Misallocation of the Immigrant Workforce: Aggregate Productivity Effects for the Host Country

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Motivation

- The impact of immigrants on the aggregate productivity of the destination country through an allocative channel has been under-explored in the literature.
- If immigrants, relative to natives, face more frictions that prevent them from working in their preferred occupations, immigration might increase occupational misallocation, resulting in a loss of aggregate productivity.
- This paper:
  - Uses the Venezuelan exodus to Colombia in 2015-2019 to assess whether the occupational misallocation is effectively larger for immigrants in a period of mass migration.
  - Derives its implications for the aggregate productivity of the host country (Colombia).

Preview

- First, we show reduced-form evidence suggesting more labor misallocation for immigrants:
  - Although immigrants have on average more years of education than non-migrants, they tend to work in occupations with lower requirements of education (relative to non-migrants).
  - There are significant residual income gaps for immigrants.
    - These gaps are the result of both a composition effect of equivalent immigrants working more in occupations with lower remunerations, and of the presence of within-occupations gaps.
    - The gaps are also time-variant and positively correlated with the fraction of immigrants in the workforce.
- Second, we use a model of occupational choice with frictions (discrimination and barriers preventing workers from choosing occupations) to quantify the extent of labor misallocation for immigrants and its implications for aggregate productivity.

Preview of results:

- Both types of frictions are present and are quantitative relevant.
- We conduct two counterfactual exercises to evaluate their importance:

1. Both and each set of frictions for immigrants is entirely removed.
   - At least one third of immigrants reallocate. The reallocation of the entire workforce rises total output by as much as 0.9%.
2. Immigrants' frictions are equalized to those inferred for natives.
   - At least 9% of immigrants reallocate, and aggregate productivity would increase as much as 0.4%.

- Finally, we show that our macroeconomic gains from our counterfactuals are robust to non-trivial variations in the calibrated parameters and to alternative specifications of our model.

Related Literature

- Misallocation of heterogeneous workers across sectors, locations or occupations in a context of self-selection:
  - Lagakos and Waugh (2013), Adamopoulos et al. (2017), Hsieh et al. (2019), Bryan and Morten (2019), Pulido and Święcki (2020)
- Educational mismatch of immigrants to jobs:
  - Chiswick and Miller (2011), Nielsen (2011), Joona et al. (2014), McDonald and Worswick (2015), Borjas et al. (2019).
- Matching of immigrants and local firms:
  - Orefice and Peri (2020), Burzynski and Gola (2019)
- Effects of immigration on aggregate productivity:
  - Peri (2012), Lewis (2013), Hornung (2014), Ortega and Peri (2014), Aleksynska and Tritah (2015)
- Discrimination for immigrants:
  - Rydgren (2004), Oreopoulos (2011), Weichselbaumer (2017).
- Economic effects of Venezuelan immigration in Colombia:
  - Peñaloza (2019), Santamaria (2019), Caruso et al (2019), Bonilla et al (2020), Knight and Tribin (2020), Bahar et al (2020).

Venezuelan Exodus

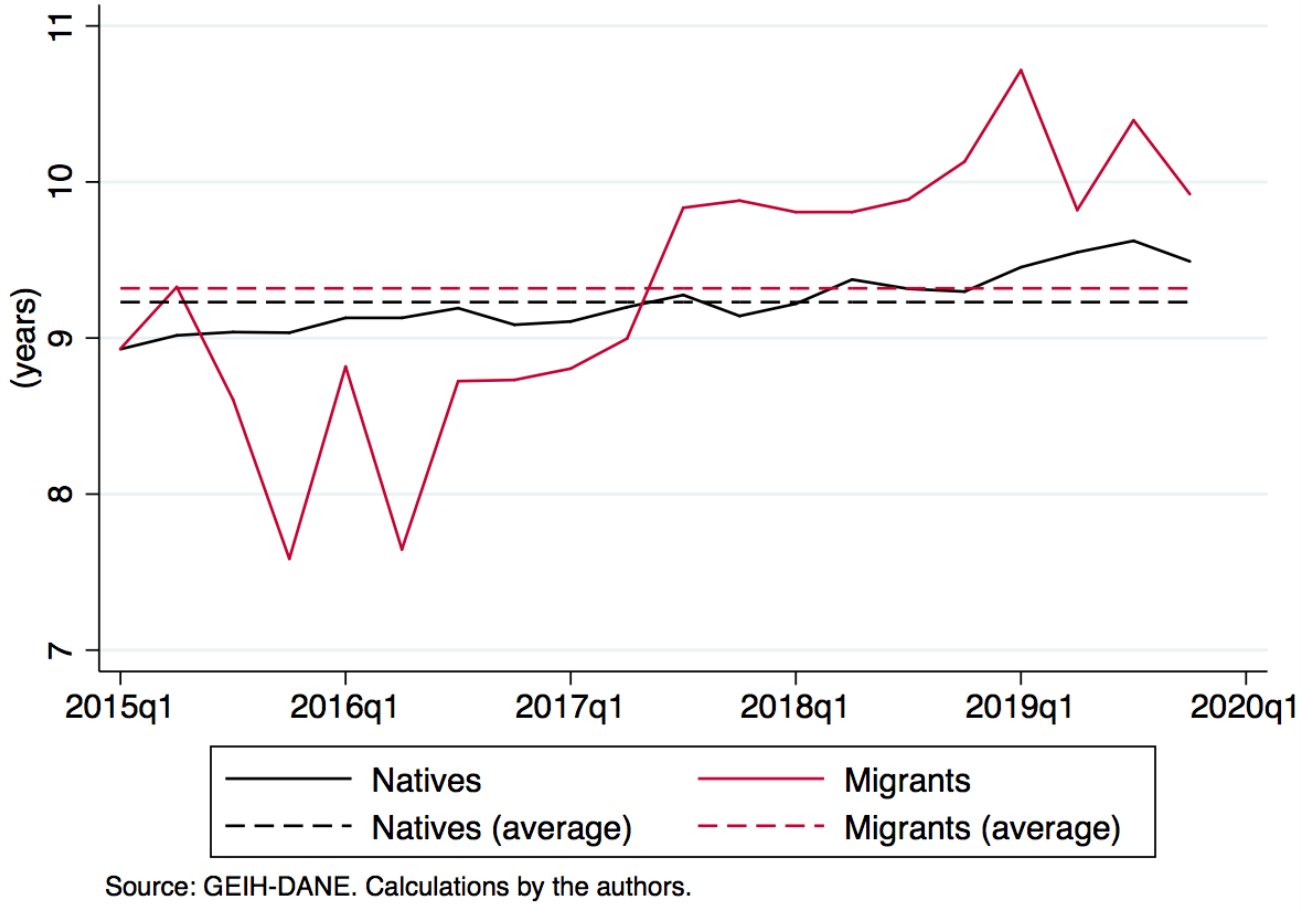
- The "Venezuelan exodus" began at the end of the presidency of Hugo Chávez and was exacerbated during the presidency of Nicolás Maduro.
  - These governments were characterized by the implementation of a series of socialist reforms: land expropriations, nationalizations, price and currency controls, systematic restrictions on private businesses (Vera, 2015; Gutiérrez S., 2017).
  - Coupled with political mismanagement and a downfall in oil prices, the country suffered by 2015 the worst economic crisis in its history, marked by hyperinflation, shortages of food and medicine and looting (Mauricia, 2019; O'Neil, 2019).
- According to the UN Refugee Agency (UNHCR) from 2015 to 2019 an estimated of 4.5 million people fled Venezuela; Colombia was by far the main receptor of migrants (around 2 millions at the end of 2019)

Data

- Colombian household survey (GEIH) is uniquely well fitted for our goals:
  - Period of time: 2015-2019
  - Detailed information on demographics, labor and migration.
  - More than 300000 observations in sample
- Main outcome variable is monthly income converted to constant Colombian pesos of 2015
- Main sample consists of workers after they finish schooling but prior to their retirement (25-70)
  - To control for the age composition of the migrant population, because is more biased towards people in productive ages.
- We consider the 30 most representative occupations in the survey.

Empirical facts (I)

Fact 1: *Migrants have equal or slightly higher levels of education than natives.*



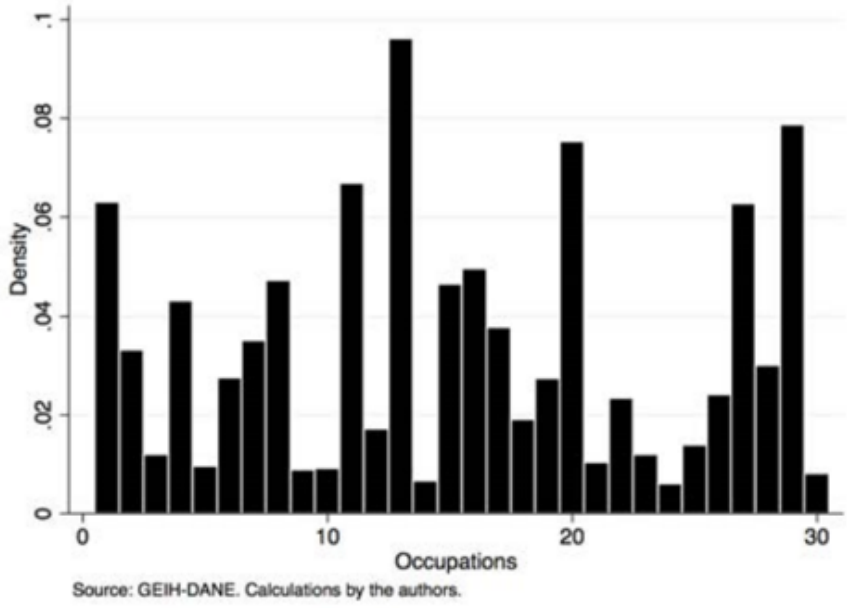
Source: GEIH-DANE. Calculations by the authors.

Empirical facts (II)

Fact 2: *The occupational allocation of immigrants is more concentrated into occupations with lower skills requirements.*

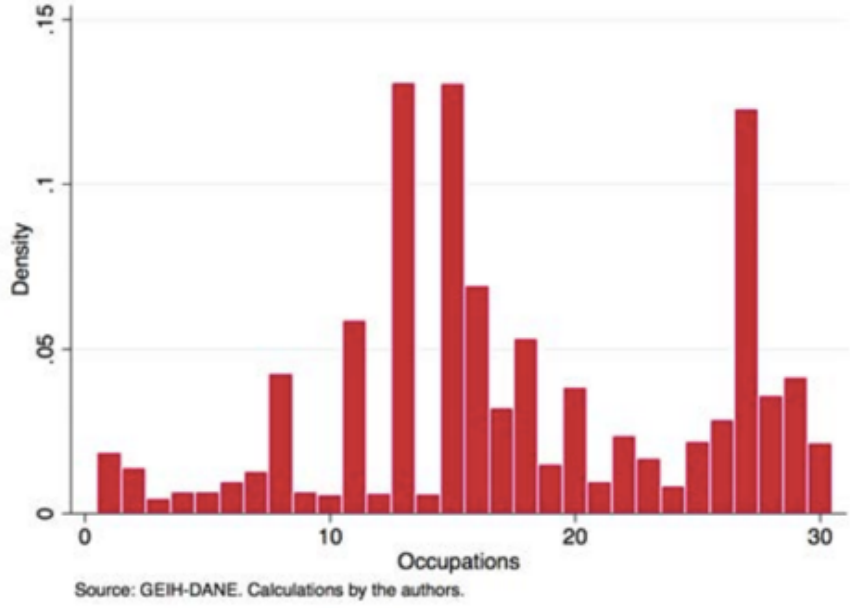
Figure 3 – Occupational Distribution

(a) Natives



Source: GEIH-DANE. Calculations by the authors.

(b) Migrants



Source: GEIH-DANE. Calculations by the authors.

Estimating Income Gaps for immigrants

Fact 3: *There are significant residual income gaps for immigrants.*

- Let y_{islt} denote income of an individual i working in occupation s, living in province l in quarter t. We estimate the equation,

$$ln\, y_{islt} = X_{it}\beta + \phi I_i + D_l + D_t + \varepsilon_{islt}$$

- X_{it} refers to a series of Mincerian controls, D_l and D_t are province and time fixed effects.
- I_i is an indicator of whether individual i is migrant, so ϕ captures the migrant premium of interest.
- Robust standard errors are clustered at the municipality level.
- Labor income includes both wages and fringe benefits for salaried workers, and net-profits from personal business in the case of non-salaried or self-employees.

Empirical facts (III-A)

Fact 3A: *Migrants on average perceive a residual labor income 33.6 log points [lp.] (or 40%) lower than non-migrants.*

	ln(income)
Migrant	-0.336***
	(0.057)
Gender	0.530***
	(0.072)
Experience	0.054***
	(0.001)
Experience sq.	-0.001***
	(0.00)
Education	0.111***
	(0.003)
Observations	1,502,537
R-squared	0.346
Location FE	YES
Time FE	YES
Occupation FE	NO

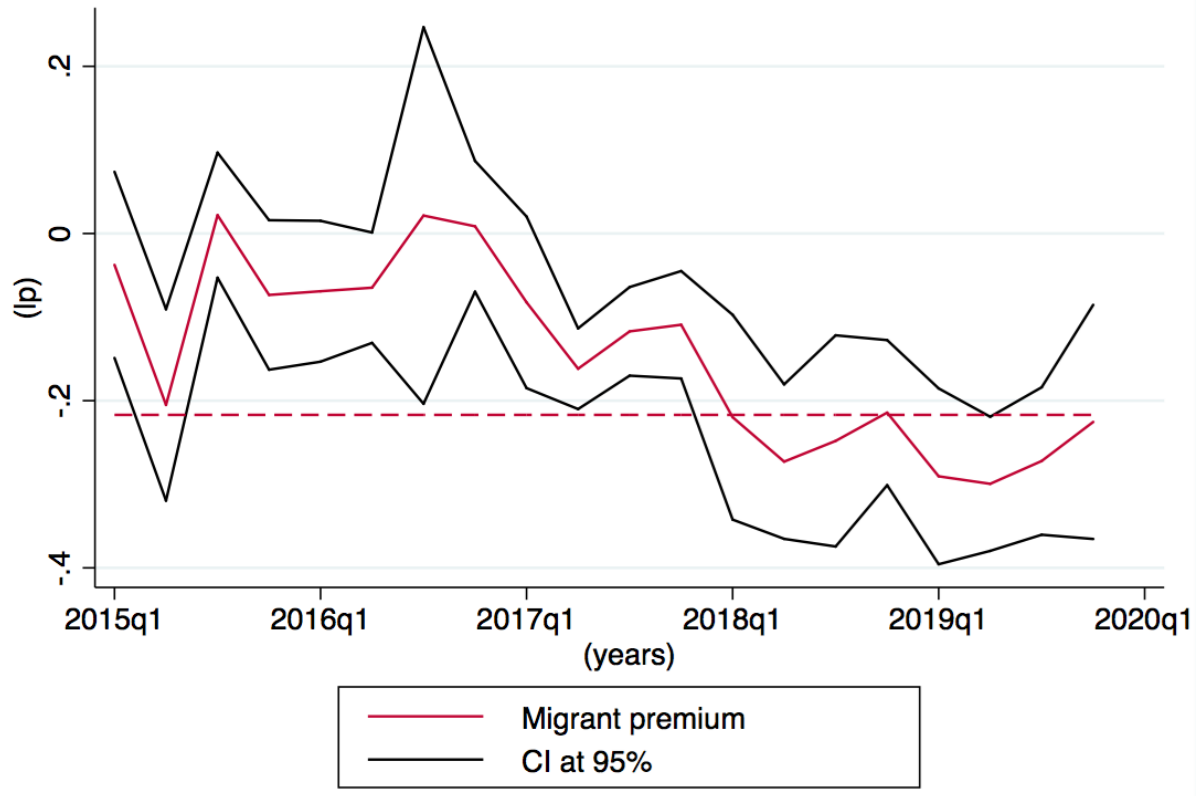
Empirical facts (III-B)

Fact 3B: *The income gap for immigrants is consequence of both, within occupation premia and the composition effect of immigrants with similar observables working in occupations with lower remunerations.*

	ln(income)	ln(income)
Migrant	-0.336***	-0.217***
	(0.057)	(0.043)
Gender	0.530***	0.431***
	(0.072)	(0.087)
Experience	0.054***	0.049***
	(0.001)	(0.002)
Experience sq.	-0.001***	-0.001***
	(0.00)	(0.00)
Education	0.111***	0.077***
	(0.003)	(0.003)
Observations	1,502,537	1,502,537
R-squared	0.346	0.401
Location FE	YES	YES
Time FE	YES	YES
Occupation FE	NO	YES

Empirical facts (III-C)

Fact 3C: *The migrant premium evolves over time and is correlated with the inflow of migrants.*



Source: GEIH-DANE. Calculations by the authors.

Reduced Form Results: Recap and Interpretation

- Taken together, our empirical findings in both occupational allocations and incomes point to the possibility that immigrants have their workforce more missallocated accross occupations than natives.
- However, in a context with self-selection across occupations, neither the residual income-gaps nor the allocations by themselves provide enough evidence about the existence and the magnitude of the frictions.
  - Consider the case of discrimination:

1. Discrimination works as a "tax".
2. Only immigrants with high enough unobservable skills are not going to be deterred to work in an occupation
3. So the higher skills on average can compensate the discrimination "tax".

Theoretical Model

- We introduce a simple discrete-time Roy model of occupational choice:
  - Two groups of workers: immigrants (I) and natives (N).
  - Two types of frictions: discrimination and involuntary choices.
- We first present our model with no frictions based on HHJK (2019).
- Next, we show how to generalize this basic framework to introduce each type of our frictions.

Frictionless Economy (I)

- Workers from a group $g = I, N$ choose an occupation i at time t from a set of M ocupations.
- Workers are endowed by unobservable heterogeneous abilities ε_i, and possess an amount of human capital:

$$h_{igt} = \overline{h}_{ig} a_{igt}^{\gamma} s_{ig}^{\phi_i}$$

  - $\overline{h}_{ig}$ represents permanent differences in human capital common to the group g in occupation i
  - a_{igt} is a mesure of experience
  - s_{ig} is a mesure of education attainment
  - γ and ϕ_i capture the returns to experience and education respectively.
- Collapse in $x_{igt} = a_{igt}^{\gamma} s_{igt}^{\phi_i}$ so $h_{igt} = \overline{h}_{ig} x_{igt}$

Frictionless Economy (II)

- We assume abilities draws ϵ_i are drawn from a multivariate Fréchet distribution:

$$F(\epsilon_1, ..., \epsilon_M) = exp\left[-\sum_i^M \epsilon_i^{-\theta}\right]$$

- For her labor supply at time t, worker receives the value of her efficiency units of labor

$$y_{igt} = w_{it}\epsilon_i h_{igt}$$

  - w_{it} the price per efficiency unit of labor in occupation i at time t

Frictionless Economy (III)

- The worker's problem is thus to choose her occupation at the beginning of period t that maximizes her contemporaneous utility:

$$V_{igt} = \max_i \{U_{igt}\} = \max_i \{z_{igt} c_{igt}\}$$

  - c_{igt} their consumption at time t
  - z_{igt} parameter that measures the common utility benefit of all members of society from working in occupation i

Frictionless Economy (IV)

- We abstract from firm heterogeneity and instead assume that a representative firm produces final output Y from workers in the M occupations according to a CES technology:

$$Y_t = \left\{ \sum_i^M \left[A_{it} \sum_g^G q_{gt} p_{igt} \mathbb{E}\left(h_{igt} \epsilon_{ig}\right) \right]^{\frac{\sigma-1}{\sigma}} \right\}^{\frac{\sigma}{\sigma-1}}$$

  - A_{it} is the exogenous productivity of occupation i at time t
  - q_g is the total amount of workers in group g at time t
  - σ is the elasticity of substitution across occupations
  - p_{igt} is the share of workers of group g who choose occupation i at time t
  - $\mathbb{E}\left(h_{igt} \epsilon_{ig}\right)$ is a measure of the average quality of workers of group g who choose occupation i at time t

- General equilibrium definitions: ▸ Equilibrium

Type I of frictions: Discrimination against immigrants

- Assuming only immigrants face discrimination, workers' income becomes:

$$y_{igt} = (1 - \tau_{ig})\, w_{it} \epsilon_i h_{igt}$$

- $\tau_{ig} = 0$ if $g = N$ because discrimination works as a "tax" only on immigrants earnings, where $\tau_{ig} \in [0, 1]$

Type II of frictions: Involuntary occupation choices

- A fraction of workers are forced to make involuntary occupational choices
- We allow this fraction to be possibly different between immigrants and natives.
- We assume that at the beginning of each period every worker gets a random draw, such that a worker will be able to choose the occupation they desire with probability $1 - \alpha_g$, and they will be forced to work in any other occupation, assigned randomly, with probability α_g.
- We allow for α_g to be time-variant (α_{gt}) for immigrants to reflect the fact that this type of frictions could depend, for instance, on how sluggish their labor market is or on policy reforms.

Occupational shares and wage premia

Corollary

The income gap for immigrants in occupation i at time t (IG_{it}) defined as the ratio of the geometric average of earnings of immigrants ($\hat{y}_{ilt}$) relative to the same average for natives ($\hat{y}_{iNt}$), is given by:

$$IG_{it} \equiv \frac{\hat{y}_{ilt}}{\hat{y}_{iNt}} = (1-\tau_{il}) \frac{\overline{h}_{il}\hat{x}_{ilt}\left(\widetilde{p}_{ilt}\right)^{\frac{1}{\theta}(\delta_{ilt}-1)}}{\overline{h}_{iN}\hat{x}_{iNt}\left(\widetilde{p}_{iNt}\right)^{\frac{1}{\theta}(\delta_{iNt}-1)}} \qquad (1)$$

where:

$$p_{igt} = (1-\alpha_{gt})\tilde{p}_{igt} + \alpha_{gt}M^{-1}$$

and

$$\delta_{igt} = \frac{\alpha_{gt}}{Mp_{igt}}$$

is the share of workers within an occupation i who do not voluntary chose such occupation. ▸ Propositions

Inference procedure

- Our procedure to quantify the extent of occupational misallocation for immigrants relies on finding the magnitudes of the frictions x_{jl} and ϕ_{gt} for which the system of equations (1) fits best the data.
- For our baseline results, we assume $\overline{h}_{ig} = 1 \forall\ i, g$, so immigrants have on average the same permanent components of talent than natives in each occupation.
- In our robustness checks we present alternatives to this assumption, modifying our model specification to infer values of $\overline{h}_{jl}$ for each i.
- Parameters γ and ϕ_i are taken from mincerian regressions.
- We only need to calibrate θ; procedure based on model implications for wage dispersion.

Results for frictions

	$\forall\ t$	2015	2016	2017	2018	2019
Magnitudes of estimated frictions						
$Var\left[(1+\tau_{il})\right]$	0.10			-		
$\alpha_{I,t}$		5.1%	3.8%	5.6%	8.1%	9.2%
α_N	4.7%			-		

Variance of wedges $= 0.10$ implies a considerable dispersion of our estimated wedges: their values fluctuate between 0.3 times the median wedge and 1.7 times the median wedge.

▸ Values of wedges ▸ Model fit

Counterfactuals

- How would occupational allocations and aggregate productivity change when implementing two reforms:

1. Removing entirely frictions for immigrants
2. Equalizing immigrants' frictions to those found for natives

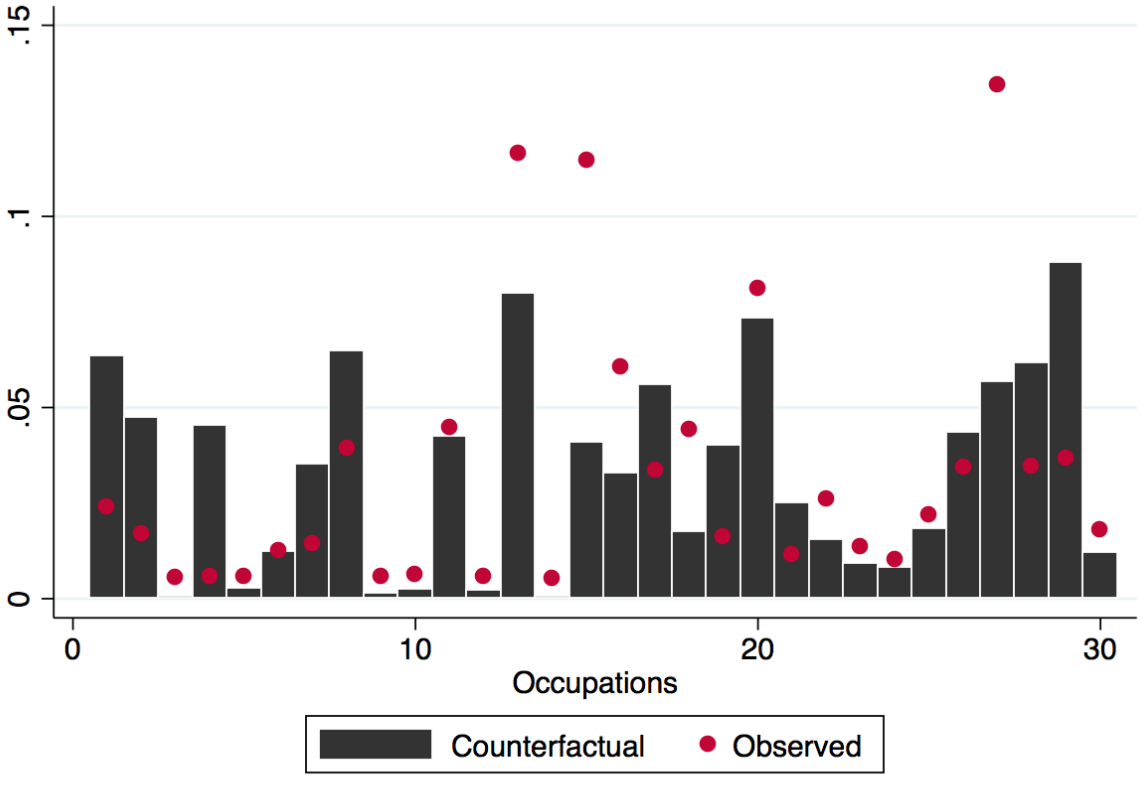
Procedure for counterfactuals

- First, we need to solve for the remaining exogenous variables of the model: Group-specific preferences for a given occupation z_{igt}, and the exogenous productivities of each occupation i, A_{it}. ▸ Results
  - These variables are kept constant when our counterfactual exercises are performed.
  - We solve for these values jointly with the equilibrium values of y_{it} and w_{it} for the observed economy using the ▸ Equilibrium conditions, model implications and the normalization $z_{igt} = 1$ for $i = 1$.
- The procedure needs a value of σ, the elasticity of substitution among occupations, a parameter that we make equal to 3 in our baseline results.
  - We explore robustness to setting it as low as 2 or as high as 5 in the next subsection.

Reform I: Removing frictions for immigrants

- We first evaluate the counterfactual of removing entirely both types of frictions for immigrants ($\tau_{iI} = 0, \alpha_{I,t} = 0 \; \forall \; i, t$) .
- Around 30% of immigrants in each year would reallocate; immigrants gain participation in high skilled occupations

Occupation allocation for immigrants: Observed and counterfactual



Source: Calculations by the authors

Reform I: Removing frictions for immigrants

- Reallocation of immigrants would increase total output by as much as 0.9% (in 2019)
- By removing each type of friction separately, we find that discriminatory wedges have larger implications.

Results of counterfactuals: Reform I	**2015**	**2016**	**2017**	**2018**	**2019**
-Productivity gains (%):					
Both types: $\tau_{il} = \alpha_{I,t} = 0 \, \forall \, i, t$	0.06	0.12	0.21	0.58	0.90
Only type I:$\tau_{il} = 0 \, \forall \, i$	0.05	0.09	0.16	0.40	0.61
Only type II:$\alpha_{I,t} = 0 \, \forall \, t$	0.01	0.02	0.04	0.14	0.23
- Share of immigrants reallocated (%):					
Both types: $\tau_{il} = \alpha_{I,t} = 0 \, \forall \, i, t$	31.08	31.18	32.24	30.95	29.41
Only type I: $\tau_{il} = 0 \, \forall \, i$	30.00	30.40	30.93	29.31	27.92
Only type II: $\alpha_{I,t} = 0 \, \forall \, t$	2.36	1.60	2.13	3.37	3.86
- Share of natives reallocated (%):					
Both types: $\tau_{il} = \alpha_{I,t} = 0 \, \forall \, i, t$	0.04	0.07	0.11	0.26	0.38
Only type I: $\tau_{il} = 0 \, \forall \, i$	0.03	0.07	0.11	0.25	0.36
Only type II: $\alpha = 0 \, \forall \, t$	0.00	0.00	0.00	0.02	0.04

Ref. II: Equalizing immigrants' frictions to those of natives

- Now we:

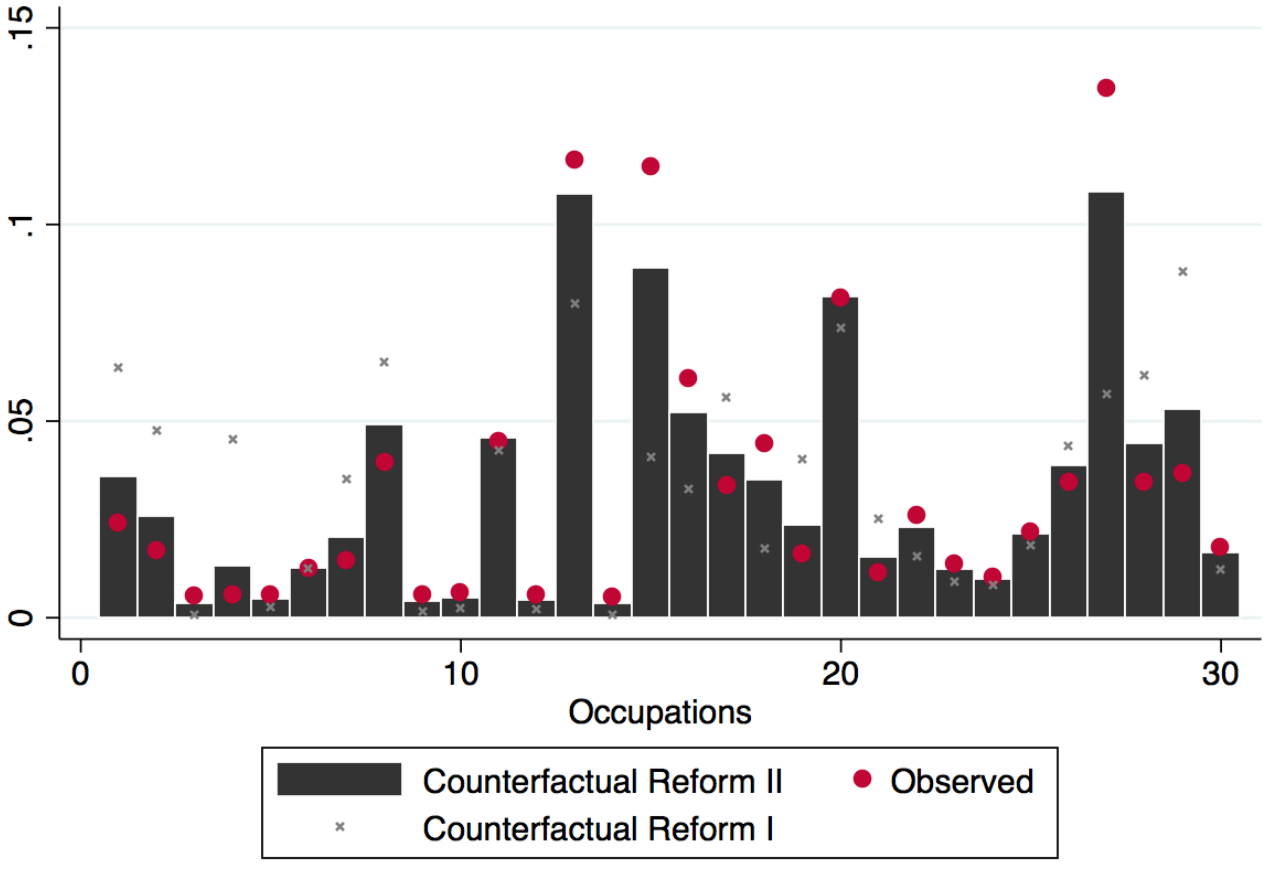
1. Equalize fractions of immigrants that are forced to make involuntary choices to the value estimated for natives: $\alpha_{gt} = \alpha_N$
2. Reduce the variance of wedges to a level that reflects the prevalent discrimination in the labor market for natives.

- For 2), we re-estimate our model for sub-groups of natives for which one could presumably argue there would be discrimination against them (women and rural workers), constraining $\alpha_{gt} = \alpha_N$.
  - 4 subpopulations: urban-men (UM), rural-men (RM), urban-women (UW), and rural- women (RW); assuming UM do not face discrimination.
  - We obtain a variance of wedges equal to 0.03 for RM, 0.08 for UW and 0.10 for WR (these numbers imply a pooled variance of 0.047)
  - So we shrink immigrants' wedges until their variance $= 0.047$.

Ref. II: Equalizing immigrants' frictions to those of natives

- Reform II reallocates 9.1% of immigrants. This new allocation is half way between the observed one and the obtained in the first reform.

Occupation allocation for immigrants: Observed and counterfactual



Source: Calculations by the authors

Ref. II: Equalizing immigrants' frictions to those of natives

- Colombian aggregate labor productivity would permanently increase up to 0.4% due to the "assimilation" of the immigrant workforce in 2019.

Results of counterfactuals: Reform II	**2015**	**2016**	**2017**	**2018**	**2019**
Productivity gains (%):	0.02	0.04	0.08	0.24	0.38
Share of workers reallocated (%):					
Immigrants:	10.21	10.31	10.55	9.69	9.11
Natives:	0.01	0.02	0.04	0.08	0.12

Robustness

- Robustness to parametrization: θ, σ ▸ Results
- Robustness to specification: Differences in $\frac{\bar{h}_{il}}{\bar{h}_{iN}}$, time-variant discrimination $(1 + \tau_{ilt})$ ▸ Results

Conclusions

- Mass migrations can affect the aggregate productivity of the host country if immigrants are more misallocated in the labor market relative to natives.
- Information only from residual income gaps or occupational allocations is not enough to distinguish misallocation from sorting: We need a model to discipline both empirical findings.
- Armed with the model, we infer how costly the frictions for immigrants are for Colombian allocative efficiency.
  - We find that by eliminating all frictions for immigrants, Colombian aggregate labor productivity could increase permanently by approximately 0.9%.

Avenues for future research

- For tractability, our model abstracts from capital or the use of other inputs, so our implications for aggregate productivity are limited to the effect of labor misallocation only.
  - Here, dynamic considerations could also matter.
- We made particular choices about the functional form of the talent distribution (Fréchet) and the specification of frictions, collecting previous ways in the literature to generate occupational misallocation of self-selecting workers while keeping the problem analytically tractable.
  - There is room for further exploration of the consequences of moving towards more general specifications.

Thanks!

Equilibrium definitions

1. The definition of the total supply of efficiency units of labor of each group in each occupation, H_{igt}^{supply}, which aggregates individual choices:
$$H_{igt}^{supply} = q_{gt} p_{igt} \mathbb{E}(h_{igt} \epsilon_{ig})$$
2. The definition of the total demand of efficiency units of labor of each group in each occupation, H_{igt}^{demand}, given by firm profit maximization:
$$H_{igt}^{demand} = A_{it}^{\sigma-1} w_{it}^{-\sigma} Y_t$$
3. Total output given by the production function in equation (6), which in equilibrium is also equal to aggregate wages plus total revenues from τ:
$$Y_t = \sum_i \sum_g w_{it} \mathbb{E}(h_{igt} \epsilon_{ig})$$
4. w_{it} is the value that clears each occupational labor market:
$$H_{igt}^{supply} = H_{igt}^{demand}$$

▸ Return 1 ▸ Return 2

Occupational shares and wage premia

- Denote the overall "reward" that someone from group g with the mean ability obtains by working in occupation i at time t:

$$\widetilde{w}_{igt} \equiv (1-\tau_i) w_{it} \overline{h}_{it} x_{igt} z_i$$

Proposition 1

The share of workers of group g who work in occupation i p_{igt} is given by:

$$p_{igt} = (1-\alpha_{gt})\tilde{p}_{igt} + \alpha_{gt} M^{-1}$$

where:

$$\widetilde{p}_{igt} = \frac{\widetilde{w}_{igt}^{\theta}}{\sum_s \widetilde{w}_{sgt}^{\theta}}$$

Occupational shares and wage premia

Proposition 2

The geometric average of abilities of the group g in an occupation i at time t is given by:

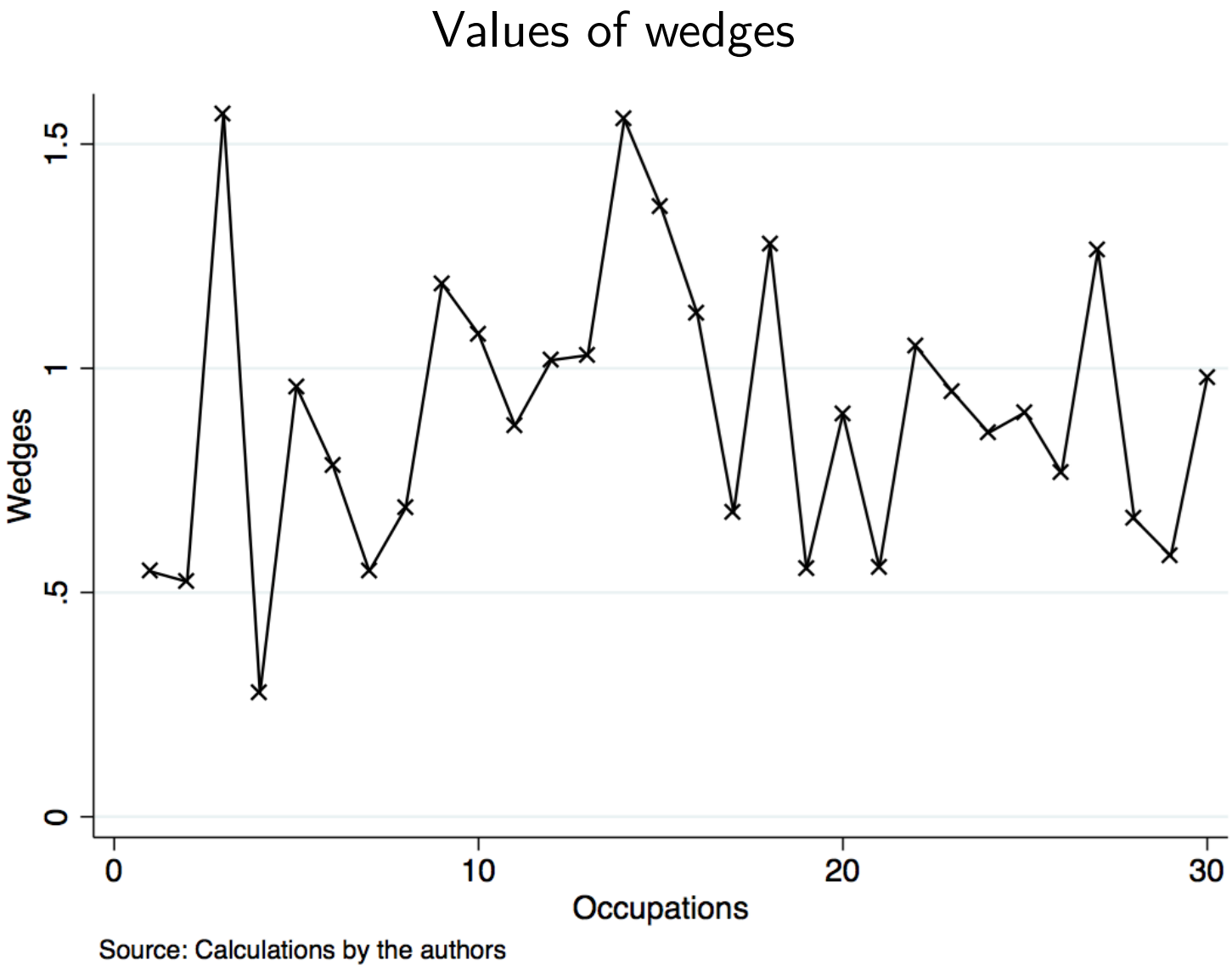
$$\hat{\epsilon} = \widetilde{\Gamma}\left(\frac{1}{\widetilde{p}_{igt}}\right)^{\frac{1}{\theta}(1-\delta_{igt})}$$

where:

$$\delta_{igt} = \frac{\alpha_{gt}}{Mp_{igt}}$$

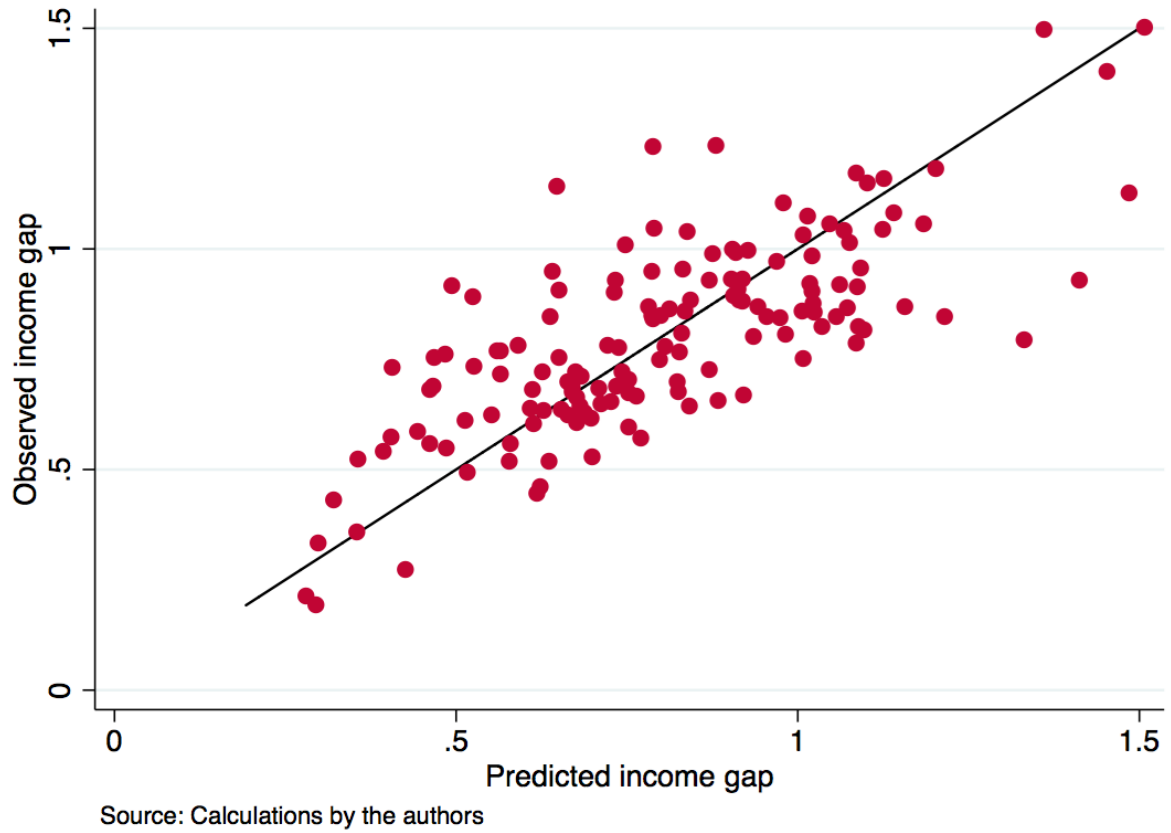
is the share of workers within an occupation i who do not voluntary chose such occupation. ▸ Return

Inference results in baseline: Wedges



Return

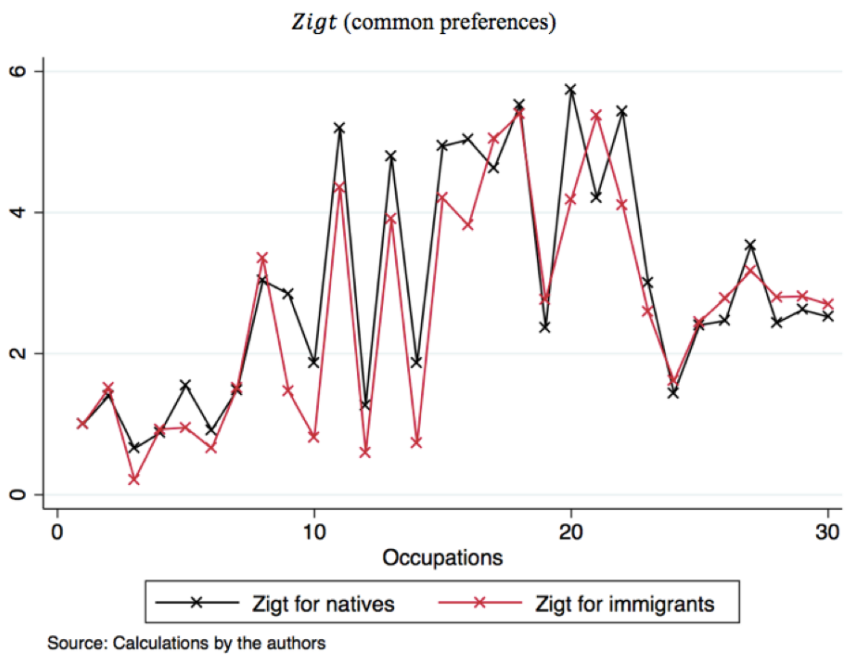
Model fit



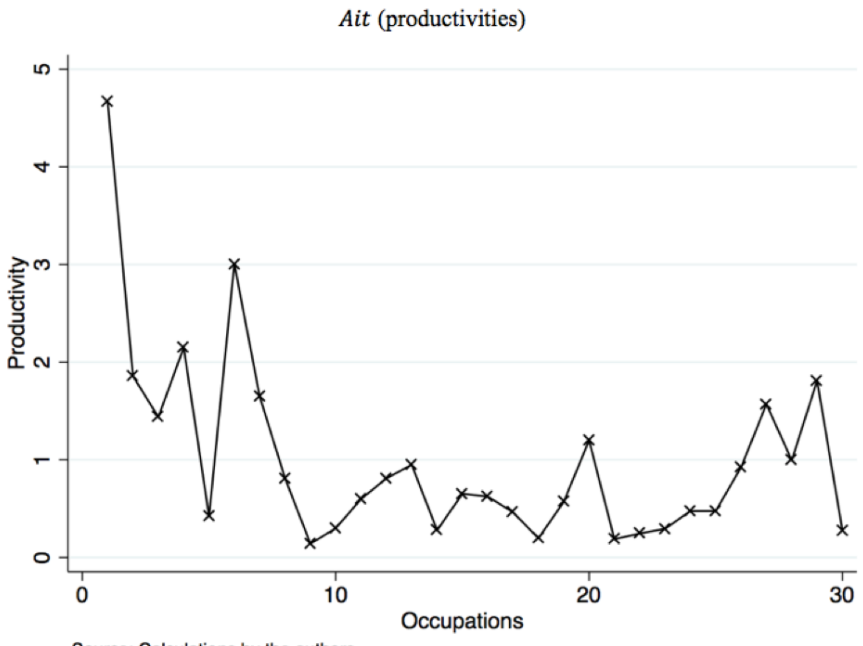
- There is a strong positive association between the observed and predicted income gaps, with a relatively high correlation coefficient (0.73).

Return

Results for exogenous variables



Source: Calculations by the authors



Source: Calculations by the authors

▸ Return

Robustness to parametrization: Changes in θ

	(1) Baseline	(2) Low θ	(3) High θ
Calibrated parameters			
θ	2.35	1.50	3.50
σ	3.00	3.00	3.00
Results of counterfactual exercises for 2019			
Reform I			
- Productivity gains (%):			
Both types:$\tau_{il} = \alpha_{I,t} = 0 \,\forall\, i, t$	0.90	0.73	0.94
Only type I: $\tau_{il} = 0 \,\forall\, i$	0.61	0.45	0.65
Only type II: $\alpha_{I,t} = 0 \,\forall\, t$	0.23	0.24	0.21
- Share of reallocated workers (%) [immigrants, natives]:			
Both types:$\tau_{il} = \alpha_{I,t} = 0 \,\forall\, i, t$	[29.4, 0.4]	[23.9, 0.1]	[39.4, 0.7]
Only type I: $\tau_{il} = 0 \,\forall\, i$	[27.9, 0.4]	[22.9, 0.1]	[36.3, 0.7]
Only type II: $\alpha_{I,t} = 0 \,\forall\, t$	[3.9, 0.0]	[3.1, 0.0]	[4.7, 0.1]
Reform II			
- Productivity gains (%):	0.38	0.30	0.46
- Share of reallocated workers (%) [immigrants, natives]:	[9.1, 0.1]	[9.1, 0.1]	[12.3, 0.2]

▸ Return

Robustness to parametrization: Changes in σ

	(1) Baseline	(4) Low σ	(5) High σ
Calibrated parameters			
θ	2.35	2.35	2.35
σ	3.00	2.00	5.00
Results of counterfactual exercises for 2019			
Reform I			
- Productivity gains (%):			
Both types: $\tau_{il} = \alpha_{I,t} = 0 \, \forall \, i, t$	0.90	0.84	0.96
Only type I: $\tau_{il} = 0 \, \forall \, i$	0.61	0.54	0.67
Only type II: $\alpha_{I,t} = 0 \, \forall \, t$	0.23	0.24	0.22
- Share of reallocated workers (%) [immigrants, natives]:			
Both types: $\tau_{il} = \alpha_{I,t} = 0 \, \forall \, i, t$	[29.4, 0.4]	[29.3, 0.5]	[29.6, 0.3]
Only type I: $\tau_{il} = 0 \, \forall \, i$	[27.9, 0.4]	[27.8, 0.5]	[28.0, 0.2]
Only type II: $\alpha_{I,t} = 0 \, \forall \, t$	[3.9, 0.0]	[3.9, 0.0]	[3.9, 0.0]
Reform II			
- Productivity gains (%):	0.38	0.36	0.39
- Share of reallocated workers (%) [immigrants, natives]:	[9.1, 0.1]	[9.1, 0.2]	[9.2, 0.1]

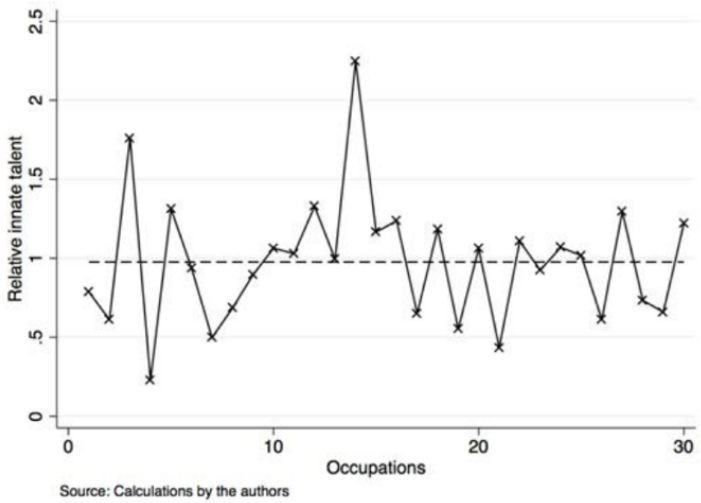
▸ Return

Robustness to specification: Differences in $\frac{\bar{h}_{iI}}{\bar{h}_{iN}}$

We explore robustness to two different model specifications

- The first aims to infer simultaneously values for $\frac{\bar{h}_{iI}}{\bar{h}_{iN}}$.
  - Since $\frac{\bar{h}_{iI}}{\bar{h}_{iN}}$ is undistinguishable from $(1+\tau_{iI})$, we have to change the specification of wedges.
  - An option is to assume discrimination has not always been present for immigrants, but only when their presence in the country was very noticeable to the public, so now $(1+\tau_{gIt}) = (1+\tau_{gI})$ for $t = 2017, 2018, 2019$, and 0 otherwise.

Innate Talent Differences $\frac{\bar{h}_{iI}}{\bar{h}_{iN}}$ in a Specification with Wedges Starting in 2017.



Source: Calculations by the authors

Robustness to specification: Differences in $\frac{\bar{h}_{il}}{\bar{h}_{iN}}$

Results of counterfactual exercises for 2019	(1) Baseline	(2) Inferring $\frac{\bar{h}_{il}}{\bar{h}_{iN}}$
Reform I		
- Productivity gains (%):		
Both types: $\tau_{il} = \alpha_{I,t} = 0 \, \forall \, i, t$	0.90	0.52
Only type I: $\tau_{il} = 0 \, \forall \, i$	0.61	0.29
Only type II: $\alpha_{I,t} = 0 \, \forall \, t$	0.23	0.21
-Share of reallocated workers (%) [immigrants, natives]:		
Both types: $\tau_{il} = \alpha_{I,t} = 0 \, \forall \, i, t$	[29.4, 0.4]	[21.4, 0.3]
Only type I: $\tau_{il} = 0 \, \forall \, i$	[27.9, 0.4]	[19.0, 0.2]
Only type II: $\alpha_{I,t} = 0 \, \forall \, t$	[3.9, 0.0]	[3.8, 0.0]
Reform II		
- Productivity gains:	0.38	0.31
-Share of reallocated workers (%) [immigrants, natives]:	[9.1, 0.1]	[7.6, 0.1]

▸ Return

Robustness to specification: Time-variant discrimination

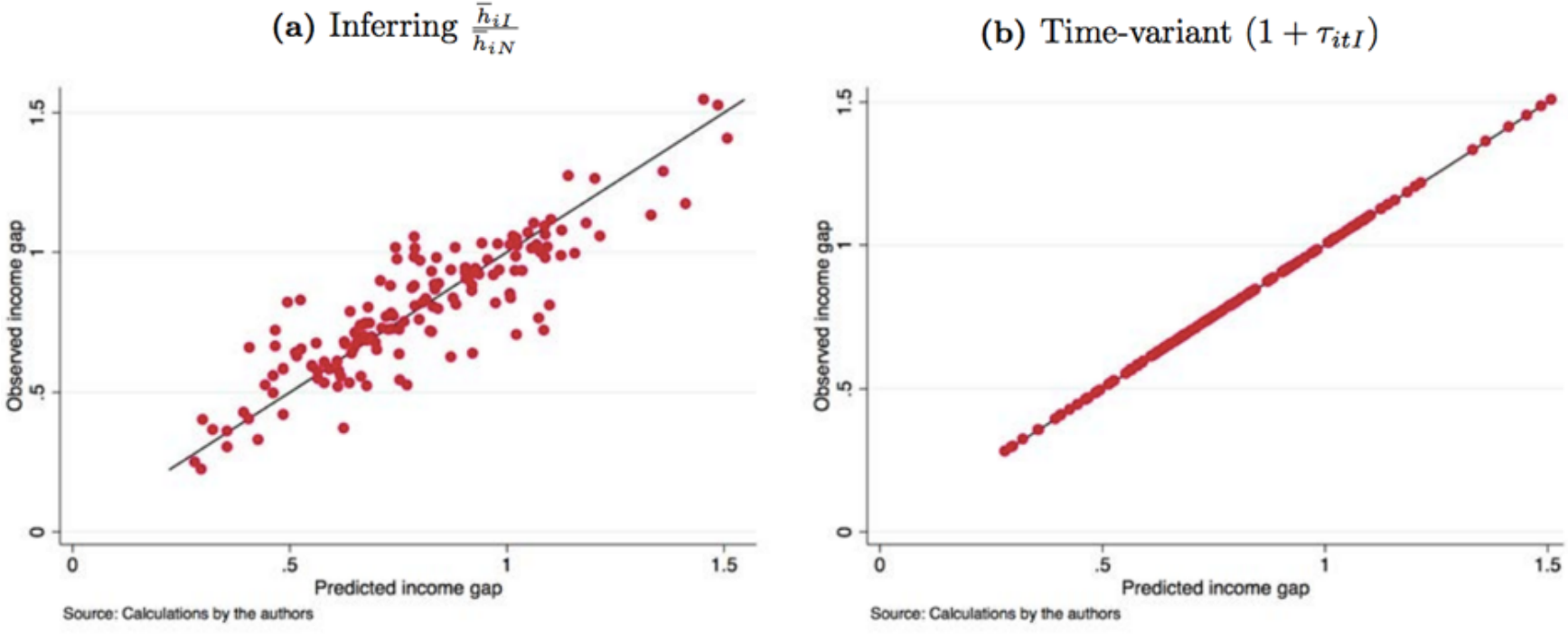
- Our second alternative specification allows us to consider time-variant discriminatory wedges.
- We return to our assumption $h_{ig} = 1$ and infer $(1 - \tau_{ilt})\,\forall\, i, t$.

Results of counterfactual exercises for 2019	Baseline	Time-variant $(1+\tau_{ilt})$
Reform I		
- Productivity gains (%):		
Both types: $\tau_{il} = \alpha_{I,t} = 0\,\forall\, i, t$	0.90	1.28
Only type I: $\tau_{il} = 0\,\forall\, i$	0.61	1.28
Only type II: $\alpha_{I,t} = 0\,\forall\, t$	0.23	-
-Share of reallocated workers (%) [immigrants, natives]:		
Both types: $\tau_{il} = \alpha_{I,t} = 0\,\forall\, i, t$	[29.4, 0.4]	[51.9, 0.6]
Only type I: $\tau_{il} = 0\,\forall\, i$	[27.9, 0.4]	[51.9, 0.6]
Only type II: $\alpha_{I,t} = 0\,\forall\, t$	[3.9, 0.0]	-
Reform II		
- Productivity gains:	0.38	0.53
-Share of reallocated workers (%) [immigrants, natives]:	[9.1, 0.1]	[12.9, 0.2]

▸ Return

Robustness to specification: Model fit

Model Fit under Alternative Specifications



▸ Return