

# Informality and Aggregate Productivity The Case of Mexico

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# Motivation

- ▶ How important is informality for understanding low aggregate productivity?
- ▶ The Case of Mexico:
  - ▶ Informality covers 90 percent of firms and 56 percent of workers
  - ▶ Informal firms are smaller and on average less productive
  - ▶ Evidence of greater misallocation within the informal sector
  - ▶ Informality may be the main reason aggregate productivity has remained low (Levy, 2018)

# This paper

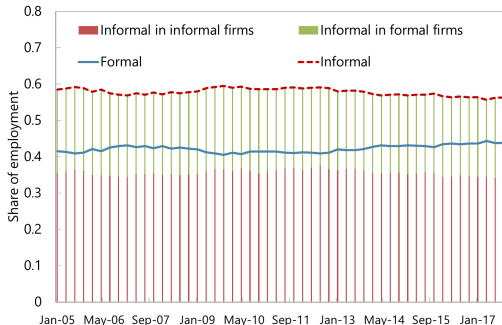
- ▶ Describes the structure of informality in Mexico using
  - ▶ Firm-level data: Mexican Economic Census 1998-2013 [summary stats](#)
  - ▶ Worker-level data: National Employment and Occupation surveys (ENOE) 2005-2019 [summary stats](#)
- ▶ Estimate a model with endogenous informality
  - ▶ Ulyssea (2018) + idiosyncratic firm-level distortions (wedges)
    - ▶ Restuccia and Rogerson (2008) Hsieh and Klenow (2009)
  - ▶ Informality reduces productivity through misallocation:
    1. Large value-added / worker gaps between formal and informal sectors
    2. Greater dispersion of distortions in informal sector
- ▶ Conduct policy experiments in distorted environment:
  - ▶ Reforming the social security contributory system
  - ▶ Reducing labor distortions
  - ▶ Reducing entry costs into the formal sector
  - ▶ Reducing idiosyncratic distortions in the informal sector

# Main Takeaways

Do policies which reduce informality increase aggregate productivity?

- ▶ **Our view:** It's complicated
  - ▶ Reducing formal labor costs  
⇒ Formal Employment ↑ Formal Firms ↑ Productivity ↑
  - ▶ Reducing formal entry costs  
⇒ Formal Employment ↑ Formal Firms ↑ Productivity ↑
  - ▶ Eliminating informality can have a moderate impact on misallocation

# Informality in Mexico



Informal employment shares in Mexico

Source: ENOE

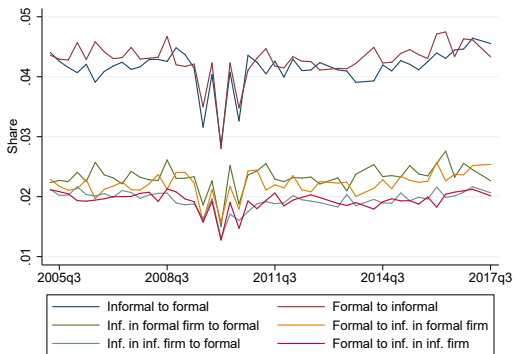
# Wage premia

	No controls		Age and education controls		Worker fixed effects	
	(1)	(2)	(3)	(4)	(5)	(6)
Formal	0.406*** (0.00103)	0.472*** (0.00109)	0.154*** (0.00103)	0.233*** (0.00109)	0.00470** (0.00213)	0.0392*** (0.00216)
Informal at formal firm	-0.210*** (0.00130)	0.0457*** (0.00137)	-0.222*** (0.00126)	-0.0261*** (0.00132)	-0.108*** (0.00197)	-0.0448*** (0.00202)
Education effects	No	No	Yes	Yes	No	No
Age effects	No	No	Yes	Yes	No	No
Sector effects	No	Yes	No	Yes	No	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Worker effects	No	No	No	No	Yes	Yes
<i>N</i>	6,231,902	6,231,902	6,231,902	6,231,902	6,231,902	6,231,902
<i>R</i> <sup>2</sup>	0.127	0.173	0.267	0.290	0.790	0.791

Sources: ENOE; and staff calculations.

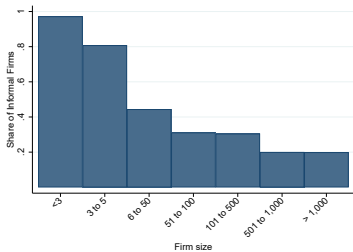
Note: Regressions with  $\log(\text{wage})$  as the dependent variable. Year, sector, education and age included as a vector of age and education dummies. Education categories are none, primary, secondary, high school, tertiary technical degree and  $\checkmark$  college completed. Sectors are agriculture, construction, manufacturing, and services. Robust standard errors in parentheses \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

# Informality in Mexico

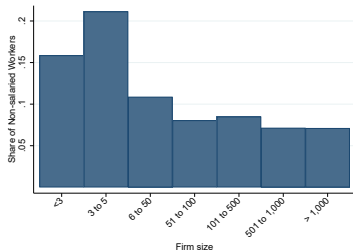


Transitions between formal and informal employment in Mexico  
Source: ENOE

# Informality in Mexico



Extensive margin

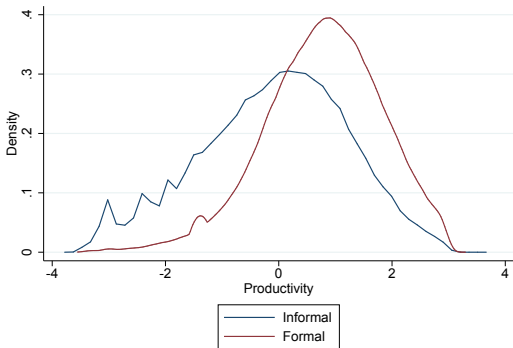


Intensive margin

Source: Mexican Economic Census.



# Informality in Mexico



kernel = epanechnikov, bandwidth = 0.0588

Value added per worker dispersion  
Source: Mexican Economic Census.

Productivity gaps

# Productivity premia

	Log(Value Added per Worker)						
	(1)	(2)	(3)	(5)	(6)		
Formal	1.410*** (0.00229)	1.051*** (0.00241)	0.851*** (0.00262)	0.364*** (0.00278)	0.948*** (0.00240)	0.796*** (0.00259)	0.332*** (0.00274)
Firm size			0.196*** (0.00103)	0.0740*** (0.00104)		0.156*** (0.00102)	0.0417*** (0.00103)
Share of salaried workers				0.994*** (0.00226)			0.956*** (0.00222)
Sector effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Municipality effects	No	No	No	No	Yes	Yes	Yes
<i>N</i>	3,571,102	3,571,102	3,571,102	3,571,102	3,571,102	3,571,102	3,571,102
<i>R</i> <sup>2</sup>	0.096	0.180	0.188	0.230	0.221	0.226	0.264

Sources: Mexican Economic Census 2013; and staff calculations.

Note: Four-digit sector codes used. Firms size control is the log of employed.

# Informality in Mexico

	1998		2003		2008		2013	
	Inf.	For.	Inf.	For.	Inf.	For.	Inf.	For.
Share of firms	0.82	0.18	0.87	0.13	0.89	0.11	0.89	0.11
Share of labor	0.32	0.68	0.41	0.59	0.48	0.52	0.49	0.51
Workers per firm								
Mean	2.0	19.2	2.5	23.8	3.1	26.4	2.7	23.8
S.d.	21.4	135.3	17.5	165.4	37.7	323.8	24.7	366.5
90-10 ratio	3.0	12.5	4.0	16.5	4.0	17.5	4.0	15.0
Share of salaried								
Mean	0.15	0.83	0.16	0.81	0.18	0.80	0.15	0.85
S.d.	0.32	0.24	0.32	0.22	0.32	0.23	0.32	0.21
90-10 ratio		2.00		2.00		2.00		2.00
V.A. per worker								
Mean	2.54	3.81	2.92	4.20	2.82	4.14	3.04	4.45
S.d.	1.20	1.02	1.26	0.98	1.36	1.13	1.37	1.02
90-10 ratio	3.13	2.54	3.38	2.46	3.61	2.83	3.65	2.54
Number of firms	1.88	0.42	2.37	0.35	2.48	0.31	3.19	0.38

Sources: Mexican Economic Census; and staff calculations.

Notes: V.A. refers to the log of value added per worker. Number of firms in millions.

# Regulatory drivers of informality – many suspects

- ▶ Regulatory costs to formalization
  - ▶ Mexico ranks 94th out of 190 economies in costs and procedural burdens for starting a formal business (Doing Business, 2019)
  - ▶ Taxes (e.g. income taxes, VAT, size-dependent regimes)
- ▶ Regulatory costs to hiring formal salaried workers (with benefits)
  - ▶ Social security contributions
    - ▶ Limited net benefits over non-contributory systems
    - ▶ Many workers will not get pension benefits
  - ▶ State payroll taxes
  - ▶ Income tax withholding requirements (easier to evade if non-salaried)
  - ▶ Firing costs (payments and dismissal justifications)
- ▶ Policy changes since late 1990s have widened incentive gaps
- ▶ **Question:** Which regulatory distortions matter most?
  - ▶ Need a model to analyze counterfactual policy reforms

# A Model of Informality: Overview

- ▶ Ulyssea (2018) + idiosyncratic distortions
- ▶ Two sectors - informal and formal
- ▶ Potential entrants observe noisy signal of their productivity  $\nu_i$ 
  - ▶ No signal of their distortion
- ▶ Choose once and for all which sector to enter
  - ▶ Sector-specific entry costs  $E^I$  and  $E^F$
- ▶ Observe productivity and distortion, decide entry/exit and how many formal/informal workers to hire
  - ▶ Observe productivity  $\theta_i = \nu_i \cdot \epsilon_i$  and distortion  $\tau_i^S$
  - ▶ Distribution from which  $\epsilon_i$  drawn does not depend on sector
  - ▶ Distribution from which  $\tau_i^S$  drawn is sector-specific (S = F / I)
  - ▶ Sector-specific overhead costs of production  $c_I$  and  $c_F$

# A Model of Informality: Firm Problems

- ▶ Informal firms only hire informal workers - cost increases in firm size

$$\pi_i^I = \max_{l_i} \theta_i l_i^\alpha - (1 + \tau_i^I) r^I(l_i) w l_i - c_I$$
$$r^I(l_i) = \left(1 + \frac{l_i}{b^I}\right)$$

- ▶ Formal firms can hire formal and informal workers (intensive margin)
  - ▶ Cost of hiring informal workers increasing in # of informal workers
  - ▶ Constant cost of hiring formal workers, but face labor wedge  $\tau^w$

$$\pi_i^F = \max_{l_i} \theta_i l_i^\alpha - (1 + \tau_i^F) r^F(l_i) w l_i - c_F$$
$$r^F(l_i) = \begin{cases} \left(1 + \frac{l_i}{b^F}\right) & \text{if } l_i < \tilde{l} \\ \frac{\tilde{l}}{l_i} \left(1 + \frac{\tilde{l}}{b^F}\right) + (1 + \tau^w) \frac{(l_i - \tilde{l})}{l_i} & \text{if } l_i > \tilde{l} \end{cases}$$

# A Model of Informality: Misallocation

- ▶ Informal firm value added per worker:

$$\frac{y_i}{l_i} = \frac{y_i}{l_i} = \frac{1}{\alpha}(1 + \tau_i^I)(1 + 2\frac{l_i}{b^I})w$$

- ▶ Formal firm value added per worker:

$$\frac{y_i}{l_i} = \begin{cases} \frac{1}{\alpha}(1 + \tau_i^F)(1 + 2\frac{l_i}{b^F})w & \text{if } l_i < \tilde{l} \\ \frac{1}{\alpha}(1 + \tau_i^F)w & \text{if } l_i > \tilde{l} \end{cases}$$

- ▶ Dispersion in value added per worker informative about  $\tau_i^I$  and  $\tau_i^F$

# Model estimation and fit

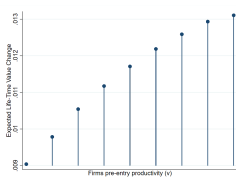
	Data	Model
Share of informal workers out of total workers	56.5%	55.4%
Share of firms that are informal	89.0%	92.8%
<i>Extensive informality margin (share of firms)</i>		
Informal firms with $\leq 5$ workers	94.0%	95.8%
Informal firms with 6-10 workers	57.0%	83.0%
Informal firms with 11-50 workers	35.0%	47.9%
<i>Intensive informality margin (share of workers)</i>		
Informal workers within formal firms of size 1-5	21.0%	23.3%
<i>Size distribution of informal firms (share of informal)</i>		
Informal firms with $\leq 2$ workers	79.0%	76.3%
Informal firms with $\leq 5$ workers	96.0%	92.7%
<i>Size distribution of formal firms (share of formal)</i>		
Formal firms with $\leq 5$ workers	52.0%	52.0%
Formal firms with 6-10 workers	21.0%	17.9%
Formal firms with 11-20 workers	13.0%	13.5%
Formal firms with 21-50 workers	8.0%	10.1%
Formal firms with $>50$ workers	6.0%	6.5%
<i>Productivity distribution</i>		
Median value-added per worker in formal vs informal	1.05	0.99
90-10 ratio of value-added per worker within informal	3.49	2.36
90-10 ratio of value-added per worker within formal	2.64	2.11



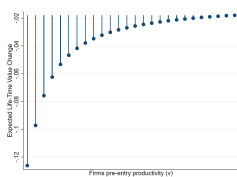
# Model parameters

Parameter	Description	Value
<i>Calibrated Parameters</i>		
$\tau_w$	Regulatory tax wedge in formal sector	0.35
$\delta^F$	Exit rate in formal sector	0.08
$\nu_0$	Location parameter of Pareto distribution	1,188
$\gamma^F$	Overhead costs in the formal sector	0.45
<i>Estimated Parameters</i>		
$b^F$	Cost parameter of informal workers for formal firms	2.35
$b^I$	Cost parameter of informal workers for informal firms	4.58
$\delta^I$	Exit rate for informal firms	0.27
$\gamma^I$	Overhead costs in informal sector	0.19
$\xi$	Shape parameter of Pareto distribution	1.57
$E^F$	Entry costs in formal sector	93,193
$E^I$	Entry costs in informal sector	8
$\alpha$	Decreasing returns to scale	0.32
$\sigma$	Post-entry productivity shock variance	0.27
$\bar{\tau}^F$	Average distortion in formal sector	1.01
$\sigma_I$	Post-entry distortion shock in informal sector	1.30
$\sigma_F$	Post-entry distortion shock in formal sector	0.99

# Policy experiment 1: Eliminating contributory social security wedge (reduction of 12% in $\tau_w$ )



Always formal



Always informal

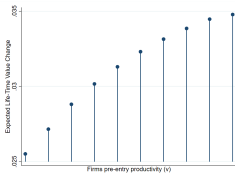


Formalized

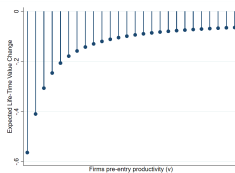
- ▶ Informal employment **-4%**
- ▶ Informal firms **-1%**

- ▶ Informal output share **-2%**
- ▶ Aggregate productivity **+1%**

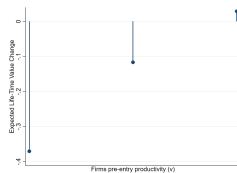
## Policy experiment 2: Reducing $\tau_w=0$



Always formal



Always informal

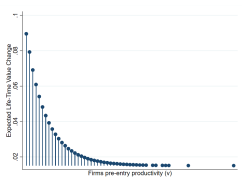


Formalized

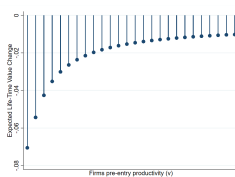
- ▶ Informal employment **-12%**
- ▶ Informal firms **-2%**

- ▶ Informal output share **-5%**
- ▶ Aggregate productivity **+2%**

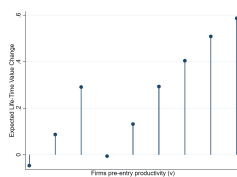
# Policy experiment 3: Reducing formalization costs by 2/3



Always formal



Always informal

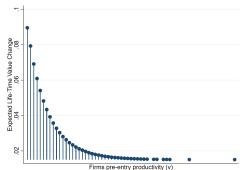


Formalized

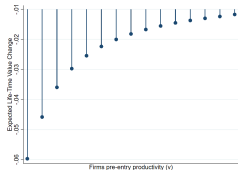
- ▶ Informal employment **-10%**
- ▶ Informal firms **-16%**

- ▶ Informal output share **-12%**
- ▶ Aggregate productivity **+8%**

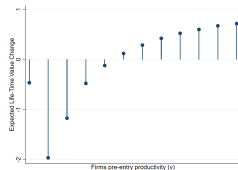
## Policy experiment 4: Eliminating formalization costs (equalizing entry costs in the formal and informal sectors)



Always formal



Always informal

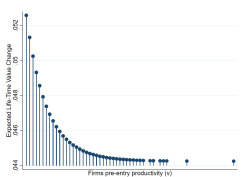


Formalized

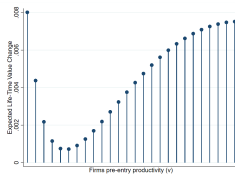
- ▶ Informal employment **-36%**
- ▶ Informal firms **-93%**

- ▶ Informal output share **-37%**
- ▶ Aggregate productivity **+29%**

# Policy experiment 5: Reducing dispersion in informal wedges $\tau_i^I$



Always formal



Always informal



Formalized

- ▶ Informal employment **-5%**
- ▶ Informal firms **0%**

- ▶ Informal output share **-0%**
- ▶ Aggregate productivity **+3%**

# Policy experiments: Aggregate effects I

	Baseline	No contributory programs	No labor wedges	2/3 Reduction in entry costs	No entry costs	Reduced dispersion in inf. wedges
Aggregate TFP	1.00	1.01	1.02	1.08	1.29	1.04
Informal Share of Firms	92.8%	92.2%	90.9%	76.6%	0.0%	92.2%
Informal Share of Employment	55.4%	51.6%	43.7%	45.5%	19.3%	46.6%
Informal Share of Output	36.5%	35.0%	31.8%	24.3%	0.0%	35.0%
VA/Worker Dispersion	88.1%	86.6%	84.0%	88.8%	78.6%	78.0%
VA/Worker Dispersion in Informal Sector	81.6%	81.9%	82.7%	81.9%	0.0%	57.0%
VA/Worker Dispersion in Formal Sector	78.9%	79.0%	79.0%	79.8%	78.6%	79.0%
Tax Revenues (share of output)	15.6%	16.9%	19.7%	19.1%	28.2%	18.7%

# Policy experiments: Aggregate effects II

	Baseline	No contributory programs	No labor wedges	2/3 Reduction in entry costs	No entry costs	Reduced dispersion in inf. wedges
Share of informal workers	55.4%	51.6%	43.7%	45.5%	19.3%	46.6%
Share of firms that are informal	92.8%	92.2%	90.9%	76.6%	0.0%	92.2%
<i>Extensive informality margin (share of firms)</i>						
Informal firms with <= 5 workers	95.8%	95.6%	94.9%	79.6%	0.0%	95.8%
Informal firms with 6-10 workers	83.0%	81.2%	76.8%	63.9%	0.0%	71.3%
Informal firms with 11-50 workers	47.9%	43.8%	34.9%	27.7%	0.0%	10.4%
<i>Intensive informality margin (share of workers)</i>						
Informal workers within formal firms of size 1-5	23.3%	15.3%	0.0%	30.0%	39.7%	22.9%
<i>Size distribution of informal firms (share of informal)</i>						
Informal firms with <= 2 workers	76.3%	77.1%	79.2%	79.4%	0.0%	81.9%
Informal firms with <= 5 workers	92.7%	93.0%	94.0%	94.3%	0.0%	97.2%
<i>Size distribution of formal firms (share of formal)</i>						
Formal firms with <= 5 workers	52.0%	50.8%	50.7%	79.1%	96.8%	50.1%
Formal firms with 6-10 workers	17.9%	18.4%	17.5%	9.8%	1.7%	17.6%
Formal firms with 11-20 workers	13.5%	13.8%	13.6%	5.6%	0.8%	14.1%
Formal firms with 21-50 workers	10.1%	10.1%	10.7%	3.7%	0.4%	10.6%
Formal firms with >50 workers	6.5%	6.9%	7.6%	1.8%	0.2%	7.5%
<i>Productivity distribution</i>						
Median value-added per worker in formal vs informal	0.99	0.93	0.73	1.07	0.00	1.02
90-10 ratio of value-added per worker within informal	2.36	2.37	2.41	2.38	0.00	1.55
90-10 ratio of value-added per worker within formal	2.11	2.12	2.10	2.06	1.89	2.10



# Conclusions

- ▶ Both intensive and extensive margins of informality are quantitatively significant
- ▶ Labor wedges from contributory social security and the tax system have small impact on aggregate misallocation
  - ▶ Eliminating these significantly increases formal employment with limited aggregate productivity effects
- ▶ Reducing formalization costs can have larger aggregate productivity effects
  - ▶ However, estimates are highly sensitive to DRS/love-of-variety
- ▶ Could productivity gains be even larger? Need other channels
  - ▶ Externalities from formalization (e.g. R&D, human capital, network effects)
- ▶ Focus on 'shifting up' the productivity distribution and removing barriers to the development of large competitive productive firms