Third-Country Effects of US Immigration Policy

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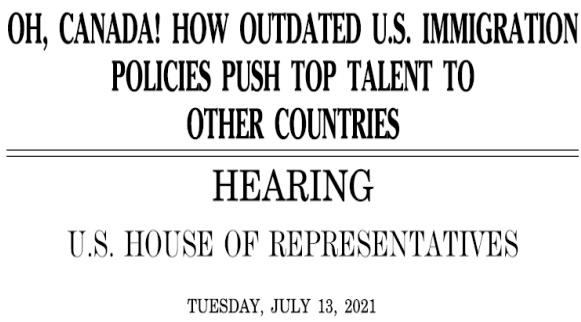
The views expressed are those of the authors and do not necessarily reflect those of the Bank of Canada.

What are the effects of US skilled immigration restrictions?

- The US restricts skilled immigration with the goal to protect American wages
- Anecdotal evidence that potential migrants to the US move to other developed countries



OH, CANADA! HOW OUTDATED U.S. IMMIGRATION POLICIES PUSH TOP TALENT TO OTHER COUNTRIES

HEARING

U.S. HOUSE OF REPRESENTATIVES

TUESDAY, JULY 13, 2021

Effects of US skilled immigration restrictions: a policy change in 2017

- Sudden tightening of the eligibility criteria of US visas for college-educated immigrants
- Followed by a sharp increase in US visa denial rates and skilled immigration to Canada

This paper:

- How do these restrictions affect Canadian skilled immigration, production, and welfare?
- How does the influx of workers to Canada and other economies impact American wages?
  - Does international trade mitigate the intended wage effect of the restrictions?

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What we do

Use quasi-experimental variation introduced by the policy, a new dataset, and a new model to:

1. **Document the effects of US restrictions on skilled immigration to Canada**
   - Variation across time and immigrant groups (occupation and nationality)
   - US work visa application data and new Canadian visa application data
2. **Document the effects of the inflow of skilled immigrants on Canadian firms**
   - Variation across time and firms differently exposed to the inflow of immigrants
   - Universe of immigration records and employee-employer records + international trade data
3. **Quantify welfare effects and the role of trade in mitigating intended effects**
   - Incorporate immigration policy in a multi-sector quantitative model of international trade
   - Calibrated based on our data and reduced-form estimates

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Preview of results: Effects of 2017 US skilled immigration restrictions

1. US restrictions led to a 30% higher level of Canadian applications in 2018

2. Canadian firms that were relatively more exposed to the inflow of immigrants:
   - Increased sales and exports
   - Increased employment of immigrant and Canadian workers
   - Paid lower wage bill per immigrant and Canadian worker

3. Quantitative model: general equilibrium (GE) effects of the spike in US visa denial rates
   - Welfare effect on American workers = Direct Effect + Indirect Competition and Price Effects
   - Overall welfare effects on Canadians $\approx 0.2\%$. Computer scientists: -3.4%, unskilled: 1.1%
   - Distributional effects in the U.S: computer scientists gain but unskilled workers lose
   - International trade dampens gains of American workers targeted for protection by up to 25%

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Contribution to the literature

- **Empirical literature on the labor market effects of immigration policies**
  - e.g., Peri et al., 2015; Clemens et al., 2018; Abarcar and Theoharides, 2021; Khanna and Morales, 2021; Beerli et al., 2021; Glennon, 2023; Kennan, 2013; Abramitzky et al., 2023
  - Offer quasi-experimental evidence of effects of immigration policy on third countries
- **Effects of skilled immigration on native-born workers and firms**
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  - Construct a novel measure of an exogenous aggregate supply shock of skilled labor
  - Quantify the aggregate effects of skilled immigration using a general equilibrium model
- **Literature of international trade and immigration**
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Roadmap of the talk

1. Data
2. US visa program and policy change in 2017
3. Effects of US restrictions on skilled immigration to Canada
4. Effects of increased skilled immigration on Canadian firms
5. Quantitative general equilibrium model

Data

1. **US H-1B visa application data:** $\sim$ 400k/year, FOIA requested
   - Worker's occupation and nationality
   - Application: approved or denied, new or continuing visa
2. **Canadian permanent residence visa application data**
   - New data on the universe of applications aggregated by occupation and nationality
3. **Canadian Employer-Employee data + immigration records + int'l trade data**
   - Worker's nationality (occupation data by industry from the Labor Force Survey 2016)

US H-1B program and sudden US policy change in 2017

- The US visa requires bachelor's (BA) degree. Valid for 3 years and can be renewed once
  - New H-1B visas for the for-profit sector are subject to a cap ($\approx$ 25% of all applications in 2016)
- The new policy tighten the eligibility criteria. Denials = new visas (45%) + continuing visas (55%)

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- E.g. BA degree is no longer enough to prove specialty occupation for some occupations

March 31, 2017

Policy Memorandum

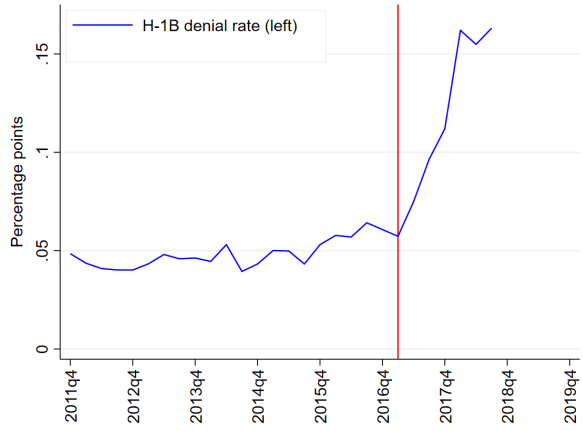
U.S. Citizenship and Immigration Services

SUBJECT: Rescission of the December 22, 2000 "Guidance memo on H1B computer related positions"

Scope

This PM applies to all U.S. Citizenship and Immigration Services (USCIS) employees. The updated guidance is effective immediately.

Spike in US denial rates and skilled immigration to Canada



- By 2018, 140K fewer H-1B approvals relative to trend H-1B approvals Cont.

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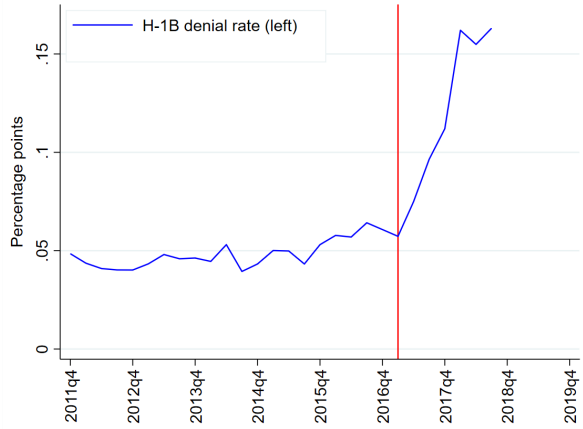

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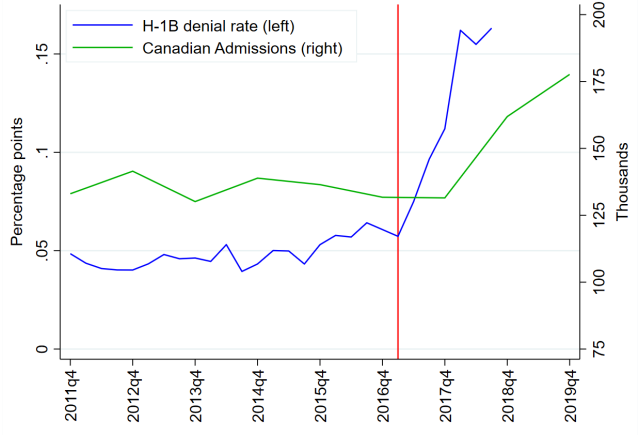

- By 2018, 140K fewer H-1B approvals relative to trend H-1B approvals Cont
- By 2019, 76K additional Canadian admissions of skilled immigrants
  - Equivalent to 2% of all workers in the high-skilled service sector

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Effect on Canadian immigration: event-study framework

$$log(Can\ App_{o,c,t}) = \sum_{\tau \neq 2016} \theta_\tau \times Fraction\ Affected_{o,c} \times \mathbb{I}(t = \tau) + FE_{o,c} + FE_{o,t} + FE_{c,t} + \epsilon_{o,c,t}$$

Immigrant group: c =country of birth, o =occupation; $2012 \leq t \leq 2018$; Baseline year: 2016

- Expected number of denied US applications, normalized by applications to the US + CAN

$$Fraction\ Affected_{o,c} = \frac{\text{Denial Rate}_o^{2018} \times \text{US Applications}_{o,c}^{2011\text{-}15}}{\underbrace{\text{CAN Applications}_{o,c}^{2011\text{-}15} + \text{US Applications}_{o,c}^{2011\text{-}15}}_{\text{Denial Rate}_o^{2018} \times \text{US Share in Applications}_{o,c}^{2011\text{-}15}\ \text{variation}}}$$

  - Relatively affected groups work in occupations with high denial rates & propensity to apply to the US

- Identifying variation: change in outcome for groups differently exposed to the US policy

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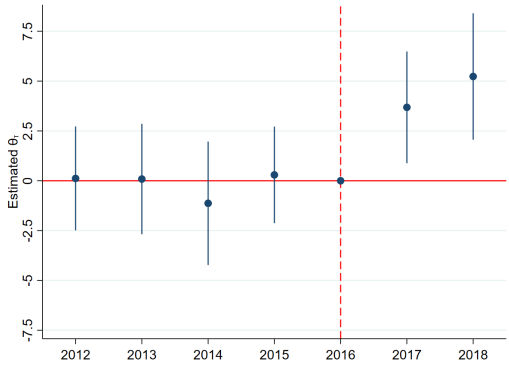
H-1B restrictions increased Canadian visa applications



- In 2018, applications were 30% higher due to the restrictions ($\hat{\theta}_{2018} \times$ avg *Fraction Affected*)
  [Back-of-the-envelope-calculation: $\downarrow$ 4 US approvals $\approx \uparrow$ 1 CAN visa application] Robustness

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Effect of the inflow on firms differently exposed: event-study framework

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i = firm, k = industry, m = commuting zone

- Exposure to the US treatment proxy a shift-share **exposure measure**: Measurement Variation
  - Motivated by the role of immigrant networks in referrals or information sharing (Egger, '21)

$$\textit{Exposure}_i \approx \sum_{o,c} \underbrace{\frac{L_{o,c,i}}{L_i}}_{\substack{\textbf{Share of o,c in} \\ \text{firm } i\text{'s workforce}}} \times \underbrace{\frac{\Delta L_{o,c}^{policy}}{L_{o,c}}}_{\substack{\textbf{Shift of immigrant group o,c} \\ \textbf{due to the US policy}}}$$

  - Exposed firms have a composition of workers skewed towards affected immigrant groups

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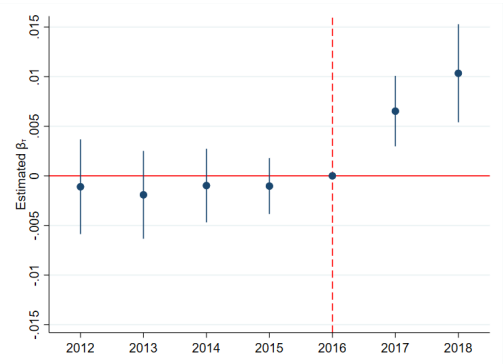
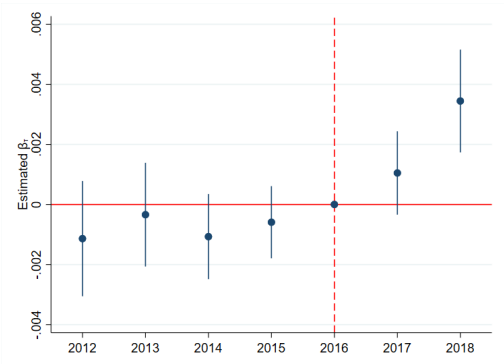
- Assumption: firms with a higher or lower share of immigrants from affected groups would not have diverged after 2016 if not for the US policy change (Abramitzky et al, 2023, AER)

Increase in total sales and the share of exports in total sales

log(sales)



Share of exports in total sales



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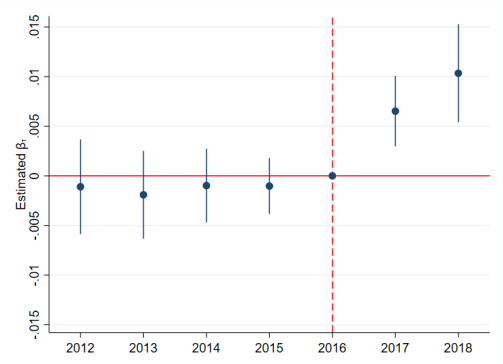
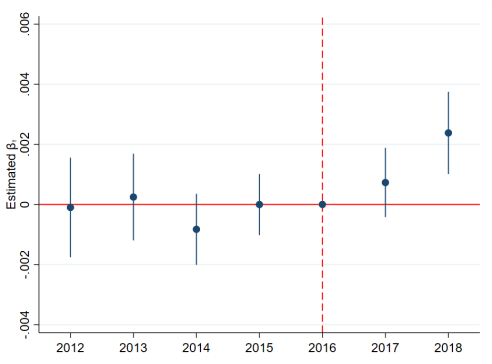
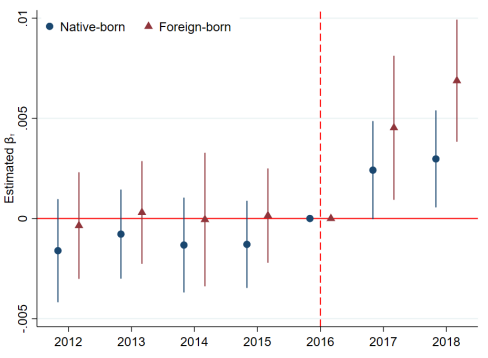


Share of exports to the U.S. in total sales

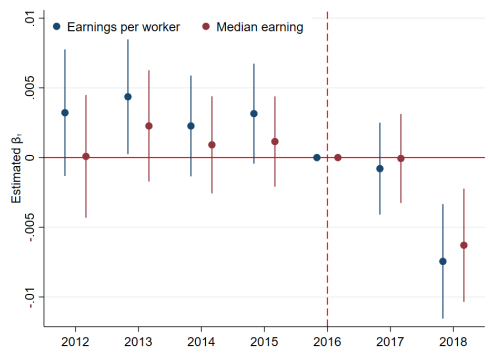


Increase in native employment and drop in earnings per native worker

Net hiring relative to 2016 employment level



log(Earnings of native-born workers)



Additional results (in the paper)

- Event studies for other outcomes: ▷
  - Decrease in the log(earnings per worker)
  - No change in markups
  - Increase in log(exports)
  - Increase in immigrant share in the wage bill
  - Increase in log(native employment), log(employment), and log(other costs)
- Event studies of domestic firms (excluding MNC) ▷
- Event studies exploiting only time and within-industry variation ▷

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   - Calibrated based on the previous event-studies estimates
   - Quantify welfare effects and the role of international trade in shaping the welfare effects

Model's overview

- Static model, multiple sectors (index k), multiple countries (index c, d, j)
- Preferences: CES preferences across sectors (elast. ρ) and varieties ω (elast. σ)
- Workers: Multiple groups g given by nationality (index c) and occupation (index o)
- Workers who move from c to d lose a fraction $\zeta_{g,d}$ of their income at country d
- Technology: $y_{d,k}(\omega) = z_{d,k}(\omega)\ l_{d,k}(\omega)$ Equations
  - $z_{d,k}(\omega) \sim$ iid Frechet (shape parameter θ, scale parameters $T_{d,k}$) [EK, '02]
  - $l_{d,k}(\omega)$: CES across occupations (elast. η) and native-immigrant (elast. ϵ) [BHTV, '22]
- Iceberg cost to export variety $\omega \in k$ from d to j: $\tau_{d,j,k} \geq 1$, with $\tau_{d,d,k} = 1$
- Goods and labor markets are perfectly competitive

Immigration policy and migration decision

- Worker ι in group $g \equiv \{o, c\}$ choose the country of residence d and the sector of work k
- Utility of choosing country d: notation: $\tilde{x} \equiv \log(x)$

$$U_{g,d}(\iota) = \begin{cases} \tilde{u}_g^{nat} + \epsilon_d(\iota) & \text{if } d = c \\ \underbrace{p_{g,d}\ \tilde{u}_{g,d}^{imm} + [1 - p_{g,d}]\ \tilde{u}_g^{nat}}_{\text{Expected utility of applying for a visa}} + \underbrace{\epsilon_d(\iota)}_{\text{Taste shock}} & \text{if } d \neq c \end{cases}$$

- $p_{g,d}$: exogenous probability of getting a visa (Immigration policy of country d)
- $u_{g,d}^{imm} \equiv \mathbb{E}\Big(\max_k \underbrace{\frac{\zeta_{g,d}\ a_{g,d,k}(\iota)\ w_{o,d,k}^{imm}}{P_d}}_{\text{real earnings in } d} \Big)$, $u_g^{nat} \equiv \mathbb{E}\Big(\max_k \underbrace{\frac{a_{g,c,k}(\iota)\ w_{o,c,k}^{nat}}{P_c}}_{\text{real earnings at home}} \Big)$
  - Efficiency units $a_{g,d,k}(\iota)$ drawn iid from Frechet distr. (shape κ, scale $a_{g,d,k}$)
  - $\epsilon_d(\iota) \sim$ EV-II, correlated across d: Elast. of subst. home & abroad $\nu_h \neq$ US & CAN ν_d

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Supply of immigrant labor g to sector k in d (Canada or the US), $L_{g,d,k}$

- Fraction of exog. mass of workers L_g choosing to emigrate: $\pi_g = \frac{[u_g^{imm}]^{\nu_h}}{[u_g^{imm}]^{\nu_h} + [u_g^{nat}]^{\nu_h}}$
  - u_g^{imm}: expected utility of emigrating
- Fraction of $L_g \times \pi_g$ choosing country d: $\pi_{g,d} = \frac{\left([u_{g,d}]^{\rho_{g,d}} \ [u_g^{nat}]^{1-\rho_{g,d}}\right)^{\nu_d}}{\sum_{d'} \left([u_{g,d'}]^{\rho_{g,d'}} \ [u_g^{nat}]^{1-\rho_{g,d'}}\right)^{\nu_d}}$
- $L_{g,d,k} = \underbrace{\pi_{g,d,k}}_{\text{Fraction of } L_{g,d} \text{ choosing } k} \times \Big(\underbrace{\rho_{g,d} \times \pi_{g,d} \times \pi_g \times L_g}_{\text{Flow of new immigrants}} + \underbrace{\bar{L}_{g,d}}_{\text{Exog. initial stock}} \Big)$

$\pi_{g,d,k} = \frac{(a_{g,d,k} \ w_{o,d,k}^{imm})^{\kappa_c}}{\sum_k (a_{g,d,k} \ w_{o,d,k}^{imm})^{\kappa_c}}$

$L_{g,d}$: Workers g in country d

Supply of immigrant labor g to sector k in d (Canada or the US), $L_{g,d,k}$

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Equilibrium

- Set of native and immigrant wages $\{w^{nat}_{o,d,k}, w^{imm}_{o,d,k}\}$ and labor allocations $\{L_{o,c,d,k}\}$ for every occupation o, nationality c, sector k, and country d such that:
  - Workers maximize expected utility
  - Producers maximize profits
  - Trade is balanced
  - Good and labor markets clear

Comparative statics: third-country effects of a drop in $p_{g,usa}$

- Canada becomes more attractive than the US: ν_d. But emigrating is less attractive: ν_h
  - $\widetilde{dApp}_{g,can} = (\nu_h, \nu_d)\ \pi_{g,usa}\ dp_{g,usa} + \phi_{g,can} \quad , \quad dp_{g,usa} < 0 \quad , \quad \phi_{g,can}$: structural error
- Immigrants g choose sectors $\rightarrow \downarrow$ immigrant wages $w^{imm}_{o,can,k} \rightarrow \downarrow$ native wages $w^{nat}_{o,can,k}$: ϵ
- Wages in other occupations o' also drop $w_{o',can,k}$: η
- Drop in unit costs based of factor shares: $d\tilde{c}_{can,k} \propto -\sum_g \overbrace{s_{g,can,k}\ \frac{\Delta L_{g,can}}{L_{g,can}}}^{\text{Shift-share exposure measure}} + \overbrace{\mu_{can,k}}^{\text{error term}}$
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Welfare effect on American workers: first-order approximation

$$\overbrace{d\tilde{W}^{nat}_{o,usa,k}}^{\text{Real wage}} \approx \overbrace{\text{Substitution Effect}_{o,usa,k} + \text{GE effects due to increasing costs in the US}_{usa,k}}^{\text{Direct effects}}$$

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$$+ \underbrace{\theta \sum_j \omega^{sales}_{usa,j,k} \lambda_{can,j,k} \, d\tilde{c}_{can,k}}_{\text{Indirect competition effect} < 0}$$

$\omega^{sales}_{usa,j,k}$: share of country j in sales of US sector k

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$\epsilon_{usa,k}$ includes indirect effects due to $d\tilde{c}_{d,k}$ for $d \neq \{can, usa\}$

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Calibration

Calibration of the model: Overview

- 4 countries (US, Canada, India, and RoW), 6 occupations (5 skilled, 1 unskilled), 8 sectors
- Calibrated directly to our data: $dp_{o,usa}$ and migration, factor, and trade shares
- Elasticities: $\Upsilon \equiv \{ \overbrace{\underbrace{\theta}_{=6.7}, \underbrace{\eta}_{=0.9}, \underbrace{\kappa}_{=2.8}}^{\text{Calibrated from literature}}, \overbrace{\underbrace{\nu_d}_{=3.6}}^{\text{IV approach}}, \overbrace{\underbrace{\nu_h}_{=2.3}, \underbrace{\epsilon}_{=4.3}, \underbrace{\rho}_{=1.2}}^{\text{Indirect inference approach}} \}$

- ν_d: IV estimate of the coefficient of an estimating equation derived from the model

$$\underbrace{\widetilde{App}_{g,can} - \widetilde{App}_{g,usa}}_{\text{Relative \# of visa applications}} = \nu_d \underbrace{\left[p_{g,can} \left[\widetilde{u}^{imm}_{g,can} - \widetilde{u}^{nat}_{g} \right] - p_{g,usa} \left[\widetilde{u}^{imm}_{g,usa} - \widetilde{u}^{nat}_{g} \right] \right]}_{\text{Relative expected value of visa applications}}$$

- (ν_h, ϵ, ρ): Match response of App_g, Earnings per native$_k$, Sales$_k$ based on event studies

IV estimation | Ind. Inf. Regressions | Ind. Inf. sensitivity | Ind. Inf. identification | Identification

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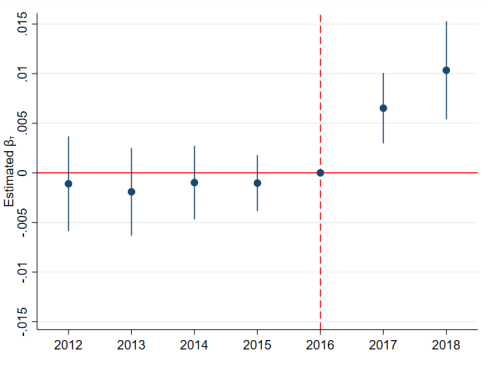
Calibrating (ν_h, ϵ, ρ): aggregate firm-level changes to sector level

Firm-level response: log(sales)



- Effect of the policy change on firm i: $\widetilde{dsales}_i \equiv \hat{\beta}_{2018}\ Intensity_i$, (recall: $\tilde{x} \equiv \log(x)$)

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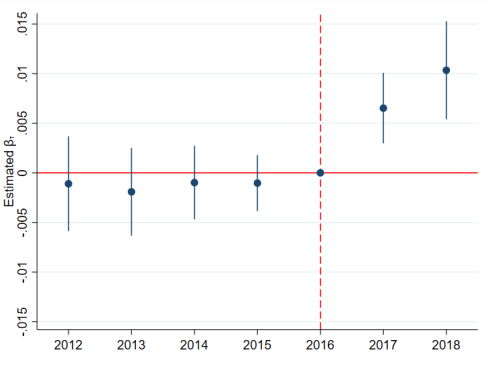

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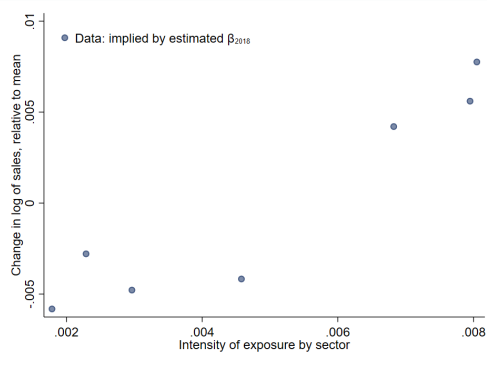

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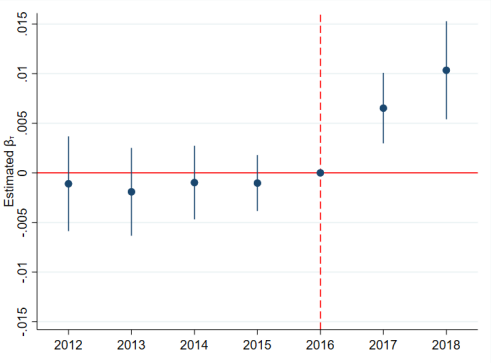

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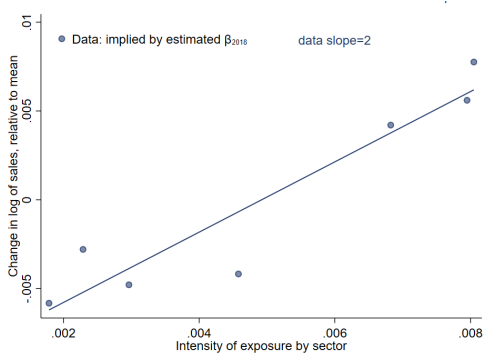

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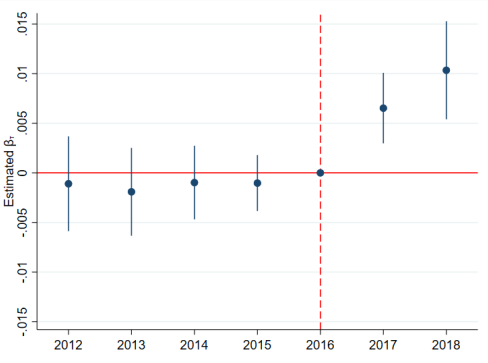

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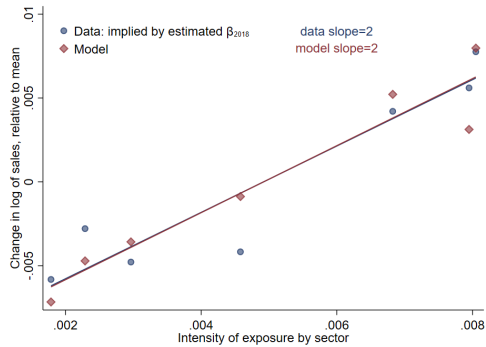
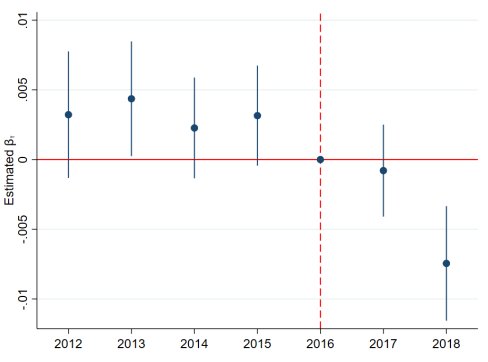


- Data slope: main moment to identify the elasticity of substitution (EoS) across sectors ρ

Calibrating (ν_h, ϵ, ρ)

Firm-level response: Earnings per native worker



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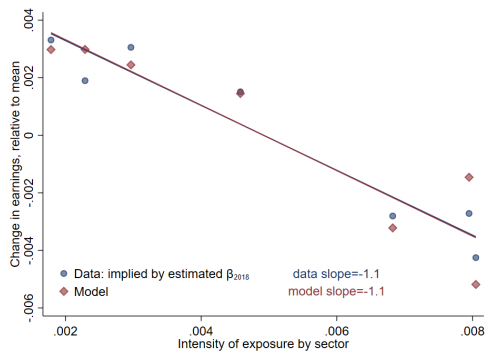
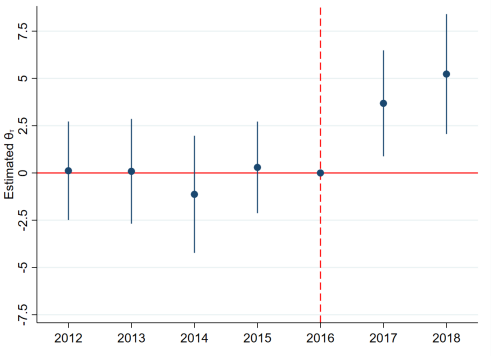


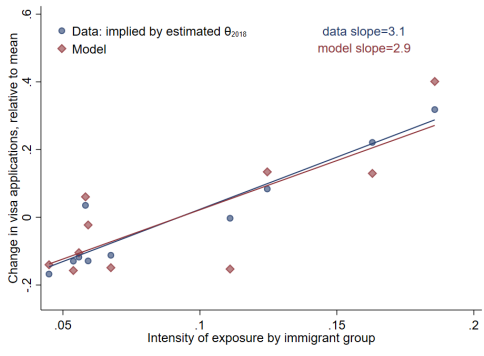
- Data slope: main moment to identify the EoS between immigrants and natives workers ϵ

Calibrating (ν_h, ϵ, ρ)

Canadian visa applications



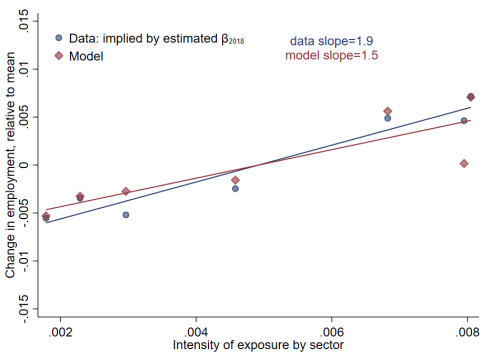
Canadian visa applications (by broad group)



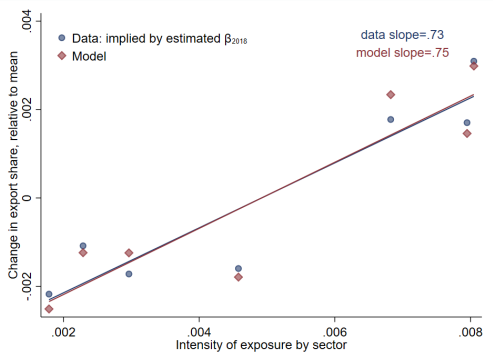
- Data slope: main moment to identify the EoS between emigrating and staying at home ν_h

Validation of the model: untargeted coefficients

log(Native employment)



Share of exports in total sales



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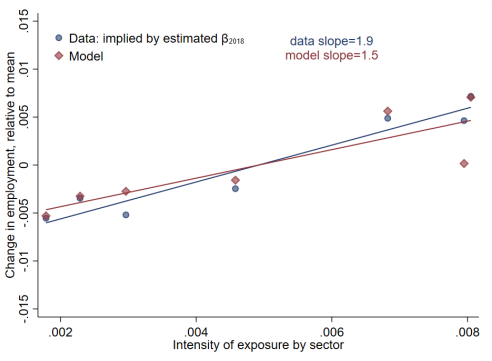
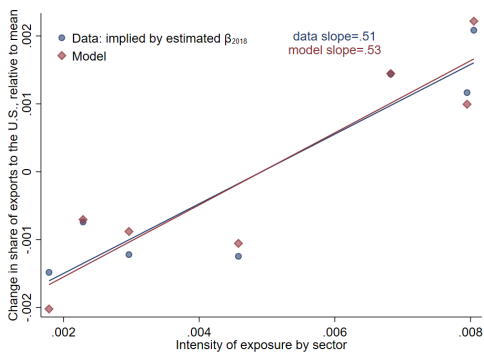


Share of exports to the U.S. in total sales



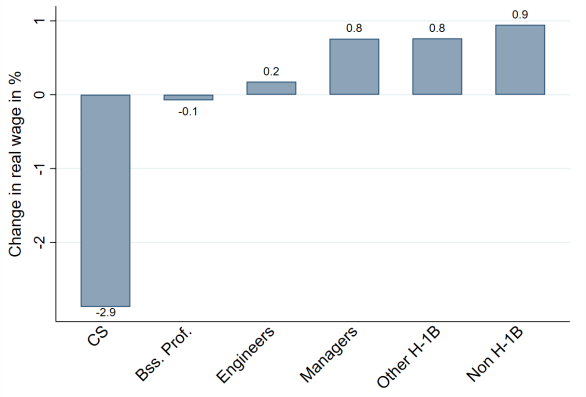
Aggregate effects of the spike in H-1B denial rates

- 2017 drop in $p_{g,usa}$ for skilled occupations (largest for CS $\approx$ -19pp)
- No change in $p_{g,usa}$ for the unskilled occupation
- No change in $\bar{L}_{g,usa}$ and $\bar{L}_{g,can}$

Welfare effects of the observed change in denial rates on Canadian workers

- Δ immigrant labor $\approx 3.4\%$.
- It affects production, especially in high-skilled service sectors $\approx 1.5\%$ More

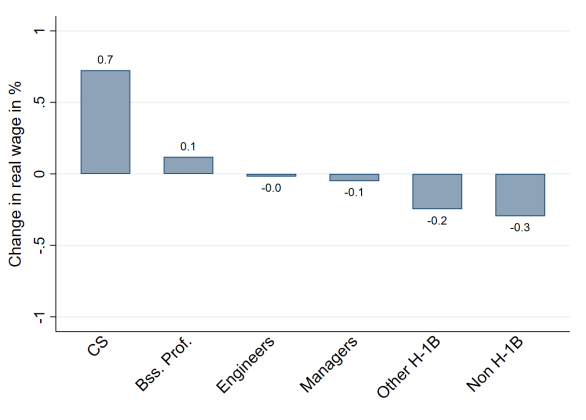
Skilled service sectors: Canadian workers' welfare



Welfare effects of the observed change in denial rates on American workers

- Δ immigrant labor $\approx$ -1.6%
- It affects production, especially in high-skilled service sectors $\approx$ -0.5% More

Skilled service sectors: American workers' welfare



Intended effects on American workers: the role of international trade

- Implement the same $dp_{g,usa}$ in a closed economy
  - Welfare effects on American workers in the closed economy: $\hat{W}^{CE}$
- Compare $\hat{W}^{CE}$ with the welfare effects on American workers in the baseline economy $\hat{W}^{BL}$
  - $\hat{W}^{CE}/\hat{W}^{BL}$: Importance of international trade in the welfare effects of $dp_{g,usa}$

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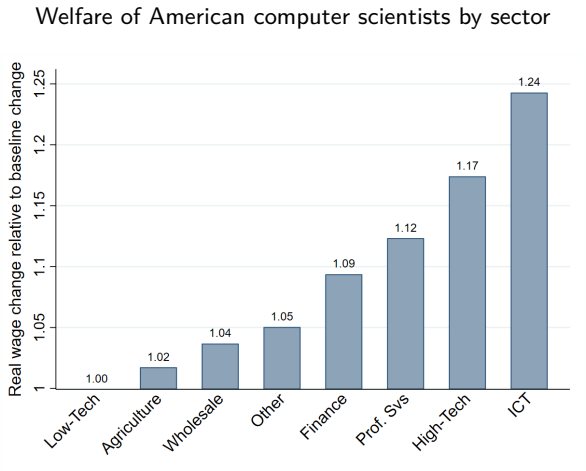

Ignoring international trade overestimates American computer scientists' gains by up to 24%

Conclusion

- We study the effect of US immigration restrictions in a global economy
  - Using a quasi-natural experiment given by an unprecedented spike in US visa denial rates
- Effects of the US immigration restrictions on the Canadian economy
  - US restrictions increased skilled immigration to Canada
  - Canadian firms that were relatively more exposed increased sales and exports
  - Canadian workers experienced large welfare effects
- Effects of the US immigration restrictions on American workers' welfare
  - Welfare gains for American computer scientists, but losses for other American workers
  - International trade dampens gains of American workers targeted for protection by up to 25%