

Rural to Urban Migration, Informality and Firm Dynamics

Clement Imbert
Warwick

Gabriel Ulyssea
UCL & IFS

STEG Annual Conference
January 21st, 2022

Motivation

Rural to urban migration has long been viewed as a potentially powerful engine of development (e.g. Lewis, 1954; Kuznets, 1964).

However, the empirical literature typically finds that internal immigration leads to higher informality and non-employment (e.g Kleemans and Magruder, 2018).

Consistent with the Harris and Todaro (1970) view that rural migrants join a queue for a limited number of formal jobs in urban areas.

Missing link between immigration and labor market effects: [firm dynamics](#).

Immigration often represents a sizeable supply shock, which can have first order effects on firm dynamics, in particular via firm entry.

Informal sector is likely to play a key role, especially for low-skill migrants.

This Paper

Question: What are the effects of rural to urban migration on formal firm dynamics and its overall labor market consequences?

What we do:

- 1 Shift-share IV design to identify causal effects of immigration on firm dynamics and labor market outcomes in Brazilian municipalities
 - Granular data on agricultural suitability and land use to construct **push-shocks** from **crop prices** + **climate shocks** (droughts)
 - Matched employer-employee data with the universe of formal firms and workers + detailed individual level data from Demographic Censuses
- 2 Structurally estimate a model of firm dynamics with two margins of informality
- 3 Use the estimated model to assess the equilibrium effects at destination of a large immigration shock (≈ 80 th percentile in our data).

This Paper

Question: What are the effects of rural to urban migration on formal firm dynamics and its overall labor market consequences?

What we do:

- 1 Shift-share IV design to identify causal effects of immigration on firm dynamics and labor market outcomes in Brazilian municipalities
 - Granular data on agricultural suitability and land use to construct **push-shocks** from **crop prices** + **climate shocks** (droughts)
 - Matched employer-employee data with the universe of formal firms and workers + detailed individual level data from Demographic Censuses
- 2 Structurally estimate a model of firm dynamics with two margins of informality
- 3 Use the estimated model to assess the equilibrium effects at destination of a large immigration shock (≈ 80 th percentile in our data).

This Paper

Question: What are the effects of rural to urban migration on formal firm dynamics and its overall labor market consequences?

What we do:

- 1 Shift-share IV design to identify causal effects of immigration on firm dynamics and labor market outcomes in Brazilian municipalities
 - Granular data on agricultural suitability and land use to construct **push-shocks** from **crop prices** + **climate shocks** (droughts)
 - Matched employer-employee data with the universe of formal firms and workers + detailed individual level data from Demographic Censuses
- 2 Structurally estimate a model of firm dynamics with two margins of informality
- 3 Use the estimated model to assess the equilibrium effects at destination of a large immigration shock (≈ 80 th percentile in our data).

This Paper

Question: What are the effects of rural to urban migration on formal firm dynamics and its overall labor market consequences?

What we do:

- 1 Shift-share IV design to identify causal effects of immigration on firm dynamics and labor market outcomes in Brazilian municipalities
 - Granular data on agricultural suitability and land use to construct **push-shocks** from **crop prices** + **climate shocks** (droughts)
 - Matched employer-employee data with the universe of formal firms and workers + detailed individual level data from Demographic Censuses
- 2 Structurally estimate a model of firm dynamics with two margins of informality
- 3 Use the estimated model to assess the equilibrium effects at destination of a large immigration shock (≈ 80 th percentile in our data).

This Paper

Question: What are the effects of rural to urban migration on formal firm dynamics and its overall labor market consequences?

What we do:

- 1 Shift-share IV design to identify causal effects of immigration on firm dynamics and labor market outcomes in Brazilian municipalities
 - Granular data on agricultural suitability and land use to construct **push-shocks** from **crop prices** + **climate shocks** (droughts)
 - Matched employer-employee data with the universe of formal firms and workers + detailed individual level data from Demographic Censuses
- 2 Structurally estimate a model of firm dynamics with two margins of informality
- 3 Use the estimated model to assess the equilibrium effects at destination of a large immigration shock (≈ 80 th percentile in our data).

Data sources

- **Migration and Labor Market Outcomes:** Decennial Population Census, 1991-2010 [▶ Demo. Census](#)
 - Migrants = in their current location ≤ 10 years; we use the accumulated immigration rate 2000-2010.
 - Focus on R-to-U (88% of all migration), and cross-state borders (40% of migration to urban areas). [▶ Map](#)
- **Firms:**
 - Matched employer-employee, admin data set from the Ministry of Labour → universe of formal firms and workers (RAIS) [▶ RAIS](#)
 - Matched employer-employee, survey data on small (up to 5 employees) formal and informal firms (ECINF)
- **Push Shocks:** Crop Prices and geo-referenced Climate data + crop shares at the municipality level (in 1980) [▶ Shocks](#)

Summary of reduced-form results

Main regression: $\Delta y_d = \beta_0 + \beta_1 Mig_d + \beta_2' X_d + u_d$

Effects of a 1p.p. $\uparrow\uparrow$ in Mig_d (14.5% SD):

- $\uparrow\uparrow$ 2.2% in the number of formal firms and 1.8% in the number of formal jobs; reduction of 2.9% in wages.
- Results driven by effects on entry rates: $\uparrow\uparrow$ 5.5 p.p.
- $\uparrow\uparrow$ 0.4 p.p. in share of formal workers (avg. employment share of 19%) \approx 2.1% increase.
- Formalization effect driven by native workers moving from informal to formal jobs: no change in non-employment.



Summary of reduced-form results

Main regression: $\Delta y_d = \beta_0 + \beta_1 Mig_d + \beta_2' X_d + u_d$

Effects of a 1p.p. $\uparrow\uparrow$ in Mig_d (14.5% SD):

- $\uparrow\uparrow$ 2.2% in the number of formal firms and 1.8% in the number of formal jobs; reduction of 2.9% in wages.
- Results driven by effects on entry rates: $\uparrow\uparrow$ 5.5 p.p.
- $\uparrow\uparrow$ 0.4 p.p. in share of formal workers (avg. employment share of 19%) \approx 2.1% increase.
- Formalization effect driven by native workers moving from informal to formal jobs: no change in non-employment.



Summary of reduced-form results

Main regression: $\Delta y_d = \beta_0 + \beta_1 Mig_d + \beta_2' X_d + u_d$

Effects of a 1p.p. $\uparrow\uparrow$ in Mig_d (14.5% SD):

- $\uparrow\uparrow$ 2.2% in the number of formal firms and 1.8% in the number of formal jobs; reduction of 2.9% in wages.
- Results driven by effects on entry rates: $\uparrow\uparrow$ 5.5 p.p.
- $\uparrow\uparrow$ 0.4 p.p. in share of formal workers (avg. employment share of 19%) \approx 2.1% increase.
- Formalization effect driven by native workers moving from informal to formal jobs: no change in non-employment.



Summary of reduced-form results

Main regression: $\Delta y_d = \beta_0 + \beta_1 Mig_d + \beta_2' X_d + u_d$

Effects of a 1p.p. $\uparrow\uparrow$ in Mig_d (14.5% SD):

- $\uparrow\uparrow$ 2.2% in the number of formal firms and 1.8% in the number of formal jobs; reduction of 2.9% in wages.
- Results driven by effects on entry rates: $\uparrow\uparrow$ 5.5 p.p.
- $\uparrow\uparrow$ 0.4 p.p. in share of formal workers (avg. employment share of 19%) \approx 2.1% increase.
- Formalization effect driven by native workers moving from informal to formal jobs: no change in non-employment.



Summary of reduced-form results

Main regression: $\Delta y_d = \beta_0 + \beta_1 Mig_d + \beta_2' X_d + u_d$

Effects of a 1p.p. $\uparrow\uparrow$ in Mig_d (14.5% SD):

- $\uparrow\uparrow$ 2.2% in the number of formal firms and 1.8% in the number of formal jobs; reduction of 2.9% in wages.
- Results driven by effects on entry rates: $\uparrow\uparrow$ 5.5 p.p.
- $\uparrow\uparrow$ 0.4 p.p. in share of formal workers (avg. employment share of 19%) \approx 2.1% increase.
- Formalization effect driven by native workers moving from informal to formal jobs: no change in non-employment.

• Manufacturing

• Services

• Enforcement

• Employment effects by skill

• Wage effects by skill

Summary of reduced-form results

Main regression: $\Delta y_d = \beta_0 + \beta_1 Mig_d + \beta_2' X_d + u_d$

Effects of a 1p.p. $\uparrow\uparrow$ in Mig_d (14.5% SD):

- $\uparrow\uparrow$ 2.2% in the number of formal firms and 1.8% in the number of formal jobs; reduction of 2.9% in wages.
- Results driven by effects on entry rates: $\uparrow\uparrow$ 5.5 p.p.
- $\uparrow\uparrow$ 0.4 p.p. in share of formal workers (avg. employment share of 19%) \approx 2.1% increase.
- Formalization effect driven by native workers moving from informal to formal jobs: no change in non-employment.

• Manufacturing

• Services

• Entrepreneurs

• Employment effects by skill

• Wage effects by skill

Summary of reduced-form results

Main regression: $\Delta y_d = \beta_0 + \beta_1 Mig_d + \beta_2' X_d + u_d$

Effects of a 1p.p. $\uparrow\uparrow$ in Mig_d (14.5% SD):

- $\uparrow\uparrow$ 2.2% in the number of formal firms and 1.8% in the number of formal jobs; reduction of 2.9% in wages.
- Results driven by effects on entry rates: $\uparrow\uparrow$ 5.5 p.p.
- $\uparrow\uparrow$ 0.4 p.p. in share of formal workers (avg. employment share of 19%) \approx 2.1% increase.
- Formalization effect driven by native workers moving from informal to formal jobs: no change in non-employment.

▶ Manufacturing

▶ Services

▶ Enforcement

▶ Employment effects by skill

▶ Wage effects by skill

Main features of the model

Equilibrium model of firms dynamics with the extensive and intensive margins of informality (Sedlacek and Ulyssea, 2021).

Long-run productivity can be different from productivity at entry → different growth profiles across firms

Selection into and out of these two margins of informality can occur both upon entry and over the life cycle of firms:

- **Extensive margin:** more low-productivity firms enter and survive, but same is true for potentially productive firms (informality as a stepping stone)
- **Intensive margin:** greater entry into the formal sector and higher survival rates (ambiguous effect); incentives for formal firms to remain small

Net effect of a migration shock (= supply shock) on formal/informal firms, their dynamics, overall labor market and aggregate outcomes is unclear *a priori*.

Estimation and Counterfactuals

We use a two-step Simulated Method of Moments (SMM) procedure.

We simulate a 10% increase in aggregate labor supply (\approx 80th percentile of immigration rate distribution) in two different environments:

- Low enforcement: Baseline Brazilian economy (in 2003)
- High enforcement: 50% higher enforcement on both margins of informality

Results:

- Effects on informality, wages and number of formal firms are fully consistent with the reduced-form, and stronger with high enforcement
- Total output and income increase, but less than 10% \rightarrow overall **decline** in per capital terms
- Firms that benefit the most from supply shock are those in the bottom quintile of productivity distribution. This effect is much stronger under low-enforcement.

Final remarks

- Immigration increases entry among formal firms, and fosters number of formal firms and formal employment among resident workers.
- In contrast with the common narrative that rural-urban migration increases the number of informal or under-employed workers in developing country cities.
- Instead, they suggest that developing countries might experience demographic dividends from internal migration, with active firm creation.
- However, counterfactuals indicate these gains accrue to the least productive firms in the economy.
- On aggregate, higher immigration does not produce net gains in terms of output and income per capita.

SUPPORT SLIDES

Migration and Labor Market Outcomes

- ◇ Unit of analysis: Brazilian municipalities
- ◇ Data source: [Decennial Population Census](#), 1991-2010
- ◇ Definitions:
 - We restrict the sample to 15-64 years old.
 - Migrants = those who came to their current location ≤ 10 years.
 - We compute the accumulated immigration rate between 2000 and 2010 and obtain a squared migration matrix between 3,658 municipalities.
 - Focus on flows to urban areas (88% of all migration), and across state borders (40% of migration to urban areas). [▶ Map](#)
 - We define formal workers as private sector employees with a formal contract, and informal ones are those without a formal contract. [▶ back](#)

Formal firms' outcomes

- ◇ Data source: *Relação Anual de Informações Sociais* (RAIS)
 - Matched employer-employee, admin data set from the Ministry of Labour in Brazil → universe of formal firms and workers.
 - Moments at the municipality level: (i) entry and exit; (ii) avg. firm size (as # employees); (iii) total number of establishments and formal workers; and (iv) the firm-level average wage.

Push Shocks: Crop Prices and Climate

Price shocks:

- Source: World Bank Commodity Price Data (The Pink Sheet) 1972-2020.
- 12 Crops: bananas, cocoa, coffee, cotton, maize, orange, rice, soybeans, sugar, tobacco, wheat and wood.
- Crop×month-level price shock, ε_{cm} : residual from AR(1) process.
- Municipality×year level shock: sum of crop-level shocks weighted by the share of each crop in value of production in 1980 Agricultural Census, π_{oc} .

$$s_o^{prices} = \sum_m \sum_c (\pi_{oc} \times \varepsilon_{cm})$$

Push Shocks: Crop Prices and Climate

Drought shock:

- Source: SPEI (Standardized Precipitation-Evapotranspiration Index), geo-localised measures of water balance linked to rainfall and temperature (Vicente-Serrano et al., 2010).
- Municipality×month-level shock, D_{om} : indicator for a drought if $SPEI < 0$.
- Municipality×year-level shock: sum of month-level shock weighted by the share of agricultural production, π_{oc} , that is in its growing season, g_{ocm} (1980 Agricultural Census).

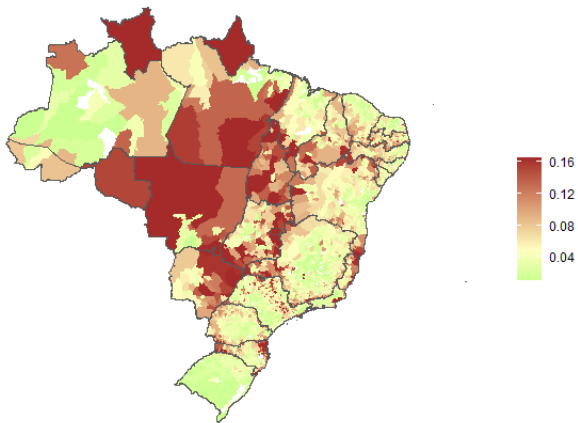
$$s_o^{drought} = \sum_m \sum_c (\pi_{oc} \times g_{ocm} \times D_{om})$$

Table 1: Descriptive Stats - Census

	2010				2000			
	Mean	SD	Med.	N	Mean	SD	Med.	N
Population	24,380	141,257	4,890	3,548	18,064	167,356	3,743	3,453
% High Skill	0.253	0.079	0.241	3,548	0.172	0.062	0.171	3,453
Out-mig.	0.319	0.249	0.281	3,548	0.254	0.173	0.213	3,453
Out-mig. S-to-S	0.112	0.155	0.074	3,548	0.095	0.104	0.059	3,453
% Formal	0.194	0.120	0.165	3,548	0.138	0.118	0.106	3,453
% Informal	0.150	0.064	0.146	3,548	0.074	0.042	0.068	3,453
% non-employed	0.446	0.091	0.438	3,548	0.432	0.072	0.426	3,453
Formal wage	4.356	1.466	4.094	3,548	3.181	1.373	3.006	3,453
Informal wage	2.753	1.013	2.493	3,548	2.328	1.146	2.069	3,453

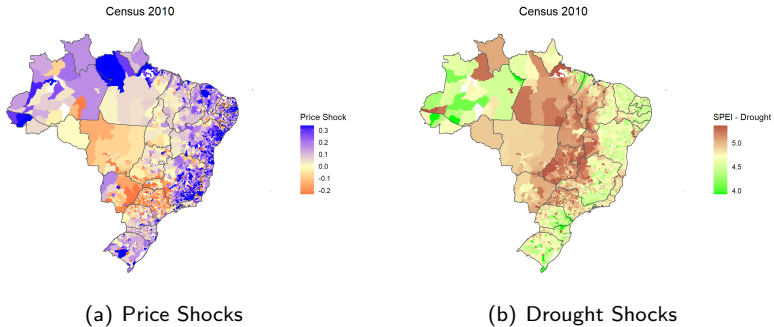
Notes: Weighted by the population at the destination municipality in the previous census; we compute the share of formal and informal as a proportion of total hours worked.

Immigration, 2000-2010



Notes: Computed using the Decennial Population Census. Darker areas denote higher immigration rates.

Figure 1: Migration Push Shocks

[▶ Back](#)

Effects of Immigration on Firms - Manufacturing

	Nb firms (1)	Entry rate (2)	Exit rate (3)	Nb jobs (4)	Firm size (5)	Firm wage (6)
Panel A: OLS Immigration	1.327 (0.158)	-0.086 (0.352)	-0.03 (0.013)	1.462 (0.24)	0.127 (0.21)	0.342 (0.237)
Panel B: IV-Price Immigration	-0.301 (0.958)	5.708 (2.16)	-0.012 (0.06)	1.447 (1.571)	1.927 (1.215)	-1.445 (0.816)
F Statistic (IV)	15.73	15.47	15.43	15.73	15.62	15.65
Observations	3124	3020	2980	3124	3065	3064

[▶ Back](#)

Effects of Immigration on Firms - Services

	Nb firms (1)	Entry rate (2)	Exit rate (3)	Nb jobs (4)	Firm size (5)	Firm wage (6)
Panel A: OLS Immigration	0.986 (0.086)	0.151 (0.219)	-0.006 (0.001)	0.76 (0.319)	-0.232 (0.27)	0.437 (0.086)
Panel B: IV-Price Immigration	2.294 (0.602)	5.197 (1.592)	-0.01 (0.009)	2.526 (1.103)	0.227 (0.833)	-2.338 (0.955)
F Statistic (IV)	16.77	16.77	16.77	16.77	16.77	16.77
Observations	3409	3409	3409	3409	3409	3409

[▶ Back](#)

Labor Market Effects by Skill

	High-Skilled Workers			Low-Skilled Workers		
	Formal (1)	Informal (2)	Non-employed (3)	Formal (4)	Informal (5)	Non-employed (6)
Panel A: OLS						
Immigration	0.052 (0.026)	-0.045 (0.014)	-0.01 (0.016)	0.153 (0.024)	-0.063 (0.013)	-0.072 (0.018)
Panel B: IV-Price						
Immigration	0.372 (0.171)	-0.239 (0.103)	0.018 (0.135)	0.329 (0.108)	-0.284 (0.094)	0.096 (0.122)
F Statistic (IV)	16.87	16.87	16.87	16.87	16.87	16.87
Observations	3548	3548	3548	3548	3548	3548

[▶ Back](#)

Wage Effects by Skill

	High-Skilled Workers		Low-Skilled Workers	
	Formal wage (1)	Informal wage (2)	Formal wage (3)	Informal wage (4)
Panel A: OLS				
Immigration	-0.066 (0.08)	-0.174 (0.157)	0.094 (0.105)	0.19 (0.087)
Panel B: IV-Price				
Immigration	-1.202 (0.448)	-0.475 (0.654)	-2.023 (0.73)	-2.059 (0.907)
F Statistic (IV)	16.86	16.87	16.87	16.87
Observations	3527	3514	3546	3548

Robustness

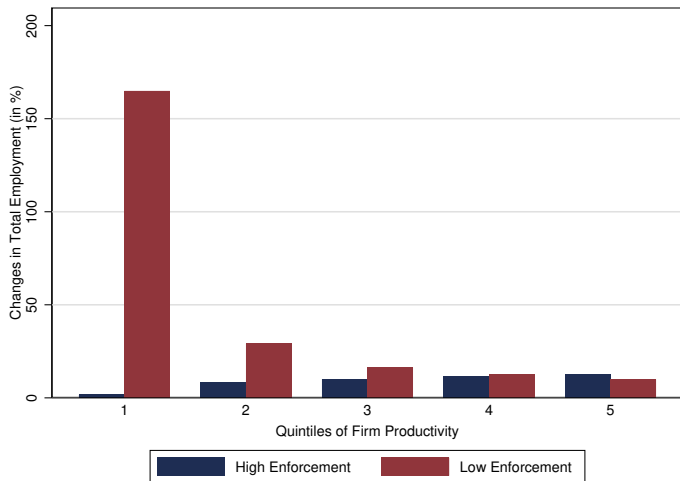
- **Pre-trends**: dynamic effects + Include lagged changes in outcomes as a control
- **Potential confounders**: Control for population, industry shares and log GDP per capita at baseline
- **Persistence of migration** (the shares): Control for lagged migration rates
- **Drought** push shock
- **Preliminary**: estimate all results using Borusyak, Hull and Jaravel (2021)

Heterogeneity by enforcement levels (preliminary)

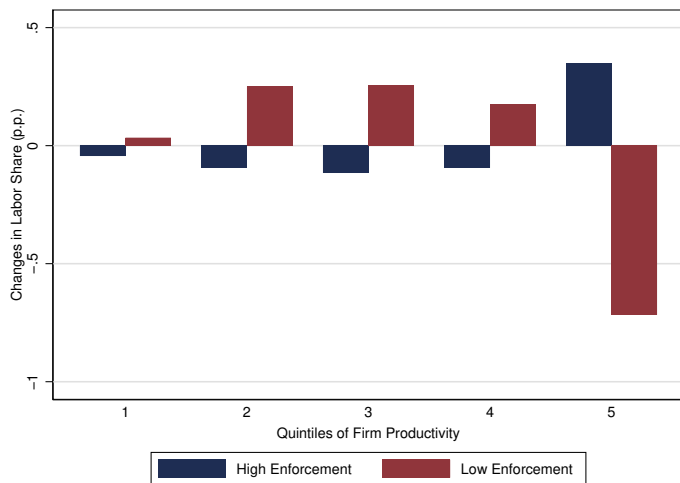
- Enforcement of labor regulations varies a lot across regions in Brazil (Almeida & Carneiro, 2011; Ponczek & Ulyssea, 2021).
- Enforcement carried out by car, inspectors located in regional labor offices.
- We use data on driving distances to the nearest L.O. for all municipalities and L.O. created up until 1995.

	Nb firms (1)	Entry rate (2)	Exit rate (3)	Nb jobs (4)	Firm size (5)	Firm wage (6)
IV - Price						
Weak enforcement	0.111 (0.057)	0.462 (0.214)	0.002 (0.001)	0.117 (0.088)	0.002 (0.079)	-0.320 (0.131)
Immigration	2.444 (0.720)	6.738 (2.694)	-0.004 (0.005)	2.114 (1.117)	-0.385 (0.951)	-4.482 (1.851)
Weak enforcement * Immigration	-1.159 (0.796)	-5.131 (2.822)	-0.012 (0.009)	-1.238 (1.229)	0.044 (1.109)	5.283 (1.832)
F Statistic (IV)	23.88	23.88	23.88	23.88	23.88	23.88
Observations	3409	3409	3409	3409	3409	3409

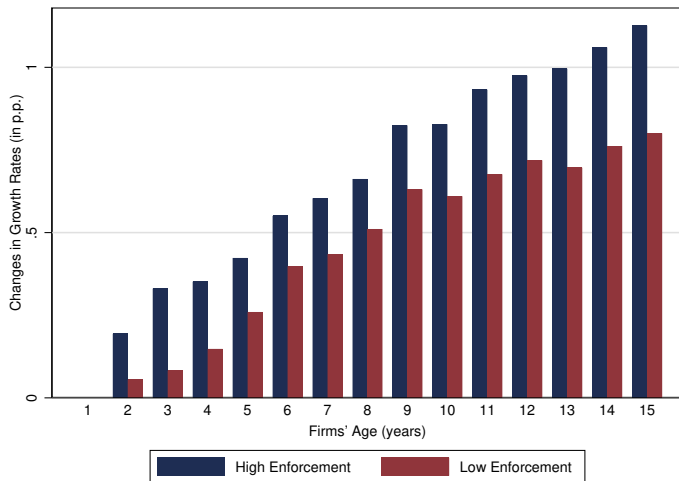
Where is the effect on formal employment coming from?



Changes in the allocation of labor



Changes in growth profiles



- Kleemans, M. and J. Magruder (2018, August). Labour Market Responses To Immigration: Evidence From Internal Migration Driven By Weather Shocks. *Economic Journal* 128(613), 2032–2065.
- Sedlacek, P. and G. Ulyssea (2021). Firm dynamics and reallocation in developing countries. Mimeo.
- Vicente-Serrano, S. M., S. Beguería, and J. I. López-Moreno (2010). A multiscalar drought index sensitive to global warming: the standardized precipitation evapotranspiration index. *Journal of climate* 23(7), 1696–1718.