

# New Technologies and Productivity and Inequality Dynamics in Latin America\*

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# Content

I. Stylized facts

II. New technologies

II.1 Productivity

II.2 Inequality

III. Policy challenges

# 1. Stylized facts

## Fact one: employment is very dispersed

	US	Argentina	Brazil	Colombia	Mexico
Self	10	27	34	34	21
1 to 5	6	24	15	25	30
Total	16	51	49	59	51

- 85% of LA's population lives in cities, so dispersion is not a reflection of high rural employment.

## Fact two: the size distribution of firms is strongly tilted towards smallness

	Firm size (# of workers)	Number of firms (000)	Share (%)	Number of workers (000)	Share (%)
Peru	2–10	3,163	98.9	8,586	73.0
	11–100	29	0.08	1,563	13.3
	101 +	4.1	0.02	1,610	13.7
	Total	3,196	100.0	11,759	100.0
United States	2–9	4,726	60.1	12,503	9.7
	10–99	1,405	17.9	29,851	23.2
	100 +	1,729	21.9	86,147	67.0
	Total	7,861	100.0	128,592	100.0

- Peru has 1/10 the population and 1/100 the GDP of the US, but 40% of its firms.
- Peru has only 4,100 firms with 100+ workers vs. 1.7 million in the US; a ratio of 0.002, much larger than can be explained by differences in population (0.1) or GDP (0.01).
- 73% of employment in Peru occurs in firms with < 10 workers, vs. 10% in US.

**Fact three: high market concentration in a few large firms**

- Mark-ups in LA systematically higher than in OECD
- Labor’s share in GDP about 20 percentage points lower than in OECD
- Little evidence of mark-ups driven by innovation; most firms in LA are technology adopters (few Samsungs!)

**Fact four: high concentration of (large) firm ownership**

- Firms listed in stock market per million inhabitants: 27.4 for OECD vs. 10.9 in Chile, 6.6 in Peru, 2.1 in Argentina, 1.6 in Brazil, 1.3 in Colombia and 1.1 in Mexico
- Share of firms listed in stock market strategically owned by single family: 16% in OECD vs. 32% in Mexico, 21% in Brazil.

**Fact five: high labor and firm informality**

Country	Informal workers (%)
Argentina	45
Bolivia	80
Brazil	45
Chile	25
Colombia	60
Honduras	80
Mexico	55
Peru	75

Firm composition, shares

	Colombia		Mexico		Peru	
	Formal	Informal	Formal	Informal	Formal	Informal
1 – 10	17.4	81.6	7.5	88.6	13.9	85.7
11+	1.0	0.0	2.5	1.4	0.2	0.3

**Fact six: growth is slow and occurs mostly from factor accumulation**

1990-2019, % per annum

	Per capita factor accumulation	TFP	GDP per capita
Brazil	1.73	(-) 0.91	0.82
Chile	3.36	0.04	3.40
Colombia	2.28	(-) 0.18	2.09
Mexico	1.53	(-) 0.43	1.09
Peru	2.49	0.22	2.72
Region	1.85	(-) 0.08	1.77

- Per capita factor accumulation was fastest in LA than other regions of the world except for East Asia, but growth was slowest.

**Fact seven: LA is one of the most unequal regions of the world**

- Gini after taxes and transfers: OECD = 0.29 vs. LA = 0.48
- Income inequality probably underestimated when using household data; analysis with admin registries show higher Gini's.
- Other measures of inequality (health, education) also show larger disparities than in other regions.

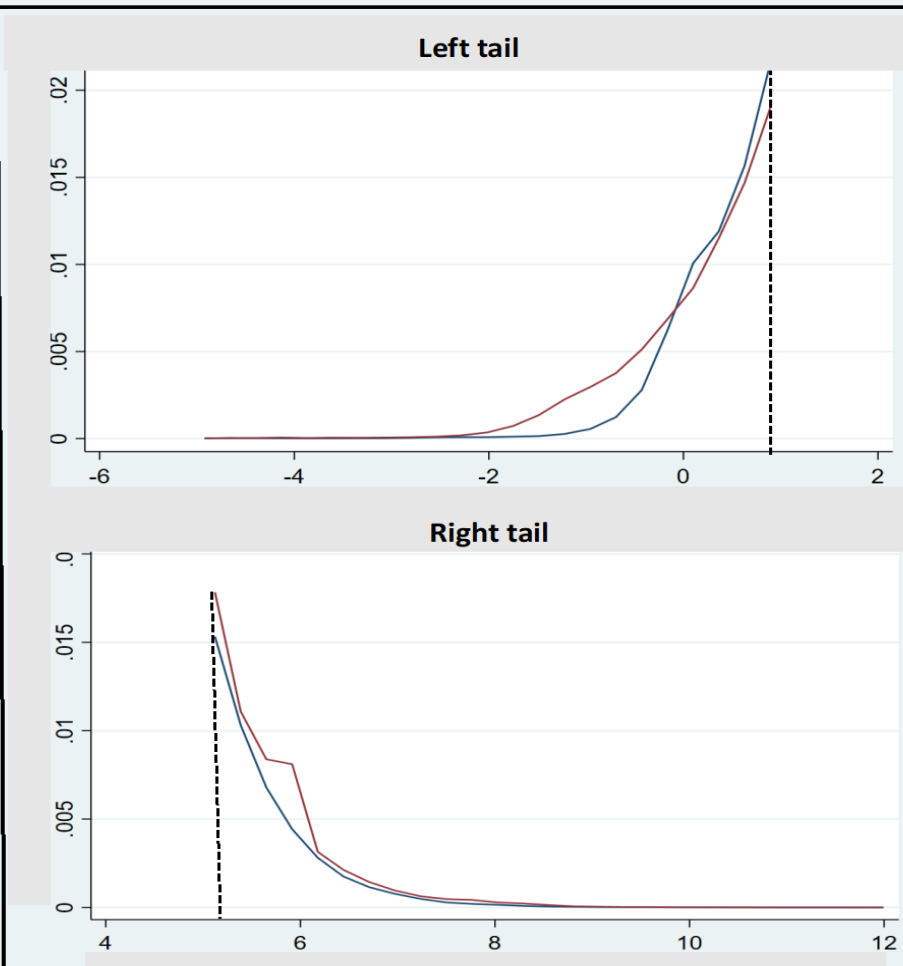
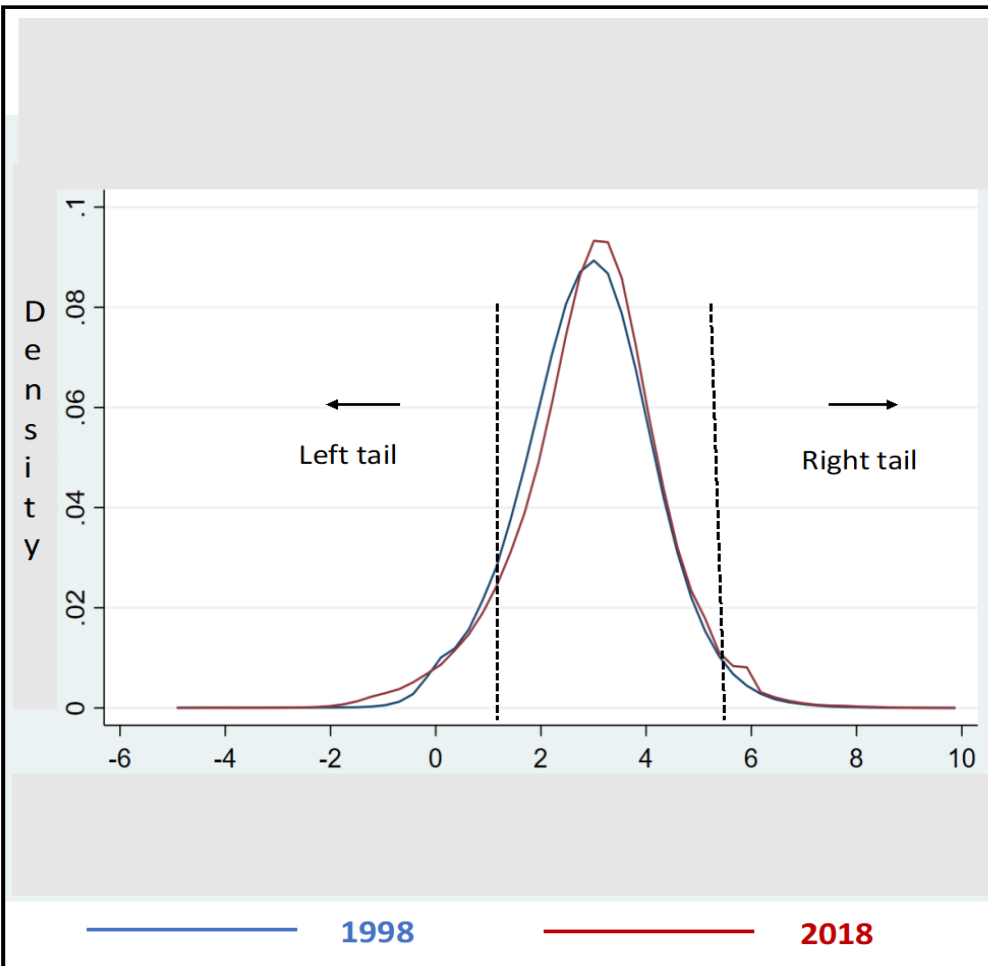
## II. New technologies

### II.1 Productivity

- Large adoption by consumers: in 2019, 67% of world population had a smartphone vs. 69% in LA; and 60% had access to internet vs. 68% in LA. Little evidence of adoption in the production process.
- Key point: adoption depends on the underlying institutions and market structure. **Innovation and adoption mediated by what firms do; firms are the key players.**
- In OECD, market structure less concentrated than in LA, more competition, larger firm size, deeper capital markets, Schumpeterian firm dynamics, and so on.
- In LA, market structure shows “fragmentation with concentration”:
  - ✓ very thick left tail of the productivity distribution populated by mostly small, informal and low-productivity firms
  - ✓ smaller right tail with larger and more capital-intensive higher productivity formal firms
  - ✓ larger dispersion of the firm productivity distribution than in US or OECD
  - ✓ stunted patterns of firm growth.
- Differences in market structure/firm dynamics between LA vs. OECD **make a huge difference for the impact of new technologies on aggregate TFP.**

- New technologies almost wholly created in developed countries and respond to incentives there. Capital intensive; substitution of routine tasks by machines; changes in the skill composition of the demand for labor towards workers with more sophisticated skills; robots for repetitive tasks.
- In developed countries, some firms adopt new technologies faster than others, but competitive pressures force lagging firms to adopt as well. Transitory widening of the firm productivity distribution, but overall distribution will shift to the right, increasing aggregate TFP.
- In LA, with some lags relative to their peers in OECD, large formal firms adopt new technologies (subsidiaries of MNE's; domestic firms that need to follow precise product specifications to participate in world value chains.; best way to compete with domestic informal firms with large labor cost, tax and other regulatory advantages).
- But small informal firms hardly adopt. Competitive pressures are weaker, few economies of scale, short lives, high rotation, few resources to invest in labor training or skill up-grading, often illegal status, etc.
- **Pace of technology adoption =  $\beta$ \*adoption in formal firms + (1 –  $\beta$ )\*adoption in informal ones.**
  - ✓ informality lowers the pace of technology adoption,
  - ✓ the productivity distribution widens,
  - ✓ impact on aggregate TFP ambiguous.

## Mexico TFP distributions, 1998-2018



- Dysfunctional firm dynamics.
  - Mexico exports over U\$400 billion of manufactures, more than the rest of LA combined.
  - But aggregate TFP 7% lower in 2018 vs. 1998!
  - New technologies not found in the aggregate TFP data, but maybe present in the right tail.
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- Studies for Colombia and Brazil also find firm dynamics very different from US, strongly influenced by informality.
  - **Dysfunctional institutions (labor, tax, social insurance, contract enforcement, ....) manifest themselves in persistent informality, which can trump (with small t) the positive effect of new technologies.**



## II. New technologies

### II.2 Inequality

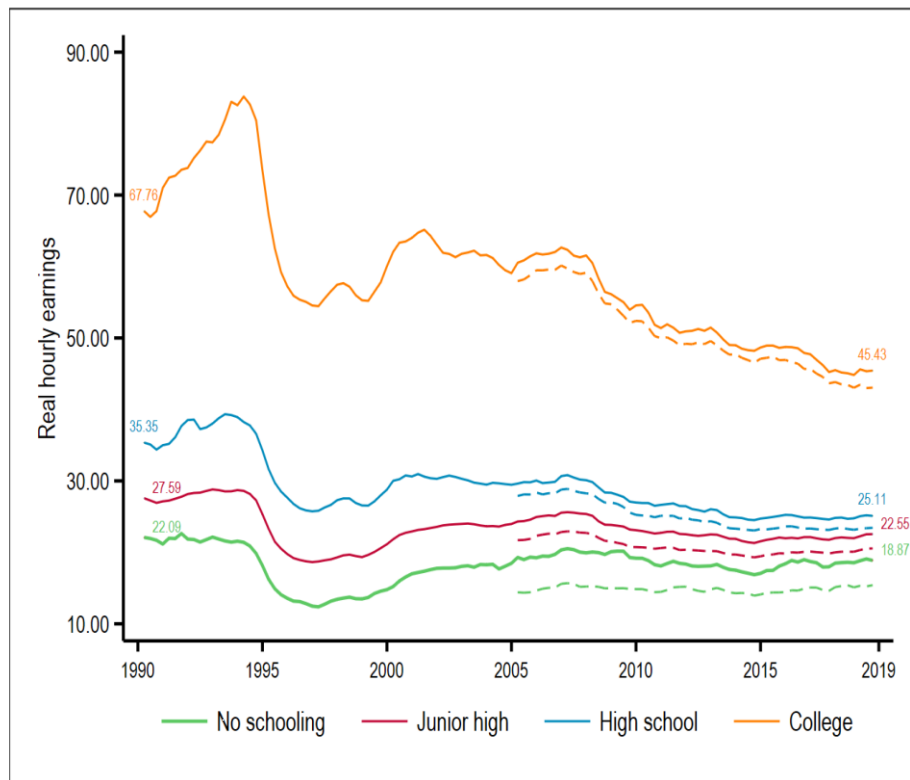
- In developed countries new technologies tend to increase inequality because:
  - ✓ labor share of GDP falls
  - ✓ large profits-cum-rents in capital-intensive “superstar” firms with large network externalities or economies of scale
  - ✓ **increasing** returns to education: race between technology and schooling is won by technology.
- In LA the story is different:
  - ✓ although historically high, little evidence that inequality has increased in the last two decades (if any, the opposite)
  - ✓ little evidence that monopoly power of large firms has increased either; few if any domestic superstar firms
  - ✓ labor share historically low but has not fallen
  - ✓ **falling** returns to education: race between technology and schooling is won by schooling.

## Wage premium in the US and Mexico

United States



Mexico



- Falling returns in Mexico not a result of falling quality. The same behavior is observed at the 90<sup>th</sup> or 95<sup>th</sup> percentile of the wage distribution.
- Wage premium also falling in other LA countries. For example, in Colombia ratio of wages of workers with university vs. secondary education fell from 1.2 in 2006 to 1.0 in 2018.

- Reasons vary across LA countries (export composition, commodity price shocks, minimum wages, informality). But, that said, no evidence that new technologies are increasing wage inequality, in contrast to the US.
- As with aggregate TFP, the impact of new technologies on inequality is yet to be found in the data.

### III. Policy challenges

- In OECD countries policy challenges vis-a-vis new technologies usually focus on:
  - ✓ investments in human capital: schooling, adapting curriculums to demands of technical change, and so on
  - ✓ anti-trust: reducing monopoly power of “superstars” without suppressing innovation
  - ✓ regulating the internet: fake news, protection of privacy rights, and
  - ✓ more recently, risks of AI
- These challenges are also present in LA. In addition, the agenda is usually enlarged to include more investments in R&D and improving the ‘eco-system’ for innovation and adoption (better links between universities and firms, subsidies to compensate firms for innovation risks, public financing for technical institutes, deeper financial markets, .....)
- This agenda is relevant to LA countries, particularly those with little informality, like Chile or Uruguay. However, in the majority, this agenda is counter-acted by other policies.
- The institutions that stand behind informality de facto act like “anti-innovation and anti-technology adoption institutions”. These institutions: (i) attract substantially more resources than those channeled to those promoting R&D, and (ii) operate across the spectrum of all firms and workers, not only the small subset at the technological frontier.

- Investments in R&D and technology adoption have high rates of return when economies operate close to their production possibilities frontier, less so when they are far from it.
- As things stand today, for the majority of countries in LA the biggest program for technological upgrading would be to fight informality and promote competition; in the absence of that, efforts to promote technology adoption and innovation through more spending on R&D and improvements in the innovation eco-system will operate on the small subset of large, usually capital-intensive, firms in the right tail of the TFP distribution. Aggregate TFP may increase but the production structure will become more polarized, and so will income distribution.
- Reforms to tackle informality are needed even without considering new technologies. But new technologies make them more urgent because otherwise LA will lag further behind vis-à-vis the rest of the world and will have greater difficulties competing in the global economy.
- If implemented, they would go a long way to facilitate a faster and more widespread adoption of new technologies. And if this was the case, the policy challenges posed by these technologies in the Region would resemble the ones already faced by OECD countries.
- This would be a good thing. But LA is not there yet.

Thank you.