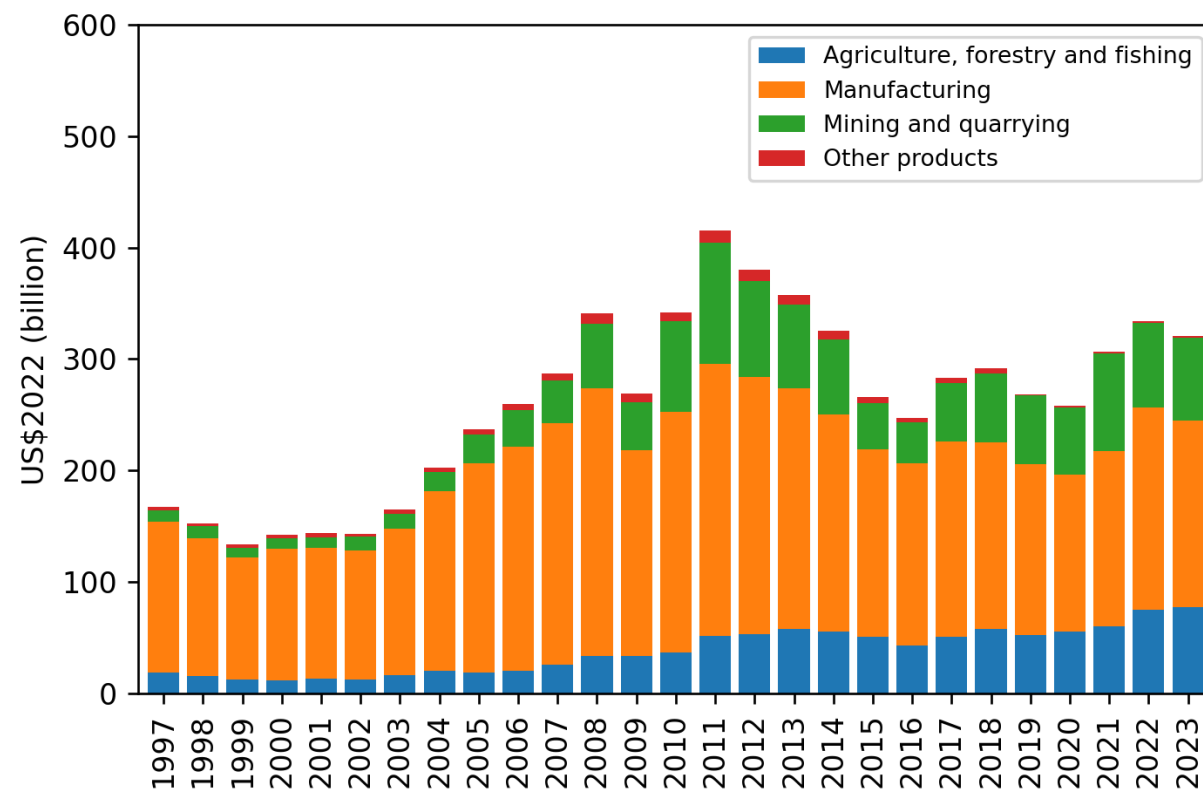# The cycle of exports in Brazil

- In aggregate terms, real exports are about 3x from larger than 25 years ago but about 25% down from the 2010 peak.

- At a macro-level (1-digit industry) the cycle is a combination of a continuous expansion of agro; a large cycle of oil; and a volatile manufacturing sector
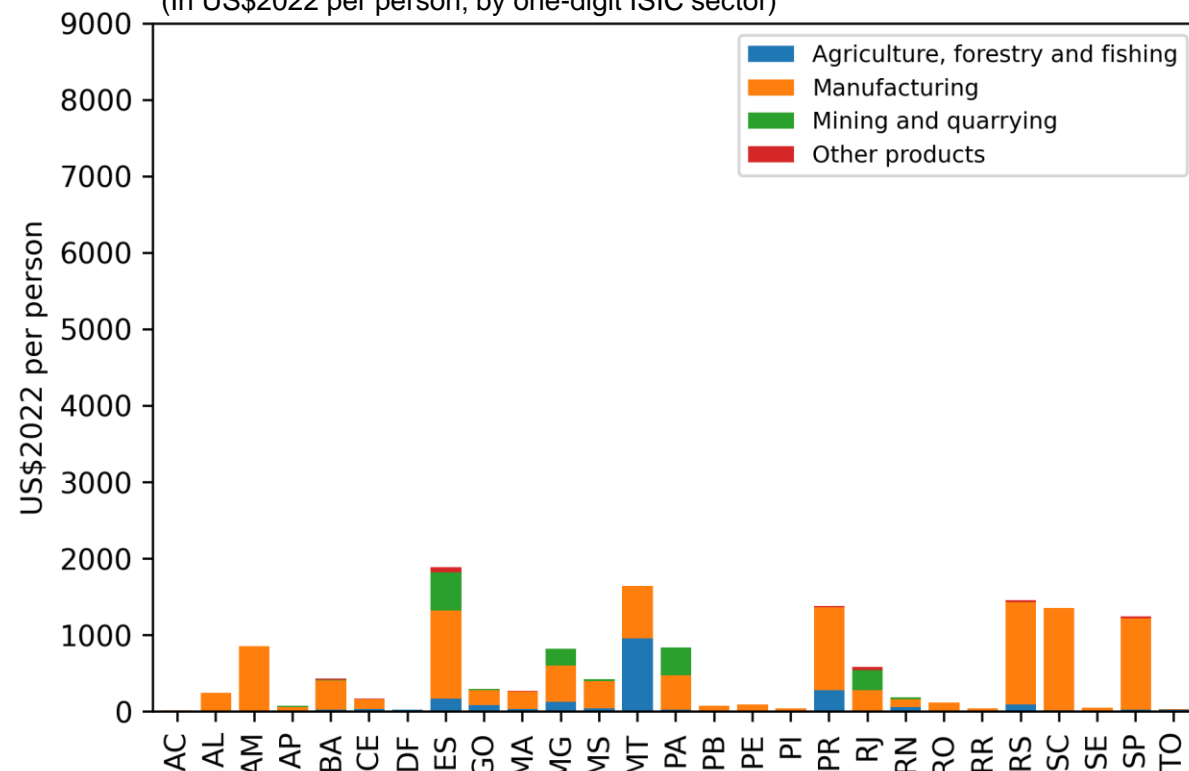

Sources: Own calculations with MDIC, IBGE and Fred data.

How does this look across states?

Average levels of exports increased for most states...

...and while the common story about agriculture does matter, there are some complementarieties between agriculture and manufacturing at play...

Brazilian States: Exports per Person, 2002
(In US$2022 per person; by one-digit ISIC sector)

Brazilian States: Exports per Person, 2022
(In US$2022 per person; by one-digit ISIC sector)
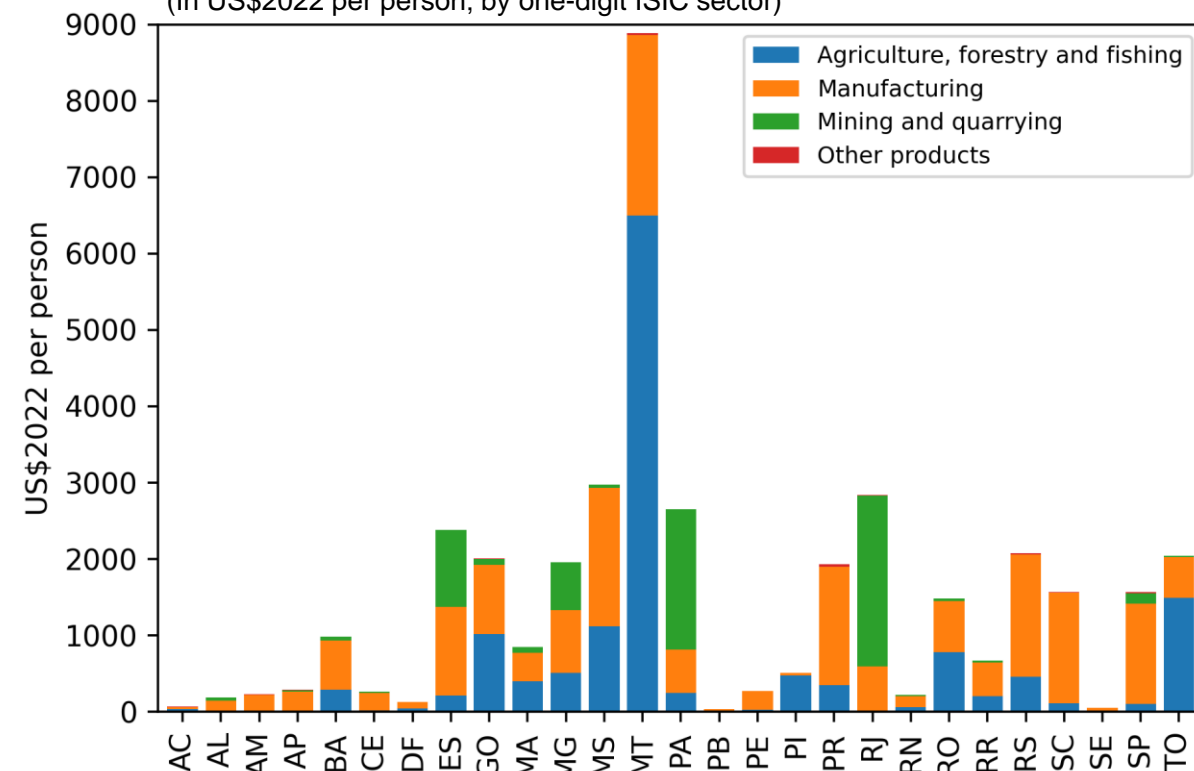
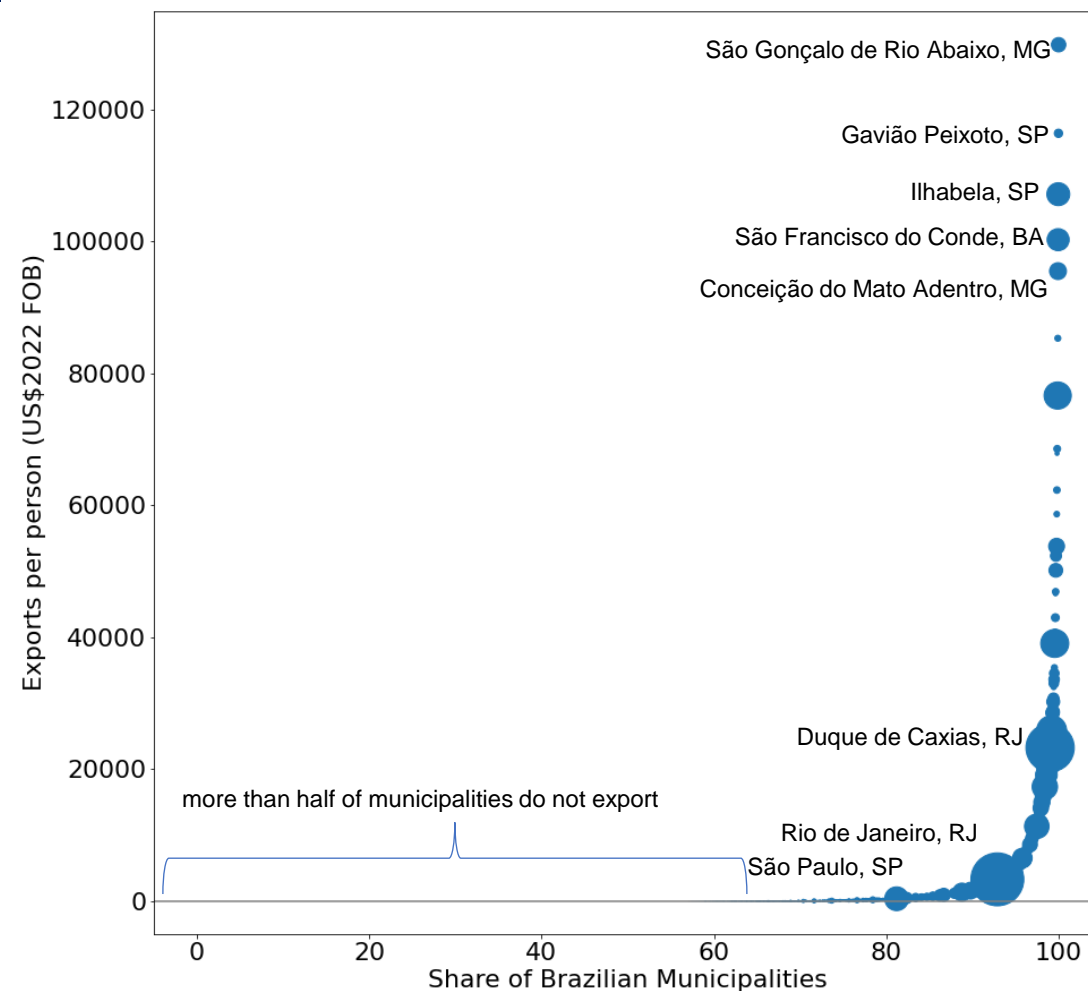Sources: Own calculations with MDIC, IBGE and Fred data.

Sources: Own calculations with MDIC, IBGE and Fred data.

Local exposure to exports

- More than half of Brazilian municipalities did not export in 2022

- Among the top 20 largest cities in Brazil, only Rio de Janeiro-RJ ($3,303), Curitiba-PR ($1,367), Guarulhos-SP ($1,591), and São Luís-MA ($1,838) have per capita exports larger than $1,000.

- However, some smaller municipalities have very high exposure to exports.

Brazilian Municipalities: Exports per Person, 2022
(In US$2022 per person; bubbles are proportional to total municipal exports)

Sources: Own calculations with MDIC, IBGE and Fred data.

Local exposure to exports

São Gonçalo de Rio Abaixo, MG
- (Vale *Brucutu* Mining Site)

Gavião Peixoto, SP
- (Embraer Production Plant)

THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

Zooming in

- In 2022, the turning point seems to be around percentile 80...

- ...in other words, 20 percent of Brazilian municipalities were more exposed to exports.

Brazilian Municipalities: Exports per Person, 2022
(In US$2022 per person; bubbles are proportional to total municipal exports
axis truncated at US$2022 1000)

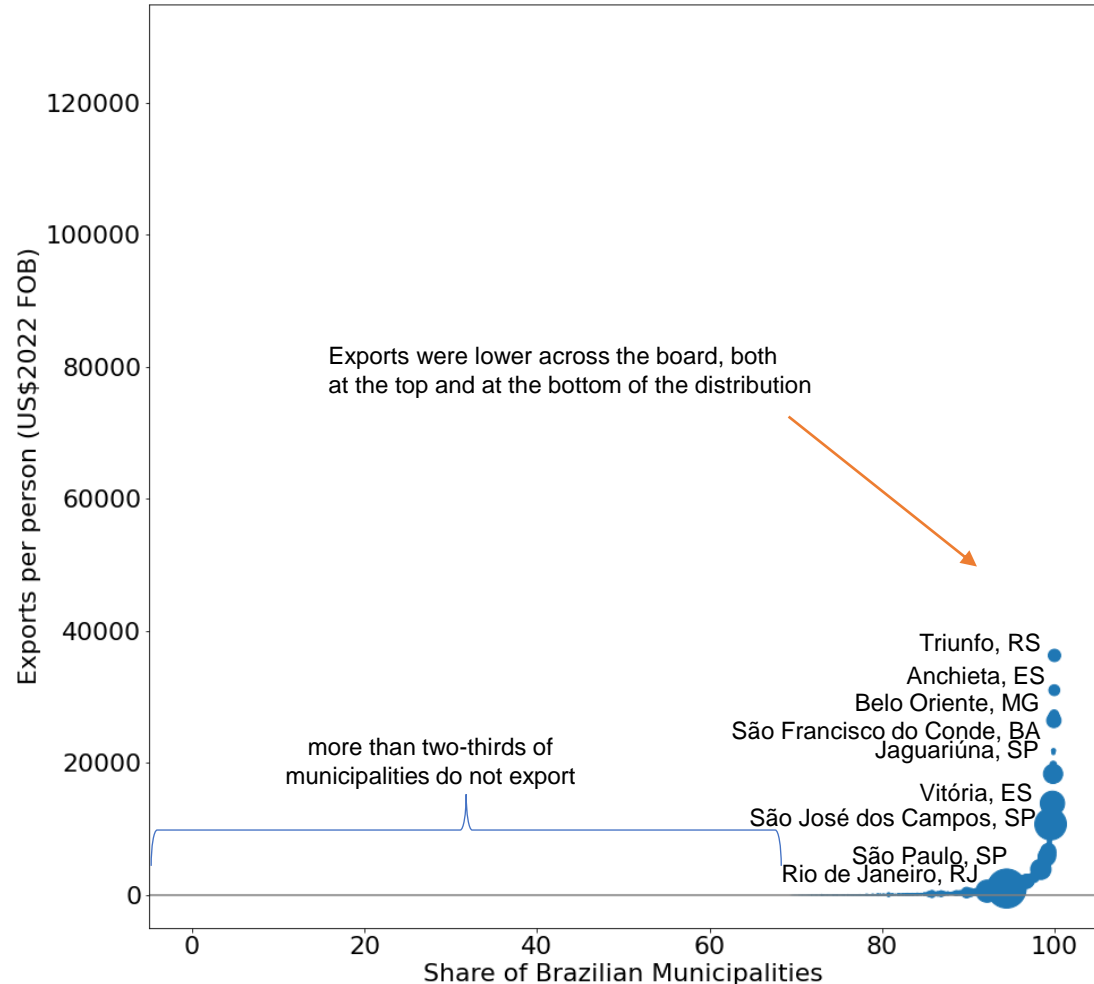Take off for higher exposure around top 20 share of municipalities
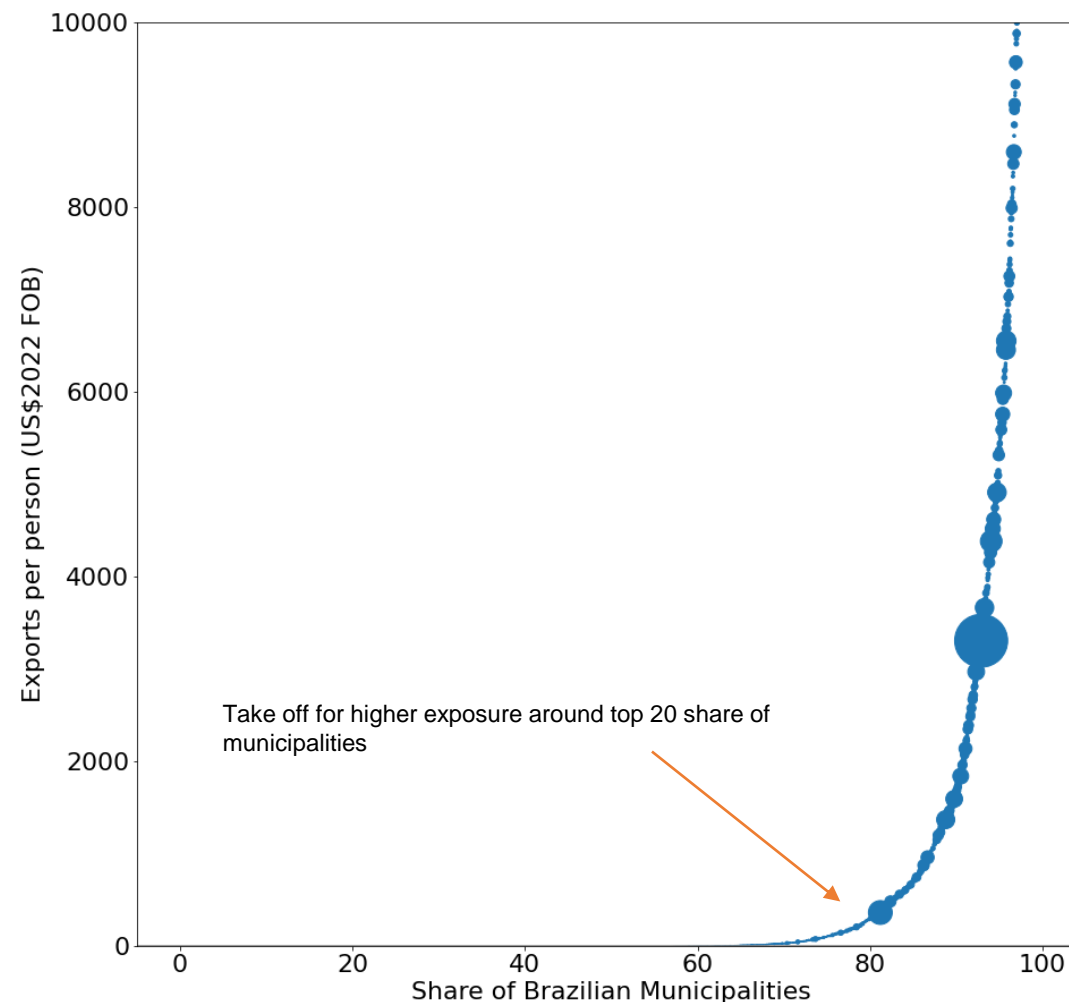
Sources: Own calculations with MDIC, IBGE and Fred data.

Going back 20 years, total exposure is lower and take off threshold was higher
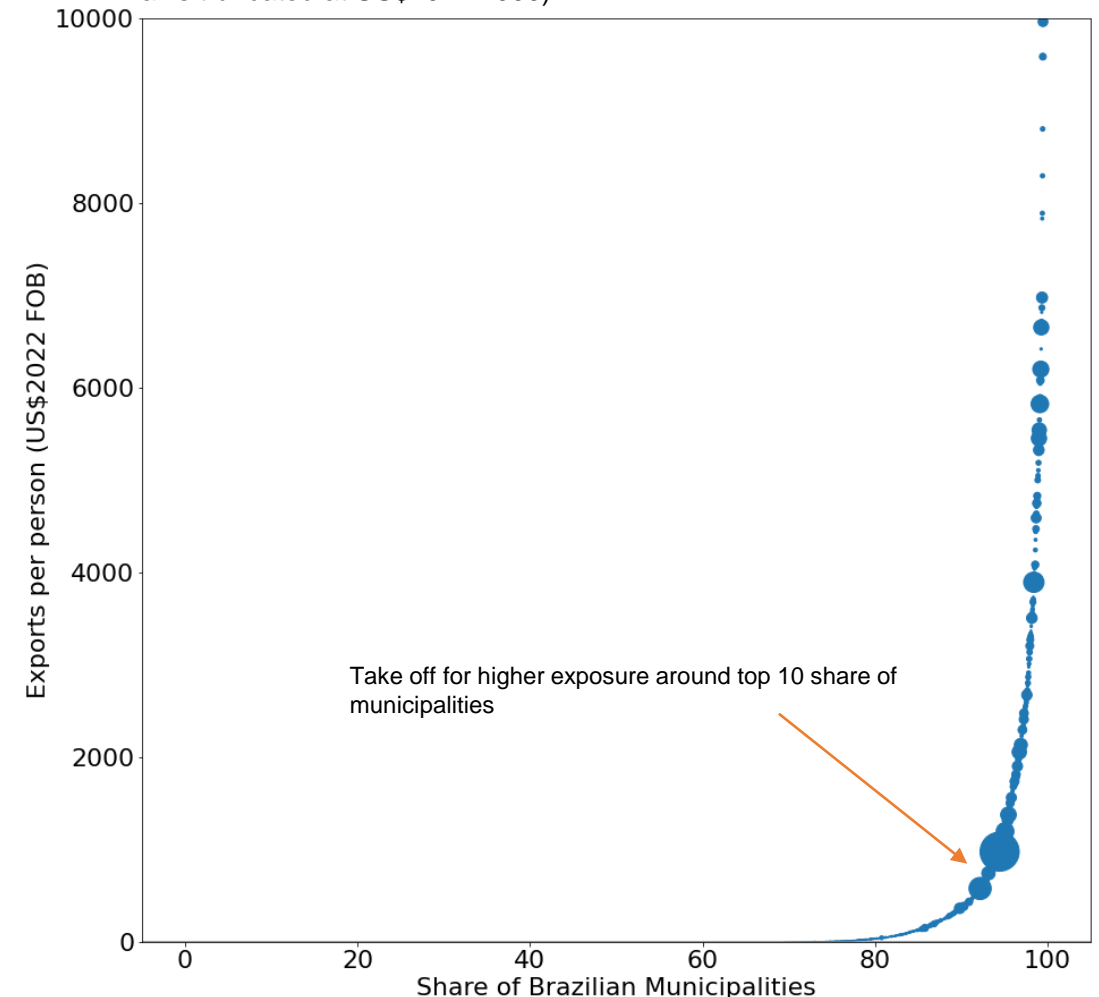
Brazilian Municipalities: Exports per Person, 2002
(In US$2022 per person; bubbles are proportional to total municipal exports)

Exports were lower across the board, both at the top and at the bottom of the distribution

Triunfo, RS
Anchieta, ES
Belo Oriente, MG
São Francisco do Conde, BA
Jaguariúna, SP

Vitória, ES
São José dos Campos, SP

São Paulo, SP
Rio de Janeiro, RJ

more than two-thirds of municipalities do not export

Sources: Own calculations with MDIC, IBGE and Fred data.

Brazilian Municipalities: Exports per Person, 2002
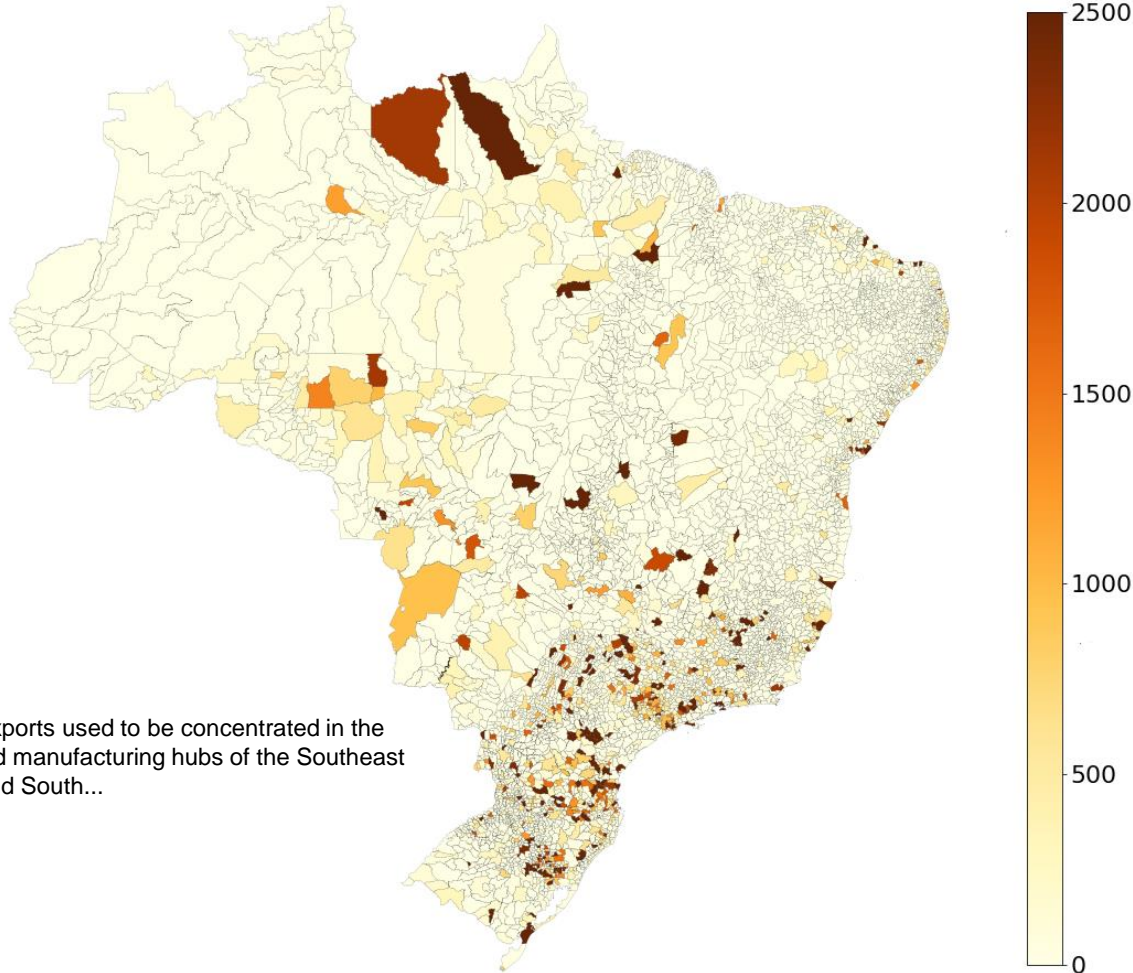(In US$2022 per person; bubbles are proportional to total municipal exports; axis truncated at US$2022 1000)

Take off for higher exposure around top 10 share of municipalities

Sources: Own calculations with MDIC, IBGE and Fred data.

Looking at the distribution over space, one can see the takeoff of the countryside

Brazilian Municipalities: Exports per Person, 2002
(In US$2022 per person; bubbles are proportional to total municipal exports;
distribution truncated at US$2022 2500+)

Exports used to be concentrated in the
old manufacturing hubs of the Southeast
and South...

Brazilian Municipalities: Exports per Person, 2022
(In US$2022 per person; bubbles are proportional to total municipal exports;
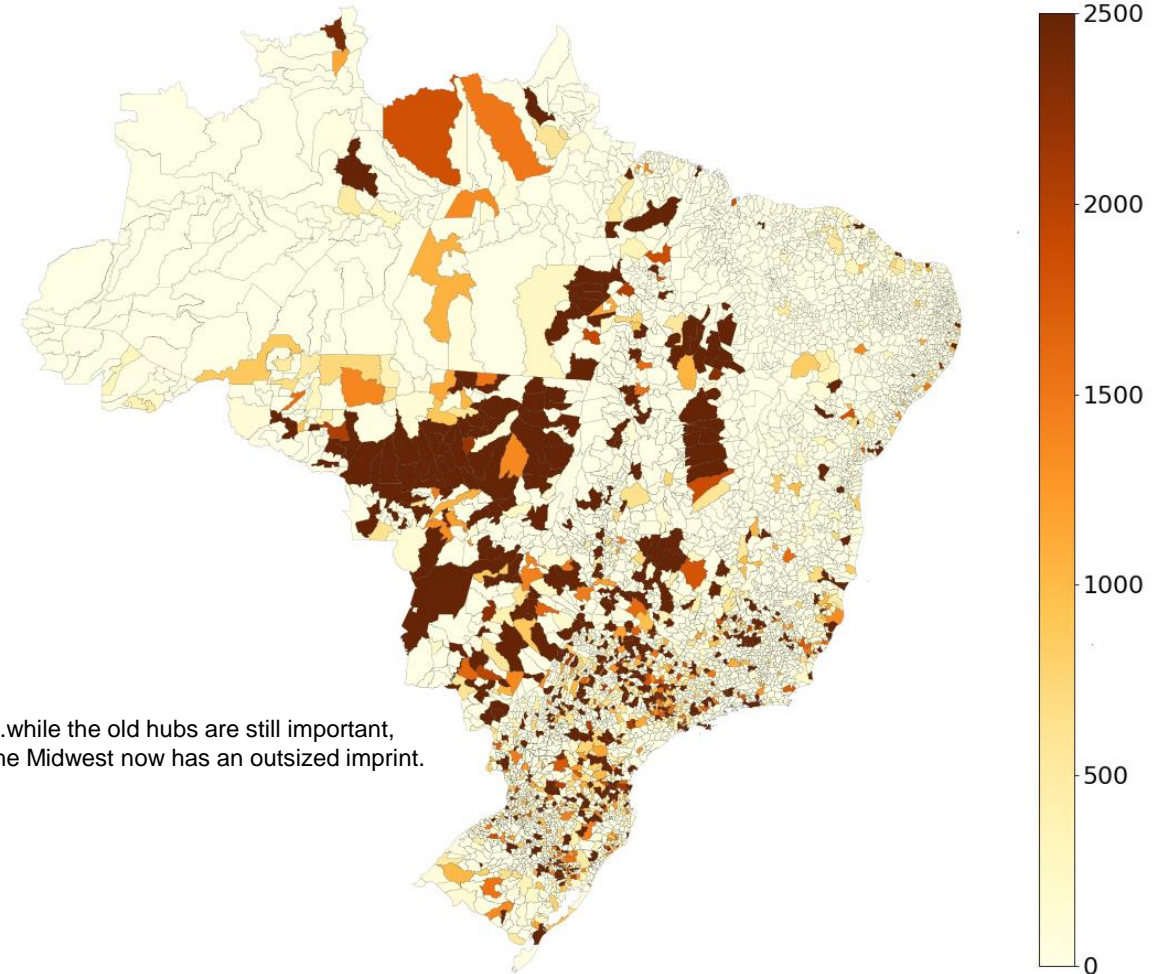distribution truncated at US$2022 2500+)

...while the old hubs are still important,
the Midwest now has an outsized imprint.

Methodology

- Observe growth in exports by region: $\Delta X_{r,s,t} = \ln X_{r,s,t} - \ln X_{r,s,t-1}$

- Local Projections (Jordà, 2005)

$$\underbrace{O_{r,s,t+h} - O_{r,s,t-1}}_{\substack{\text{cumulative change} \\ \text{in outcome since t-1}}} = \alpha_h + \textcolor{red}{\beta_h} \underbrace{\Delta X_{r,s,t}}_{\text{exports}} + \underbrace{\mathbf{Z}'_{r,s,t-1}}_{\text{controls}} \boldsymbol{\phi}_h + \varepsilon_{r,s,h}, \qquad \text{for} \quad h \in \{0,1,2,3\dots\}$$

- the coefficients are estimated for each h: they will form impulse response functions!

Since exports potentially endogenous, need IV

- Instrument: weighted average of foreign GDP growth by industry exposure

$$\Delta \overline{X}_{r,s,t} \equiv \sum_{i \in \mathcal{J}} \underbrace{\frac{L_{r,s,i,t-1}}{L_{r,s,t-1}}}_{\substack{\text{exposure} \\ \text{of region } r \\ \text{to industry } i}} \cdot \sum_{d \in C \backslash o} \underbrace{\frac{X_{r,s,i,t-1}}{X_{r,s,t-1}}}_{\substack{\text{exposure} \\ \text{of industry } i \\ \text{in state } s \\ \text{to destination } d}} \cdot \Delta Y_{d,t}$$

Two stage least squares with local projections

- Instrument: weighted average of foreign GDP growth by industry exposure

$$\Delta\bar{X}_{r,s,t} \equiv \sum_{i\in\mathcal{J}} \frac{L_{r,s,i,t-1}}{L_{r,s,t-1}} \cdot \sum_{d\in C\backslash o} \frac{X_{r,s,i,t-1}}{X_{r,s,t-1}} \cdot \Delta Y_{d,t}$$

- First-stage
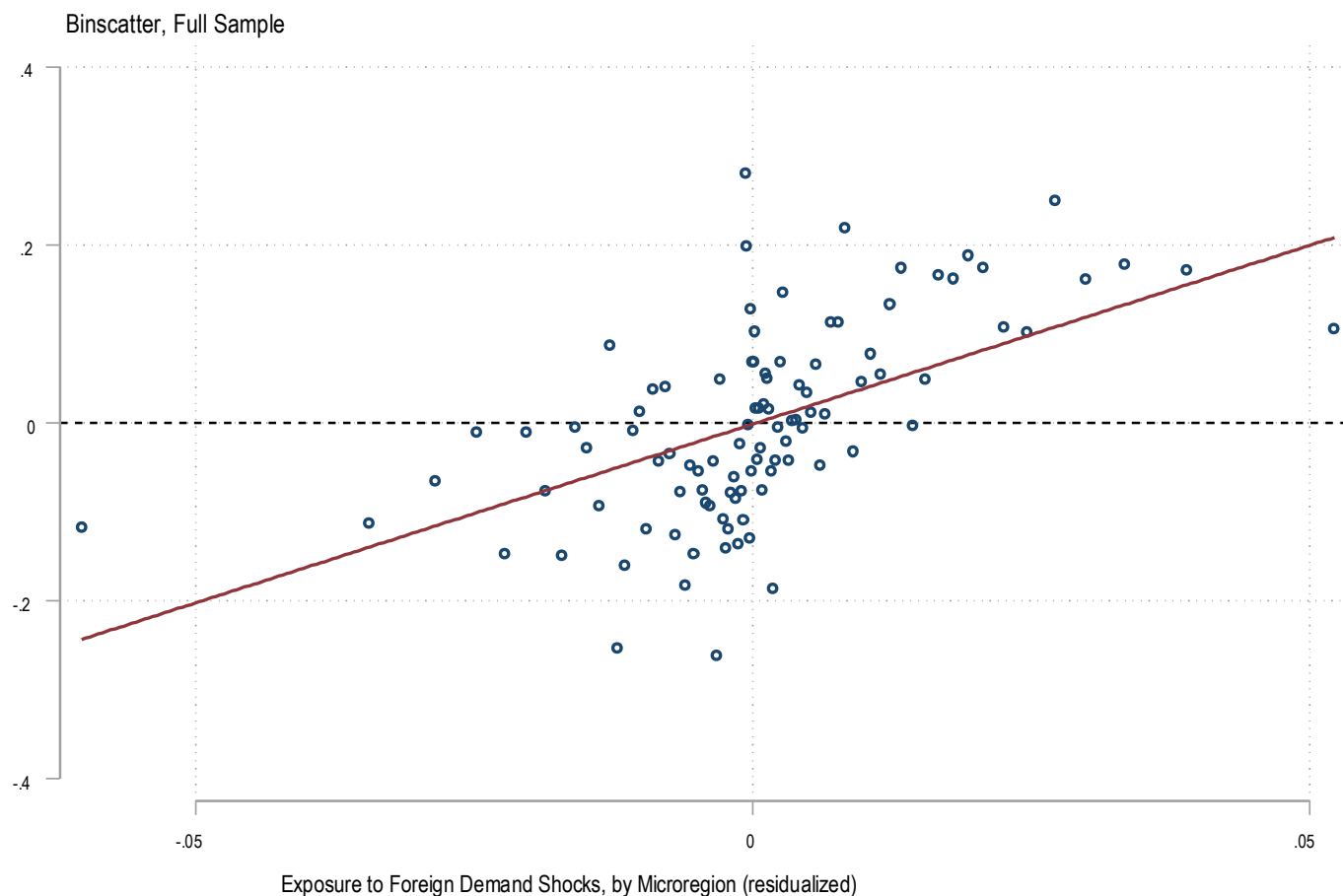
$$\Delta X_{r,s,t} = \alpha + \beta\Delta\bar{X}_{r,s,t} + \mathbf{Z}'_{r,s,t-1}\boldsymbol{\phi} + \bar{\varepsilon}_{r,s,t}$$

- Second Stage

$$O_{r,s,t+h} - O_{r,s,t-1} = \alpha_h + \beta_h\Delta\hat{X}_{r,s,t} + \mathbf{Z}'_{r,s,t-1}\boldsymbol{\phi}_h + \varepsilon_{r,s,h},$$

$$\text{for } h \in \{ 0,1,2,3 \dots \}$$

First Stage: F-stat > 53

Binscatter, Full Sample

Exposure to Foreign Demand Shocks, by Microregion (residualized)

Note: this is a binscatter that reproduces the slope of regressing the observed growth in exports on the instrument, with region-fixed effects. The underlying regression has N=10,715, β=4.025 and t-stat = 7.3