The South benefits mainly through remittances. They swamp scale effect.
- Trade mitigates the welfare effects of migration.
- Underlying these effects, migrants overwhelmingly migrate from low to high TFP countries, increasing worldwide efficiency units of labor.