Migration Shocks as Labor Supply Constraints: The Inflationary Consequences of Restricted Workforce Flows

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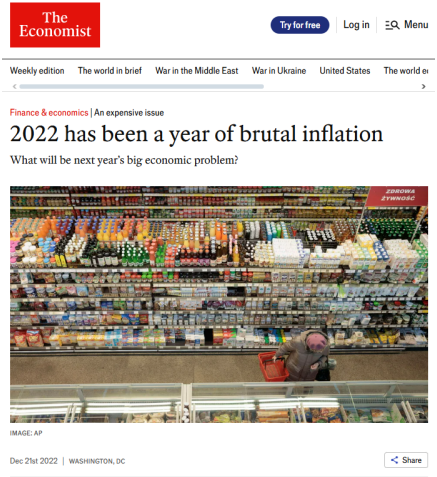
Madrid, Spain

Motivation (1)

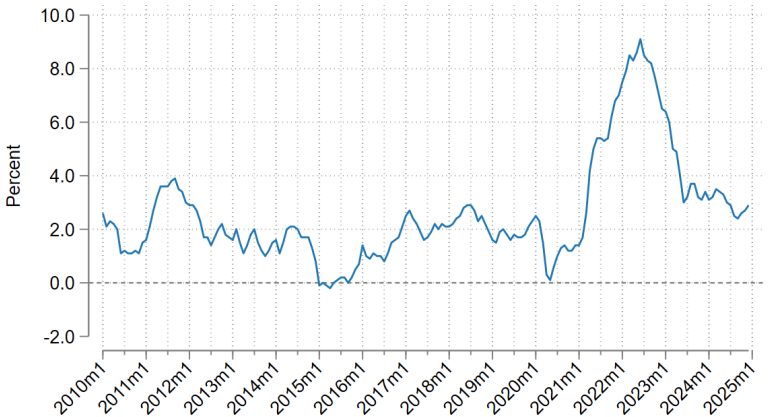
- The COVID-19 pandemic led to an unprecedented disruption in global migration flows, with the United States imposing significant restrictions on the issuance of visas.
- Inflation surged to 40-year highs during the post-pandemic recovery.
- This project explores whether reduced immigration contributed to inflation through labor shortages.



Source: The Economist (December 2022)

Motivation (2) — U.S. Inflation

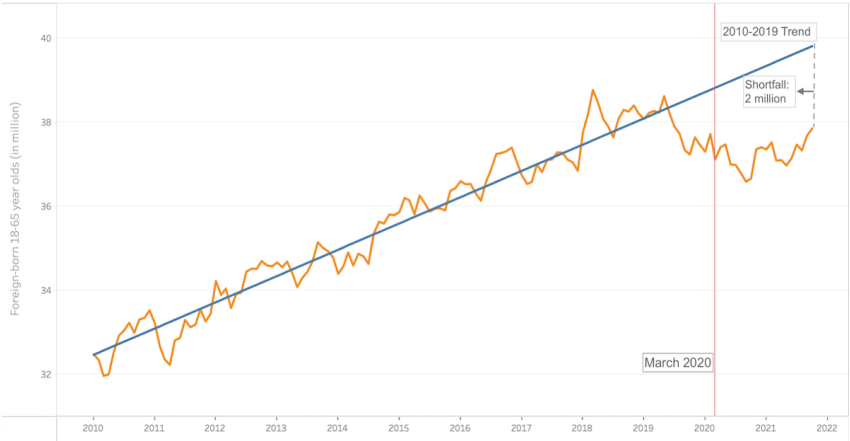
12-Month Percent Change in CPI, All Items (2010–2024)



In June 2022, the 12-month inflation rate peaked at 9.1%.

Motivation (3) — Immigration Disruptions in the U.S.

Working-Age Foreign-Born Population (2010–2021)



Source: Peri and Zaiour (2022). "Labor Shortages and the Immigration Shortfall". EconoFact

Research Objectives

1. **How did immigration restrictions during the COVID-19 pandemic affect subsequent inflation in the United States?**
2. Through which mechanisms did labor market disruptions translate into price pressures?

Source: NTV News (August 2022)

Contribution

1. **Labor market and macroeconomic effects of the COVID-19 pandemic in the U.S. and other developed economies**
   - Extensive work on pandemic-related unemployment, labor force participation, supply chains, productivity, immigration, and inflation (e.g., Bernanke & Blanchard, 2023).
   - This project highlights the role of immigration in macroeconomic stabilization.

Contribution

1. **Labor market and macroeconomic effects of the COVID-19 pandemic in the U.S. and other developed economies**
   - Extensive work on pandemic-related unemployment, labor force participation, supply chains, productivity, immigration, and inflation (e.g., Bernanke & Blanchard, 2023).
   - This project highlights the role of immigration in macroeconomic stabilization.
2. **Labor supply shocks and their implications for inflation**
   - Provides empirical evidence linking immigration flows to local price dynamics.
   - Policy relevance $\rightarrow$ Fed's dual mandate of maximum employment and price stability
   - Considers the interrelationship between the two forces rather than seeing them as a "balancing act."

Hypothesized Mechanism: From Immigration to Inflation

Immigration Shortfalls $\Rightarrow$ **Labor Market Effects** $\Rightarrow$ **Price Impacts**

Contributed to reduced labor supply in key sectors and localities.

Increased job market tightness and wage pressures for firms.

Higher costs and hiring challenges passed through to consumers as inflation.

Theoretical Framework (1)

- New Keynesian Phillips curve:

$$\pi_t = \beta \mathbb{E}_t[\pi_{t+1}] + \kappa mc_t, \tag{1}$$

where π_t is inflation, β is the discount factor, κ captures the slope of the Phillips curve, and mc is marginal cost.

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where π_t is inflation, β is the discount factor, κ captures the slope of the Phillips curve, and mc is marginal cost.

- Marginal cost is defined as:

$$mc_t = \frac{W_t}{A_t P_t}, \tag{2}$$

where W_t is the nominal wage, A_t is productivity, and P_t the aggregate price level.

Theoretical Framework (2)

Let nominal wages be determined in a search-and-matching framework, where μ_t denotes labor market tightness.

- A negative labor supply shock (e.g., due to immigration restrictions) reduces the number of workers available for matching, increasing μ_t. This raises wages through the bargaining process.
- Assuming a linear wage-setting rule:

$$\log W_t = \alpha_0 + \alpha_1 \log \mu_t + \varepsilon_t, \tag{3}$$

  Labor market tightness μ_t increases as labor supply contracts.

U.S. Immigration Disruptions During the Pandemic

Immigration to the U.S. slowed dramatically during COVID-19.

- Causes: travel bans, embassy closures, public health orders, presidential proclamations.
- Estimated shortfall of 1.6–2 million foreign-born workers (Peri and Zaiour, 2022, 2023).
- Disruptions led to sector-specific labor shortages (Pitschner, 2022; Rodriguez-Sanchez, 2022).
- Regions more reliant on immigrant labor saw faster wage growth (Cohen and Shampine, 2023).
- This paper asks whether these shocks also fueled inflation.

The Evolution of Inflation (1)

2019 December 2019 CPI inflation: 2.3%.

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2020 Lockdowns caused monthly inflation to fall by 0.8% in April.

May 2020: YoY inflation dropped to 0.1%.

End of 2020: Annual inflation rose to 1.4%.

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May 2020: YoY inflation dropped to 0.1%.

End of 2020: Annual inflation rose to 1.4%.

2021 Total fiscal stimulus through direct payments exceeded $800 billion

December 2021: Annual inflation reached 7%

The Evolution of Inflation (2)

2022

- June 2022: Annual inflation peaked at 9.1%.
- Policy response: Fed raised interest rates from 0% in March to over 4% by year-end.

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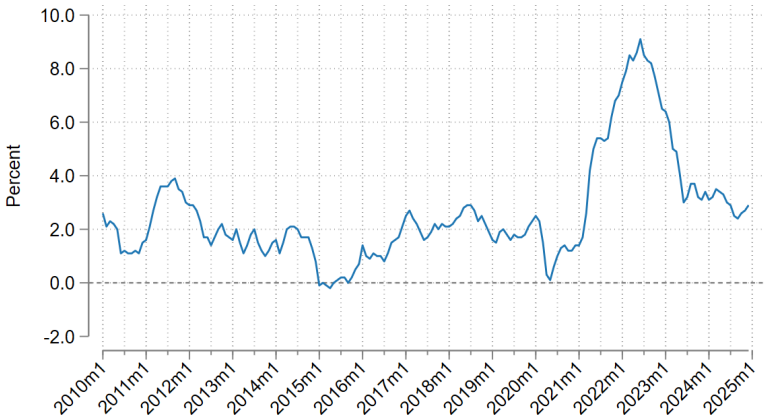
2024 By January 2024, 12-month inflation fell to 3.1%, and to 2.5% by August, approaching the Federal Reserve's 2% target.

Inflation Trends, 2020–2024

12-Month Percent Change in CPI, All Items (2010–2024)



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Data (1) — Immigration Disruptions

Authorized Immigration Disruptions

- Source: U.S. State Department
- Visas issued by month, country of origin, and category (2017–2024) Table
  - Employment-based visas, including H-1B and O-1 visas, capture participation in different industries
  - Academic visas, e.g., F-1 visas, account for international students participating in the labor market.

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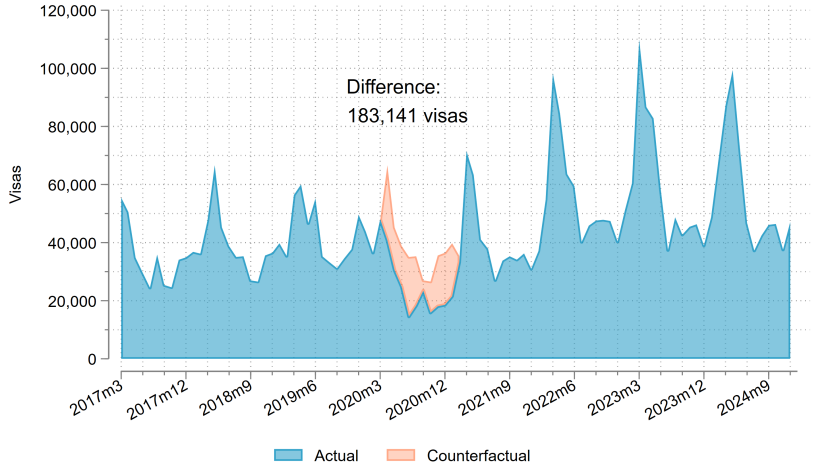
  - Employment-based visas, including H-1B and O-1 visas, capture participation in different industries
  - Academic visas, e.g., F-1 visas, account for international students participating in the labor market.
- **Severity of disruptions**: The number of academic and employment-based visas not issued to each country during 2020–2021.
  - Constructed the counterfactual number of visas for 2020 and 2021 months as the average of the same months during 2017–2019.
  - The counterfactual May 2020 is the mean of May 2017, May 2018, and May 2019.

Immigration Disruptions — Monthly Issuance of H-Type Visas

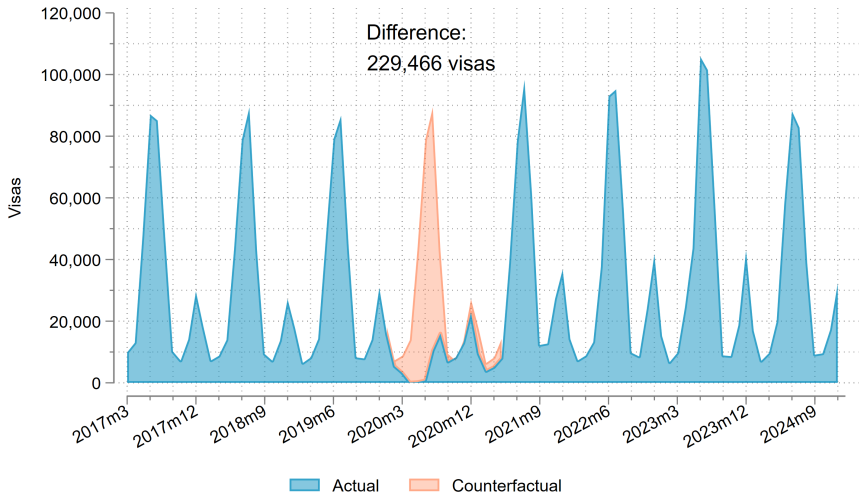
H-Type (Temporary Workers/Trainees) Visa Shortfall



Note: H-type visas include the following temporary worker/trainee categories: H1B, H1B1, H1C, H2A, H2B, H3

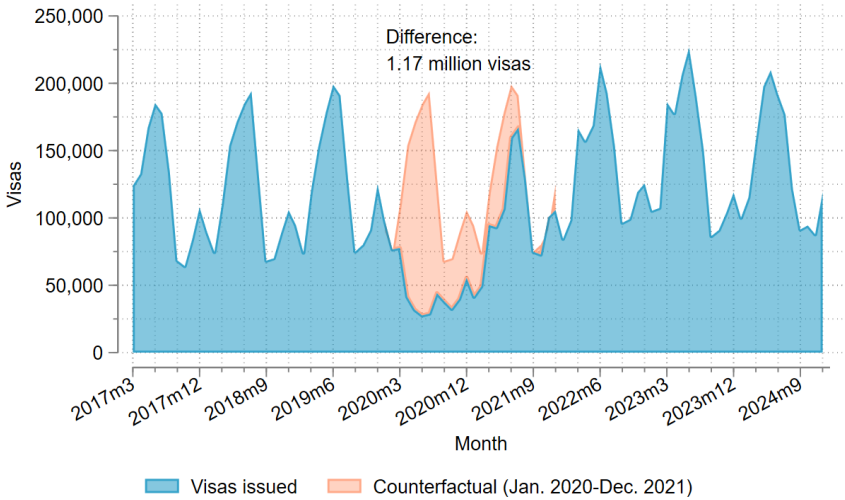
Immigration Disruptions — Monthly Issuance of F-1 Visas

F1 (International Students) Visa Shortfall



Immigration Disruptions — Issuance of Academic and Work-Based Visas

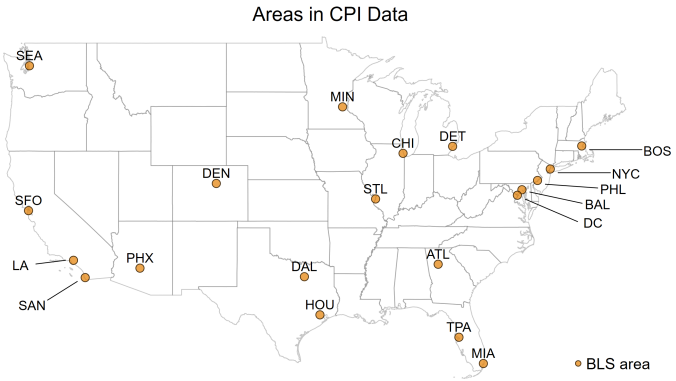
All Academic and Work-Based Visas Shortfall



Data (2) — Inflation

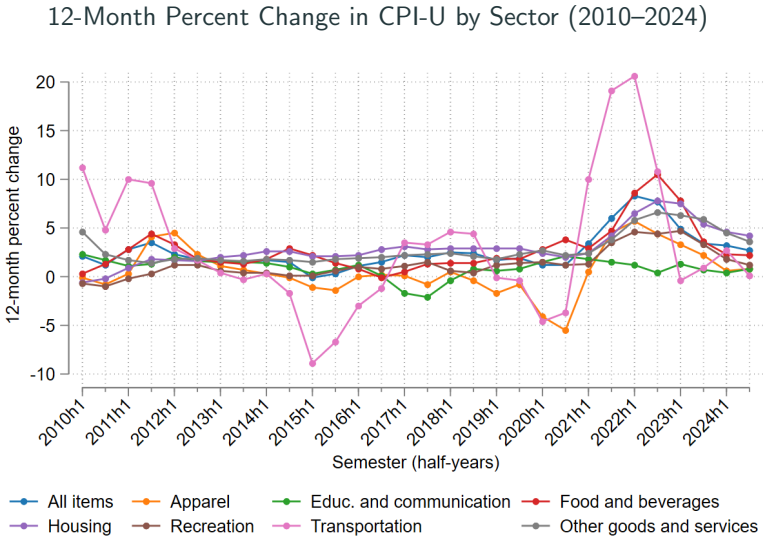
Inflation

- Source: U.S. Bureau of Labor Statistics
- Semiannual 12-month percent change in CPI-U by metropolitan area (22) and expenditure category (8) for 2010–2024



Note: Urban Alaska and Hawaii not shown

Data (3) — Inflation



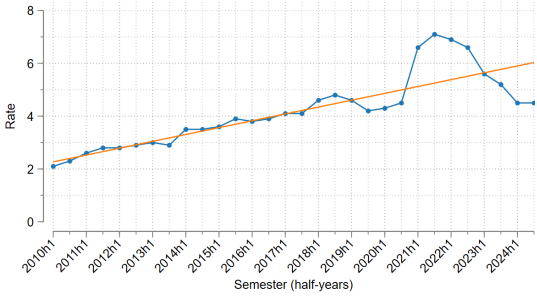
Data (4) — Labor Market Tightness

Labor Market Tightness

- Source: BLS Job Openings and Labor Turnover Survey (JOLTS)
- Semiannual 12-month change in nonfarm monthly openings, layoffs, and unemployed-to-openings ratio by state or industry (2010–2023)
  - Higher openings rate $\rightarrow$ increased difficulty to fill available positions.
  - Lower unemployed-to-openings ratio $\rightarrow$ fewer workers are competing for the available positions.
  - Low layoffs rate $\rightarrow$ firms are more inclined to retain workers

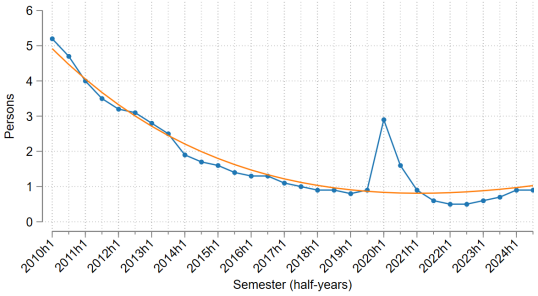
Labor Market Tightness (1)

Job Openings Rate



Unit of measurement: Job openings over (employment + job openings) times 100

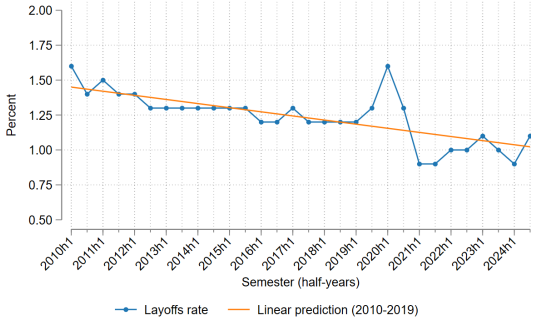
Unemployed per Opening



Unit of measurement: Number of unemployed persons per job opening (ratio)

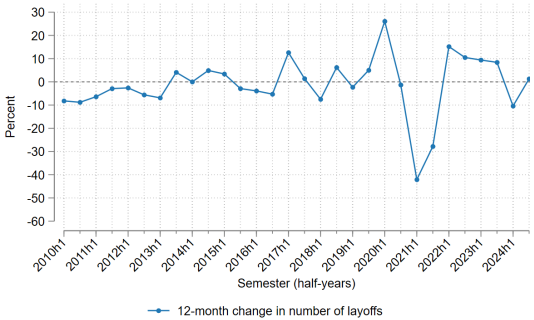
Labor Market Tightness (2)

Layoffs Rate



Unit of measurement: Layoffs divided by employment and multiplying that quotient by 100 (rate)

Annual Change in Layoffs (%)



Unit of measurement: 12-month PERCENT change in monthly layoffs (%)

Data (5) — Labor Force Composition

Labor Force Composition

- ACS 5-year (2010) data to estimate baseline foreign-born shares by metropolitan areas and industries.
- Sample: Individuals ages 18–65 in labor force
- Metro areas and industries cross-walked to CPI areas and expenditure categories

Empirical Strategy

$$y_{mkt} = \alpha + \beta\left(Exposure_{mk} \times Post_t\right) + \Gamma\left(ShareFB_{mk2010} \times \lambda t\right) + \theta_{mt} + \theta_{kt} + \varepsilon_{mkt}, \tag{4}$$

- $y_{mkt} \rightarrow$ 12-month inflation rate in metropolitan area m and economic sector k in period t
- $Exposure_{mk} \rightarrow$ exposure to pandemic disruptions in the flow of authorized foreign workers
- $Post_t \rightarrow$ indicator for periods affected by the COVID-19 pandemic

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- $Post_t \rightarrow$ indicator for periods affected by the COVID-19 pandemic
- $ShareFB_{mk2010} \rightarrow$ baseline share of foreign-born workers
- Metro×Time FE (θ_{mt}) $\rightarrow$ local shocks (economic composition, policies)
- Sector×Time FE (θ_{kt}) $\rightarrow$ industry-specific shocks (supply chain issues, demand).
- Standard errors clustered at the metropolitan area-sector level

Exposure to Visa Shortfalls

Exposure to visa shortfalls:

$$Exposure_{mk} = \sum_{c} \frac{FB_{cmk2010}}{L_{mk2010}} \times Visa\ shortfall_{c}. \tag{5}$$

- Share $\rightarrow$ Baseline share of foreign-born workers in each cell
- Shift $\rightarrow$ Country-specific visa shortfall

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Visa shortfalls:

$$Visa\ shortfall_{c} = 1 - \left(\frac{FB_{c2010} - Unissued\ visas_{c}}{FB_{c2010}} \right). \tag{6}$$

Main Results

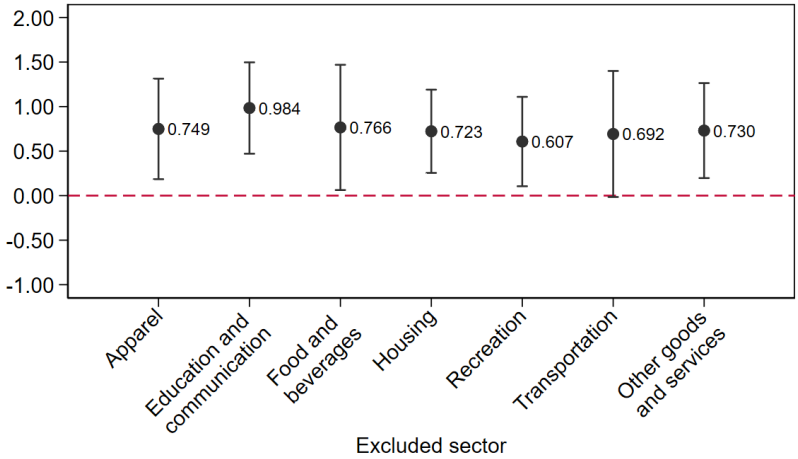
Impact of Exposure to Visa Shortfalls on Inflation Rates

	Unweighted estimates		Weighted estimates	
	(1)	(2)	(3)	(4)
Exposure×Post	0.537**	0.565**	0.857***	0.737***
	(0.2659)	(0.2659)	(0.2619)	(0.2640)
Foreign-born share time trend	N	Y	N	Y
Metro×period FEs	Y	Y	Y	Y
Sector×period FEs	Y	Y	Y	Y
Dependent variable mean	2.118	2.118	2.751	2.751
Observations	4,452	4,452	4,452	4,452
R-squared	0.162	0.162	0.183	0.186

Note: The CPI weights reflect each sector's relative importance in the overall CPI.

- A 1pp higher exposure to visa shortfall ($\approx$ 1 SD) $\rightarrow$ 0.5–0.9pp higher inflation.

Leave-One-Out Analysis: Impact of Visa Shortfalls on Inflation



- Effect remains robust when excluding any single sector.

Identification Threats

1. Assumption that, absent immigration restrictions, inflation in more affected regions would have **trended parallel** to that of less affected regions.
   - Key threat: violation of the parallel trends assumption.
   - An event study is used to to assess pre-trends and dynamic effects.

Identification Threats

1. Assumption that, absent immigration restrictions, inflation in more affected regions would have **trended parallel** to that of less affected regions.
   - Key threat: violation of the parallel trends assumption.
   - An event study is used to to assess pre-trends and dynamic effects.
2. Assumption that no unobserved factors are simultaneously correlated with immigration restrictions and local inflation rates (i.e., no **omitted variable bias**).
   - Baseline inflation is not correlated with the immigration restrictions localities are eventually exposed to.
   - Country of origin economic characteristics are not correlated with immigration restrictions (work in progress).

Identification Checks

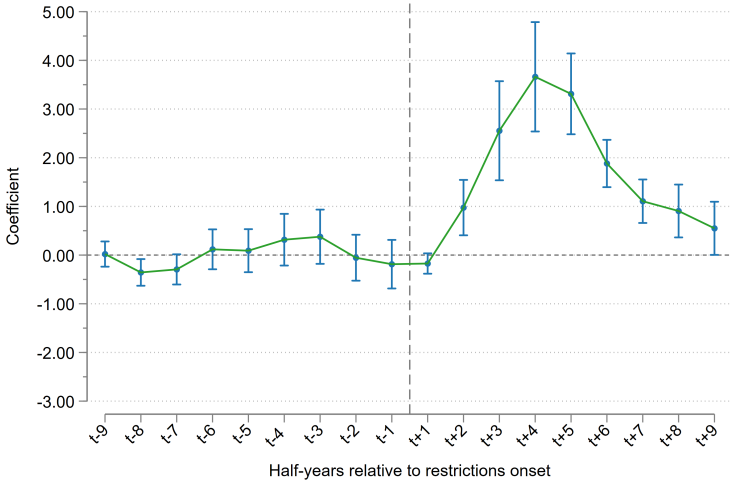
- Estimate dynamic effects pre-& post-2020.
- Check for pre-trend violations.

Event Study Model

$$y_{mkt} = \alpha + \Sigma_{t-7}^{t-1}\tau_t \times Exposure_{mk} + \Sigma_{t+1}^{t+8}\rho_t \times Exposure_{mk} + \Gamma\left(ShareFB_{mk2010} \times \lambda_t\right) + \theta_{mt} + \theta_{kt} + \epsilon_{mkt}, \quad (7)$$

- $\tau_t \rightarrow$ pre-existing differences between metropolitan areas and sectors that were eventually exposed to varying levels of pandemic visa restrictions.
- $\rho_t \rightarrow$ impact of visa restrictions on inflation rates over time after start of the pandemic.

Event Study



- No evidence of pre-trends; sharp rise post-shock.

Shock Exogeneity

Correlation Between Pre-Pandemic Inflation and Exposure to Pandemic-Related Visa Shortfalls

	(1)	(2)
Inflation rate	0.0008	0.0014
	(0.0014)	(0.0015)
Foreign-born share time trend	N	Y
Metro×period FEs	Y	Y
Sector×period FEs	Y	Y
Observations	2,912	2,912
R-squared	0.871	0.871

- Pre-pandemic inflation (2010–2019) doesn't seem to predict cell-level visa shortfalls (2020–2021).

Mechanisms: Labor Market Tightness (1)

Impact of State-Level Exposure to Visa Shortfalls on Labor Market Tightness (2010–2023)

Panel A: All states and Washington, DC

	12-month %Δ in monthly openings	12-month net Δ in monthly openings rate	12-month %Δ in monthly layoffs	12-month net Δ in monthly layoffs rate	12-month net Δ in unemployed-to-openings ratio
	(1)	(2)	(3)	(4)	(5)
Exposure×Post	0.098***	0.241***	-0.063*	-0.084	-0.705***
	(0.0276)	(0.0841)	(0.0363)	(0.0513)	(0.1167)
Foreign-born share time trend	Y	Y	Y	Y	Y
Census region×period FEs	Y	Y	Y	Y	Y
Dependent variable mean	0.134	0.269	0.015	-0.069	-0.528
Observations	1,326	1,326	1,326	1,326	1,326
R-squared	0.036	0.017	0.012	0.031	0.083

Mechanisms: Labor Market Tightness (2)

Impact of State-Level Exposure to Visa Shortfalls on Labor Market Tightness (2010–2023)

Panel B: States where the metro areas in the CPI data are located

	12-month %Δ in monthly openings	12-month net Δ in monthly openings rate	12-month %Δ in monthly layoffs	12-month net Δ in monthly layoffs rate	12-month net Δ in unemployed-to-openings ratio
	(1)	(2)	(3)	(4)	(5)
Exposure×Post	0.110***	0.298**	-0.057	-0.042	-0.797***
	(0.0369)	(0.1120)	(0.0662)	(0.0822)	(0.1573)
Foreign-born share time trend	Y	Y	Y	Y	Y
Census region×period FEs	Y	Y	Y	Y	Y
Dependent variable mean	0.139	0.271	0.009	-0.077	-0.570
Observations	468	468	468	468	468
R-squared	0.059	0.025	0.019	0.042	0.136

Conclusions & Future Work

- Labor markets more exposed to visa restrictions experienced greater inflation during the COVID-19 pandemic.
- Effects seem to be broad-based across sectors and metros and is not observed before the pandemic.
- Findings highlight importance of migration in stabilizing prices.

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Next steps:

- Examine origin-country economic shocks.
- Incorporate unauthorized migration (Title 42 expulsions).
- Examine impact of immigration disruptions on workers' earnings
- Conduct heterogeneity/robustness tests by excluding countries and visa categories

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References

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Non-Immigrant Visa Categories Included in the Analysis

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Visa category	Description
E-1, E-2, E-2C, E-3, E-3D, E-3R	Treaty trader or investor, Australian national coming to perform services in a specialty occupation, spouses or child
F-1	Students
H-1B, H-1B1, H-1C, H-2A, H-2B, H-3	Temporary worker in a specialty occupation, registered nurse in a health professional shortage area, temporary agricultural and non-agricultural workers, trainee or special education exchange visitor.
L-1, L-2	Intracompany transferee, spouse or children
J-1	Exchange visitor
M-1	Vocational students and other nonacademic students
O-1, O-2	Individuals with extraordinary abilities in sciences, arts, education, business or athletics, and individuals accompanying and assisting in performance.
TN	USMCA professional

Note: Spouses and children were included when the specific visa categories allow them to work.

Back