From Macro to Micro: Heterogeneous Exporters in the Pandemic

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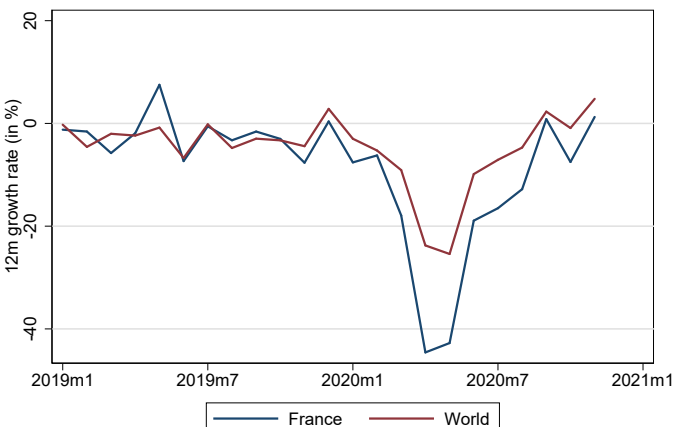
Franco-German Fiscal Policy Seminar, 9 Nov 2021

Motivation: trade collapse in early 2020

- French exports -42% y-o-y in April 2020 (world exports: -20%)



World exports calculated from export data of 97 countries, accounting for 90% of global exports in 2018. Last data point: Nov 2020. Growth computed as 12-month midpoint growth rate

What we do

We study the microeconomic foundations of this collapse

- Use French transaction-level trade data Jan 2017 - Dec 2020
  $\rightarrow$ Ex(imp)porter-by-product-by-destination-by-month.
- Decompose trade growth into margins of adjustment
- Document heterogeneity according to exporter size
- Dig deeper into the underlying drivers of such heterogeneity: supply versus demand
- Study what is behind the collapse of top exporters

What we find

Most of the adjustment through the firm intensive margin

- Number of exporters fell by 25%, but exiters are very small

The largest firms drive the trade collapse

- 0.1% exporters ($\sim$ 100 exporters) account for 57% of the export collapse (pre-crisis export share: 41%)
- Top exporters do not react more to GVC disruption (intermediate good imports)
- Top exporters react more to foreign demand shocks

Related literature

Covid and Trade

- Impact of pandemic/lockdowns on trade flows: Antras et al. (NBER, '20), Berthou & Stumpner (mimeo '21), Espitia et al. (World Bank '21), Hayakawa et al. (JETRO WP, '20), Kejzar & Velic (Covid econ '20),de Lucio et al. (mimeo '20), Meier & Pinto (Mimeo, '20), Minondo (Applied econ '21),
- GVCs: Bonadio et al. (JIE, '21), Heise (FRBNY blog, '21), Lafrogne-Joussier, Martin, Méjean ('21)

Large firms in international trade

- Super-star exporters: Freund & Pierola (ReStat '15)
- Aggregate effects from idiosyncratic firm shocks: Eaton et al. (NBER '12), Gabaix (Ecta'11),Gaubert & Itskhoki (JPE '21), di Giovanni & Levchenko (JPE '12), di Giovanni et al. (Ecta '14, NBER'21)

Margins of international trade

- BJRS (AER '09), Fernandes et al. ('19)

Disaggregated trade data

Monthly, firm-level export/import data, January 2017 - Dec 2020 (French Customs Office)

- Unit of observation:
  - Firm-by-CN8product-by-destination(origin)-by-month
  - For destinations inside EU: ID of the foreign partner company
- Coverage:
  - >98% of aggregate exports flows from official statistics.
  - Roughly 100k exporters per year, 45k per month.
  - Extra-EU trade: exhaustive data
  - Intra-EU trade:
    → Exporters required to file the detail of their transactions (product code, destination) if annual exports exceed 460k euros: see Bergounhon et al. (mimeo '18).
    → Importers required to file when cumulated yearly value imports exceed 460k euros

Firm-level balance sheets / Pandemic data

FiBEN

- Balance sheet data collected by Bank of France
- Turnover $>$ 0.75 million euros
- 200k firms / year

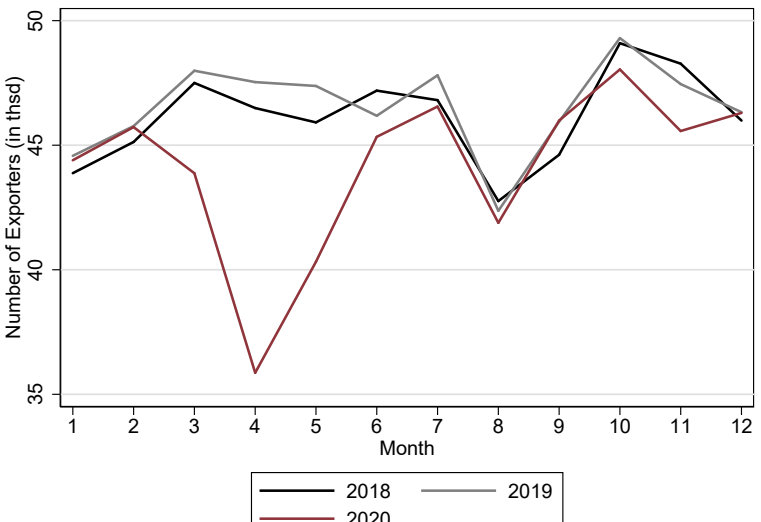
Oxford stringency index

- Hale et al (2021)
- Collected daily for a sample of 180 countries
- Aggregated into indices that range from 0 to 100 and are increasing in the measures' stringency
- Country-month averages of the index normalized to lie in the interval $[0, 1]$.

▸ Oxford Index

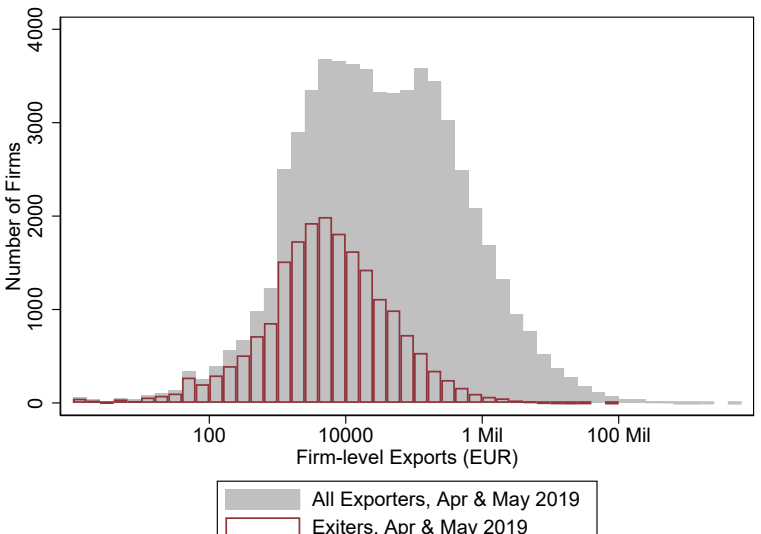
A sharp adjustment at the Extensive Margin

- The number of exporters fell substantially (-25% in April 2020)



Exiters hardly contribute to the aggregate collapse

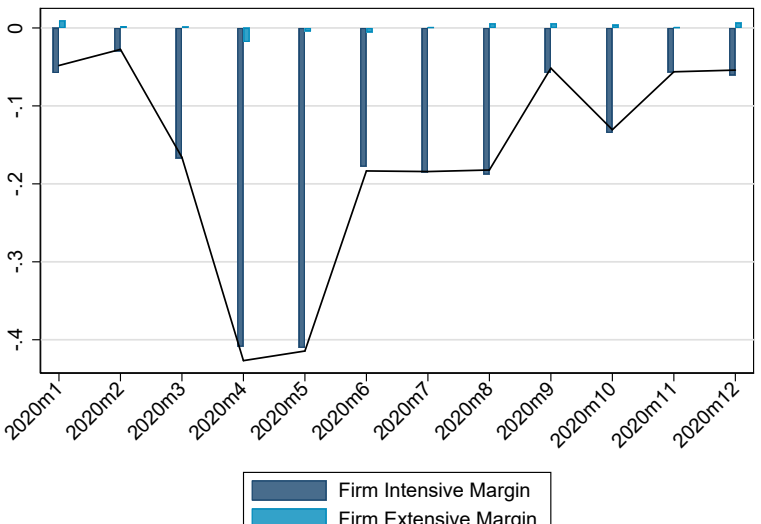
- Average exports of exiters in April & May 2019: 64k Euros → 4.5% of average of all exporters (1.4m Euros)



Note: Distribution of exporters (in grey) and distribution of exiters (in red) in April & May 2019. Exiters are defined as firms with positive exports in April & May 2019, but zero exports in April & May 2020.

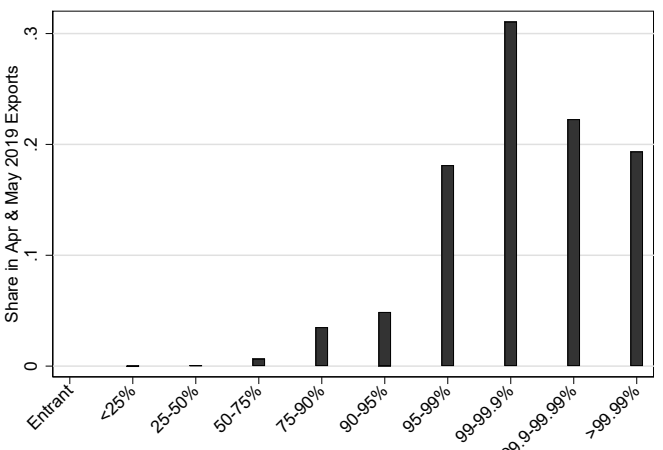
The contribution of the firm extensive margin is very small

- Decomposition: $\frac{\Delta X_t}{X_{t-1}} = \frac{\sum_{f \in S} \Delta X_{ft}}{X_{t-1}} + \frac{\sum_{f \in N} X_{ft} - \sum_{f \in X} X_{ft-1}}{X_{t-1}}$



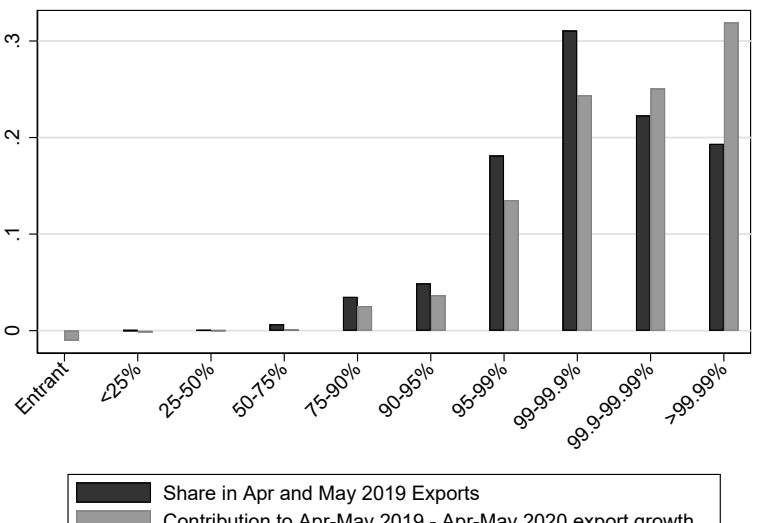
Ten firms (legal units): one fifth of aggregate French exports

- Group exporters into bins based on their total exports in 2019: $\approx$ 100k firms
- To be in top 1% / 0.1% / 0.01%, a firm needs >65m / >600m / >3bn Euros of annual exports. Total French exports in 2019: 488bn.



Top exporters contributed more than their share to the collapse

- Contribution of group $i = \frac{\Delta X_i}{\Delta X}$
- Top 0.1% ($\sim$ 100 firms) contributed 57% (initial share: 41%)
- Top 0.01% (10 firms) contributed 32% (initial share: 19%)



A flexible empirical framework: midpoint growth rates by size

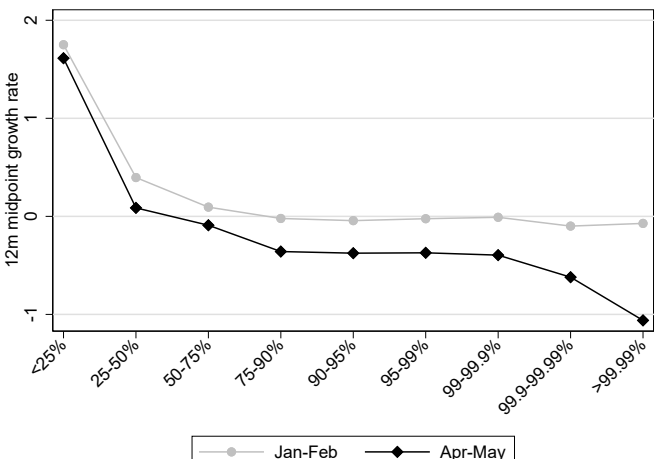
- Baseline estimation: For firm f, product k, destination (origin) j and time t:

$$g_{fjk,t} = \underbrace{\alpha_{b(f)t}}_{\text{Bins Exporter Size}} + \epsilon_{fjk,t}$$

- $g_{fjk,t}$: year-on-year midpoint growth rate. Midpoint
- Group time periods into two-months intervals
- Then add controls

Top exporters' growth rate fell by more in April-May

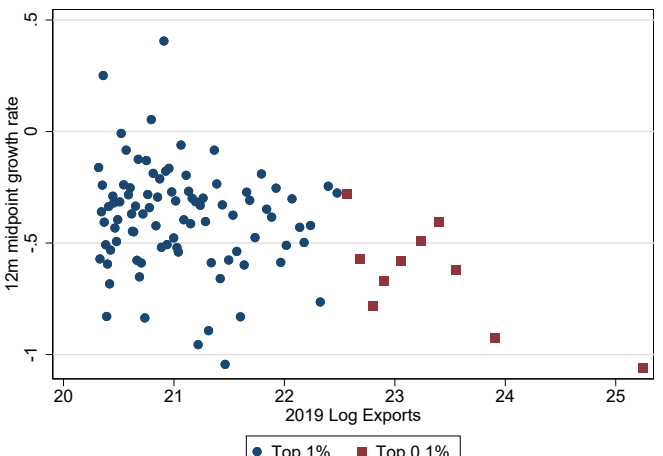
- Estimate coefficients on size dummies separately for Jan-Feb (pre-shock) and Apr-May (export collapse)



▸ Distribution within bin

Zooming in on the top 1,000 firms

- Placing top 1,000 firms ($\sim$ top 1%) into 100 bins



Covid as a supply/demand shock

- Pandemic and policy responses (especially lockdowns) led to strong supply and demand responses: Closing of workplaces, work from home, shops closed, etc.
- Exporters may be affected by:
  - Foreign lockdowns through supply disruptions from intermediate inputs
  - Domestic lockdown
  - Foreign lockdowns through a demand channel
- Top exporters may have a higher elasticity with respect to these shocks

The potential drivers of collapse of top exporters

- Supply
  - Higher exposure to foreign supply shocks of intermediate inputs?
  - Higher elasticity to foreign supply shocks of intermediate inputs?
- Demand
  - Higher exposure to foreign demand shocks?
  - Higher elasticity to foreign demand shocks?

The potential drivers of collapse of top exporters

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- Demand
  - Higher exposure to foreign demand shocks?
  - Higher elasticity to foreign demand shocks?

Intermediate imports to sales ratio as a proxy of the dependence on value chains

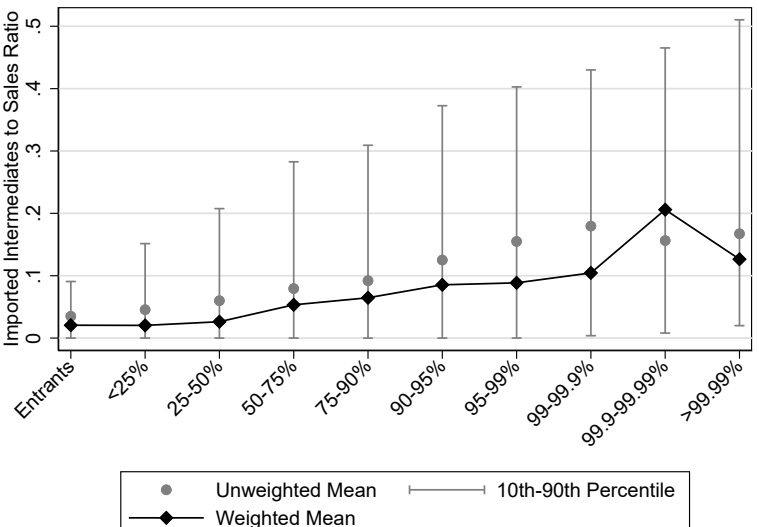
- Summarize a firm's exposure to foreign supply shocks through imported intermediate inputs by its ratio of imported intermediate inputs to sales

$$IIS_{f,2019} = \frac{X^M_{f,2019}}{Y_{f,2019}}$$

- Then control for IIS ratio in size-estimations ▸ FIBEN Subsample

IIS ratio is increasing in exporter size

- But lots of variation across exporters within a size bin
- A regression of IIS on size bin dummies only gives an R2 of 5%



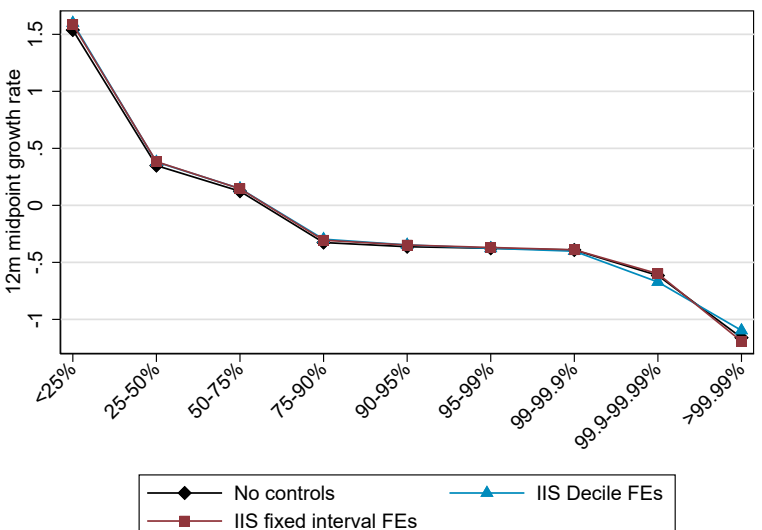
▸ Import Behavior of Exporters

The size effect holds when controlling for the IIS ratio

- Control for dummies of IIS ratio in size regressions:

$$g_{fkjt} = \underbrace{\alpha_{b(f)t}}_{\text{Bins Exporter Size}} + \underbrace{\gamma_{r(f)t}}_{\text{Bins IIS ratio}} + \epsilon_{fkjt}$$

- Sort IIS ratio into deciles or bins of fixed length

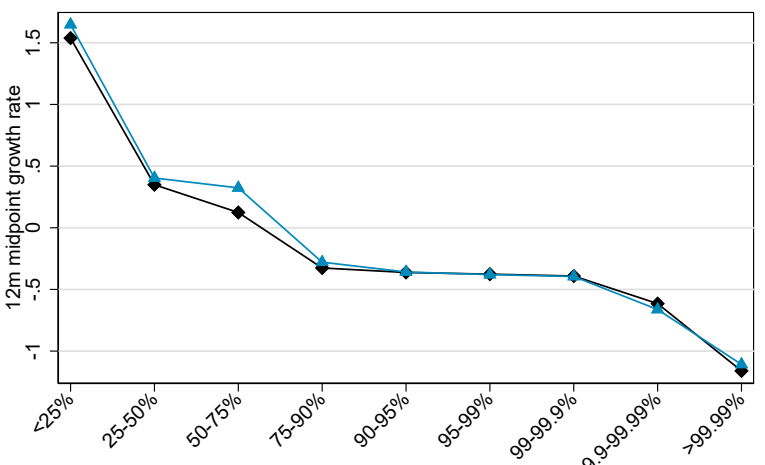


and when controlling for origin-specific supply shocks

- Control alternatively for bins of constructed origin supply shocks:

$$\text{Input Supply Shock}_{ft} = \underbrace{\frac{M^{inp}_{f,2019}}{Y_{f,2019}}}_{\text{IIS Ratio}} \times \underbrace{\sum_j \frac{M^{inp}_{fj,2019}}{M^{inp}_{f,2019}} \text{Supply Shock}_{jt}}_{\text{Weighted Avg of Origin Supply Shocks}}$$

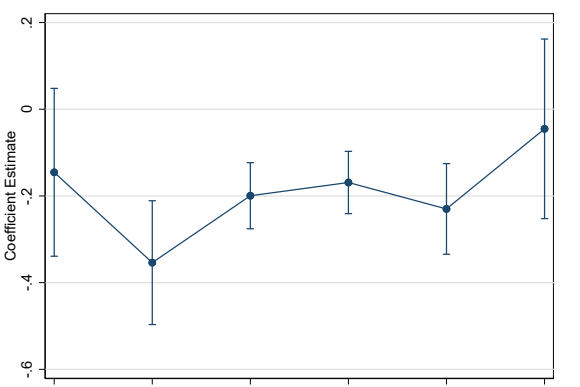
- Supply shocks in origin j taken as lockdown stringency.



Effect of *Origin* Lockdown by Size Bin

$$g_{fjk,t} = LockdownStringency_{j,t} \times \eta_{b(f)} + \beta_{ft} + \gamma_j + \delta_{kt} + \epsilon_{fjk,t}$$

Figure : Impact of Covid at origin on imports by exporter size



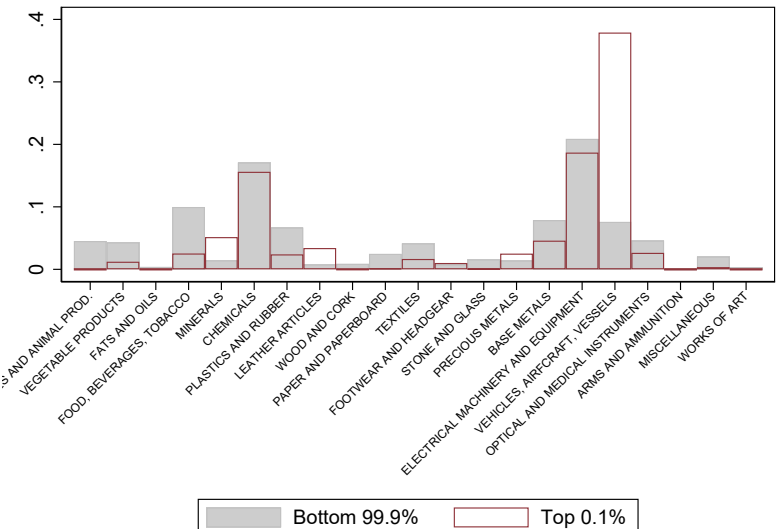
Source: French customs, Author's calculation.

The potential drivers of collapse of top exporters

- Supply
  - Higher exposure to foreign supply shocks of intermediate inputs?
  - Higher elasticity to foreign supply shocks of intermediate inputs?
- Demand
  - Higher exposure to foreign demand shocks?
  - Higher elasticity to foreign demand shocks?

Sectoral composition of bottom 99.9% vs top 0.1%

- Differences largely driven by aircrafts



Controlling for the composition effects

- Add sector FEs to the estimation

$$g_{fjk,t} = \alpha_{b(f)t} + \beta_{st} + \epsilon_{fjk,t}$$

β_{st}: Dummy for HS2 code of observed flow

- Add sector-by-destination FEs to the estimation

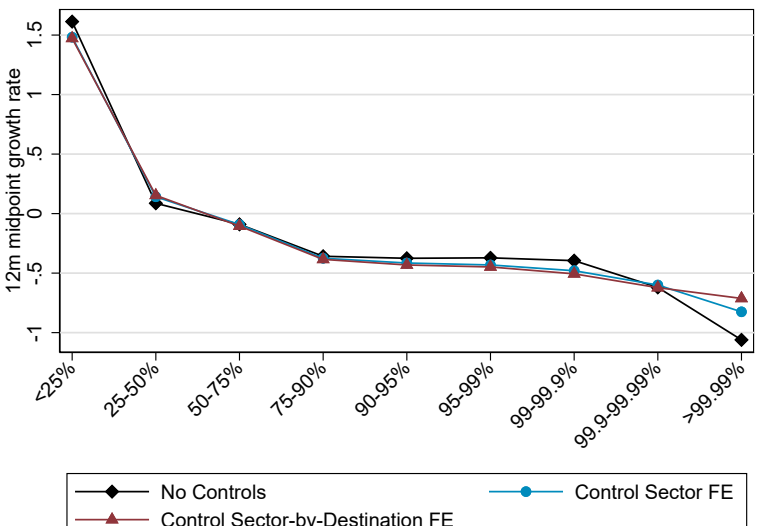
$$g_{fjk,t} = \alpha_{b(f)t} + \beta_{jst} + \epsilon_{fjk,t}$$

β_{jst}: Dummy for the sector-by-destination cell of observed flow

Higher exposure to foreign demand shock is only part of the story

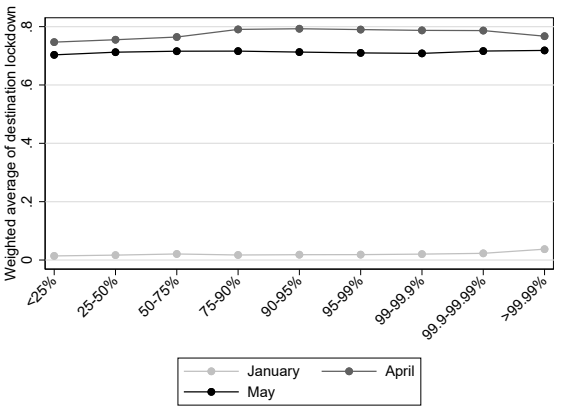
- Composition effects only partly explain the larger collapse by top exporters

→ Top exporters also fall by more within markets



(Weighted) Oxford index as a direct measure of exposure to the demand shock

- Measure directly exposure to foreign demand shocks by size bin: "Oxford stringency" index from Hale et al (2021) ▸ Stringency Index
- Weighted average destination lockdown stringency across size bins



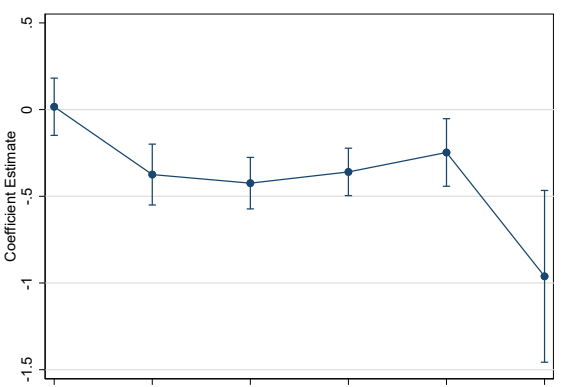
Demand effect is larger for the top exporters

- Interact destination lockdown stringency with dummies for size bins

$$g_{fjk,t} = \textit{Lockdown Stringency}_{j,t} \times \eta_{b(f))} + \beta_{ft} + \gamma_j + \delta_{kt} + \epsilon_{ijk,t}$$

- Could reflect larger absolute decline in exports or reallocation across destinations

Figure : Impact of Covid at destination by exporter size



Source: French customs, Author's calculation.

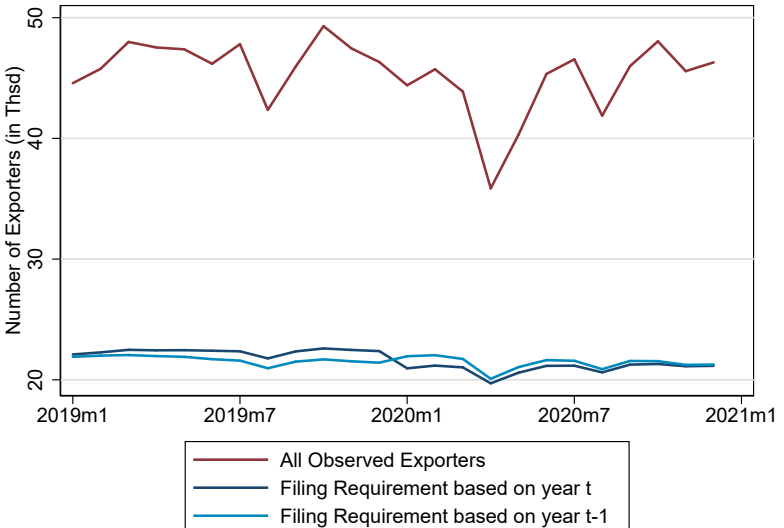
Conclusion

- Firm intensive margin accounts for almost the entire decline of exports(imports)
- Top (top 0.1%) traders adjust procyclically
  - Differences not systematically related to GVC participation
  - Top exporters decline by more within sectors and destinations
  - Top exporters react more to foreign lockdowns during Covid
- These results point to a large reaction of top exporters to demand shocks
- Similar role of top exporters during Covid and GFC ▸ Covid vs GFC

THANK YOU

APPENDIX

Exporters with and without filing obligation



Midpoint growth rate accommodate churning with high frequency data

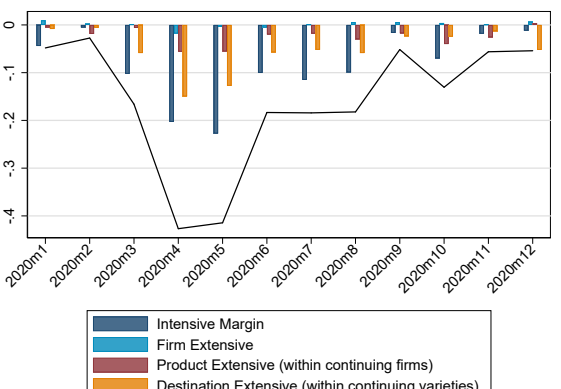
$$g_t = \frac{X_t - X_{t-12}}{\frac{1}{2}(X_t + X_{t-12})}$$

- g_t varies between -2 (for exit) and +2 (for entry)
- Can accommodate entry and exit, which is important given the high level of detail (transaction = firm-by-product-by-destination) ▸ Product and Destination Margins
  - see e.g. Haltiwanger et al. (Restat '13) on job creation by establishments
- For small values of $\frac{X_t}{X_{t-12}}$, very close to $\log(\frac{X_t}{X_{t-12}})$ ▸ MP vs. dlog

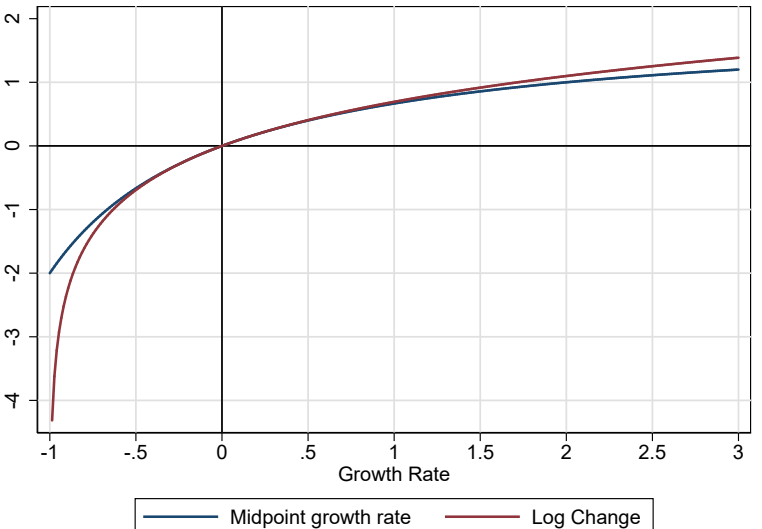
▸ Back

Decomposing the Firm Intensive Margin

- Decomposition from Bernard et al. (2009)
- *Transaction*-level intensive margin accounts for roughly half of the total export collapse

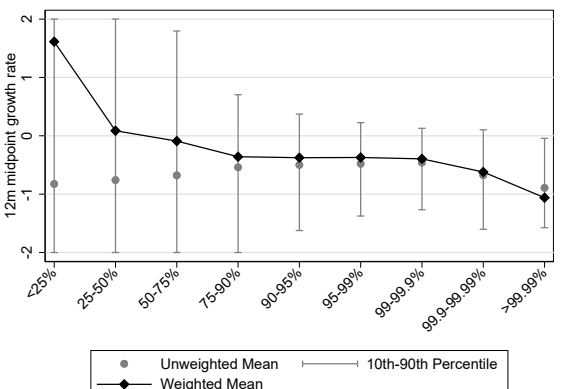


Midpoint growth rate vs log change

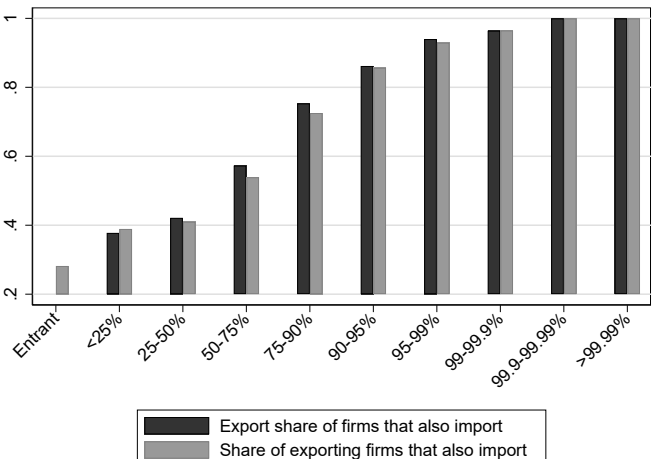


The exceptional role of large exporters during the collapse

Distribution of growth within bins



Larger exporters more likely to import...



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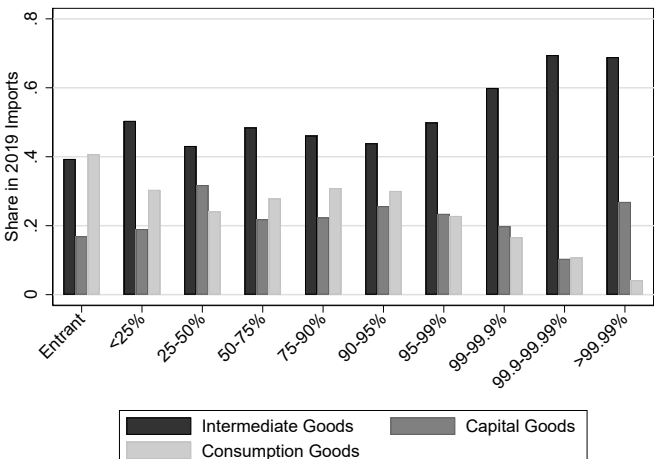
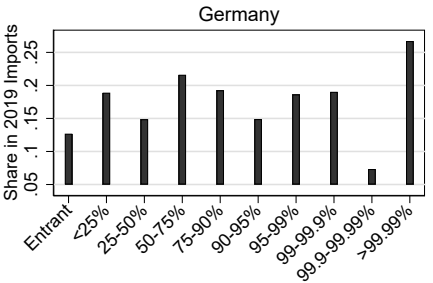
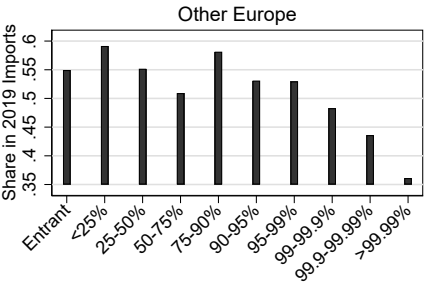
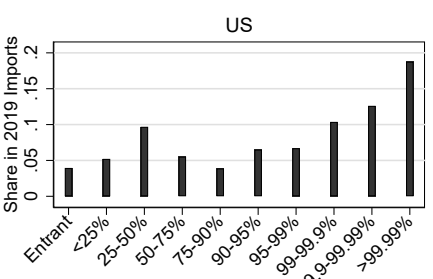
...and especially more likely to import intermediate goods

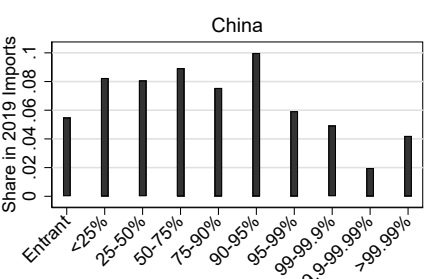


... sourcing concentrated in the US and Europe

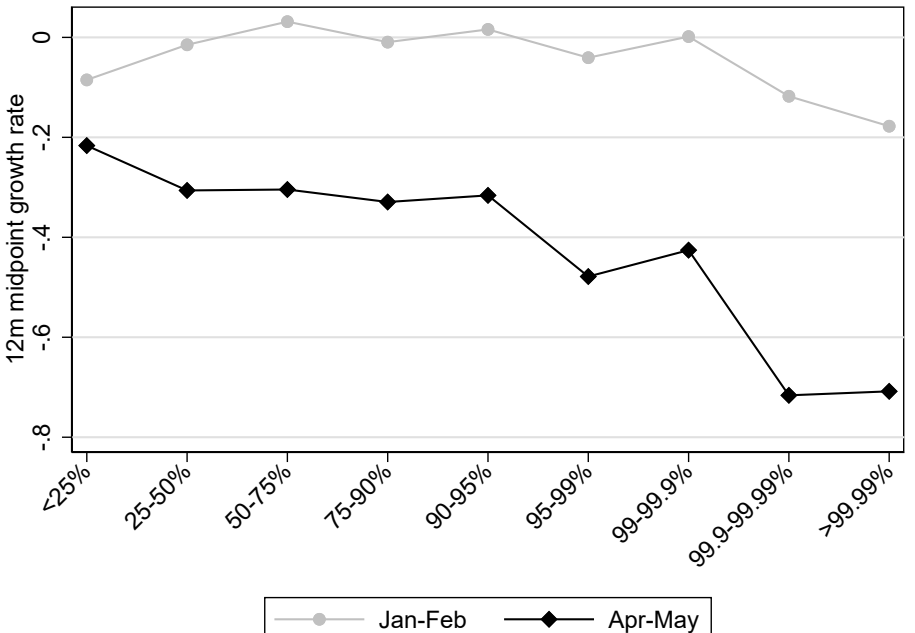






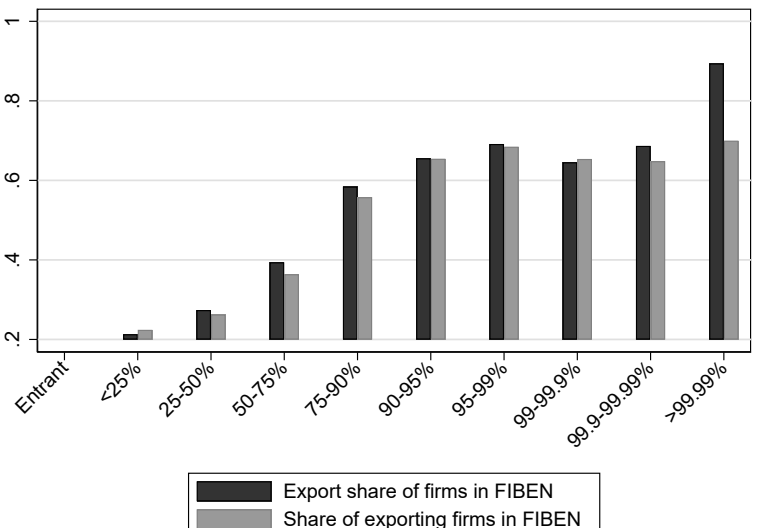


Exporters also reduce their imports



FIBEN subsample is representative

- 37% of 2019 exporters have data in FIBEN
- Mostly larger firms → 71% of 2019 export value



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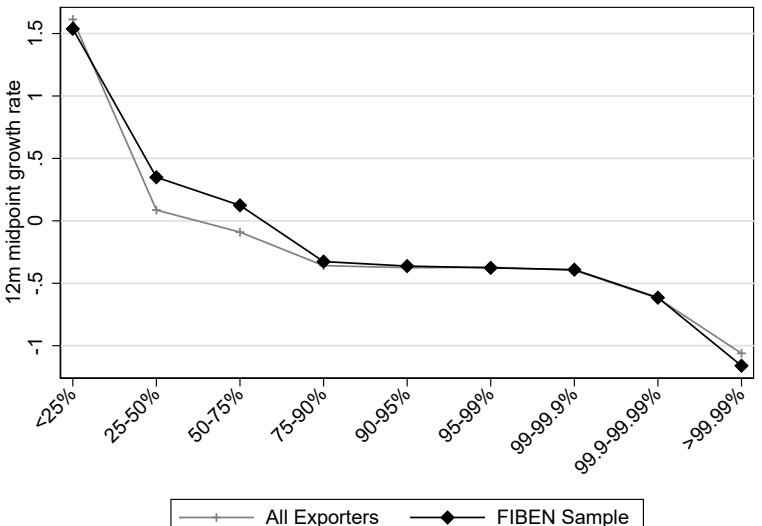
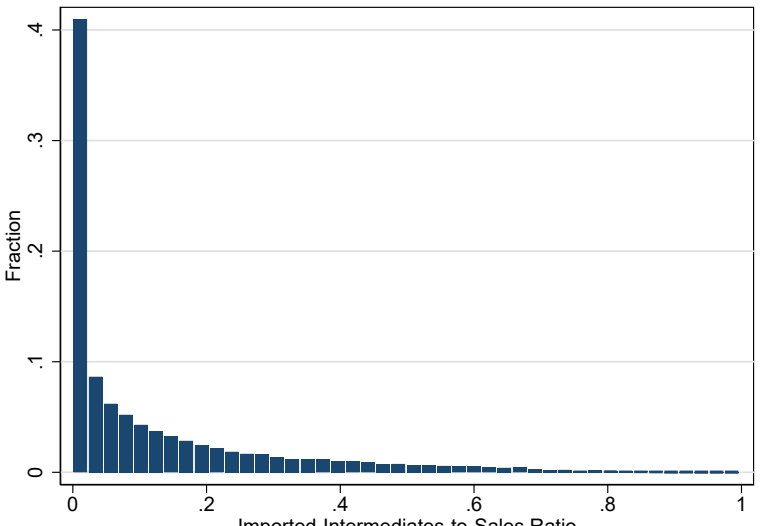
Results of size estimations very similar in FIBEN subsample

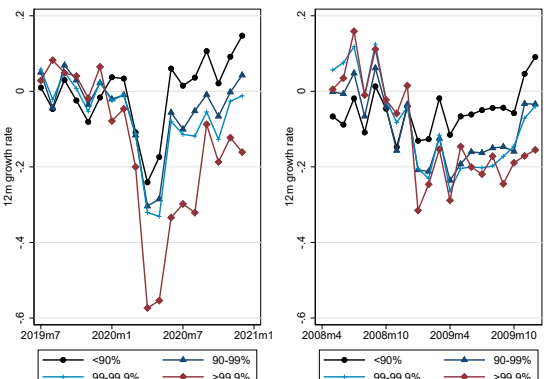


Highly skewed distribution of IIS ratio



The role of top exporters during Covid and GFC

- Top exporters decline by more during both Covid and GFC (but differences more pronounced during Covid)



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Data on lockdown stringency across countries and months

Stringency

- Main indicator “Stringency index", composite indicator of:
  - School closures; workplace closures
  - Cancel public events; close public transport
  - Public information campaigns
  - Stay at home; restrictions on gatherings
  - Restrictions on internal movement; international travel controls

Coding of stringency

- Example of workplace closures
- 0 - No measures ; 1 - recommend closing (or work from home)
- 2 - require closing (or work from home) for some sectors or categories of workers
- 3 - require closing (or work from home) all but essential workplaces (eg grocery stores, doctors)

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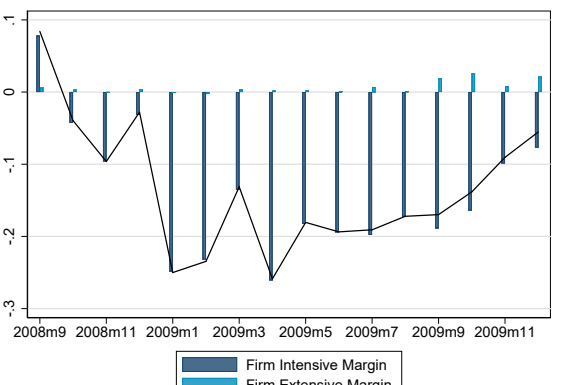
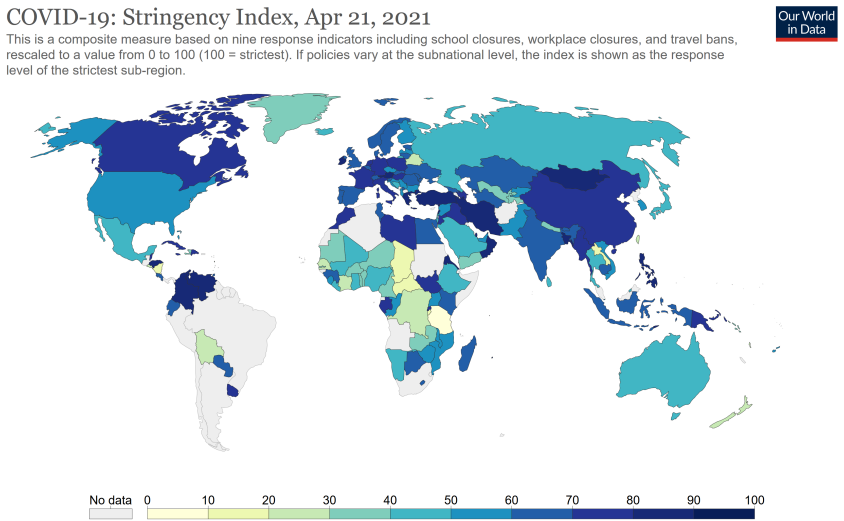
Firm Intensive and Extensive Margins during GFC

- GFC: Export collapse in France started in Jan 2009
- Firm intensive margin explains almost the entire fall.



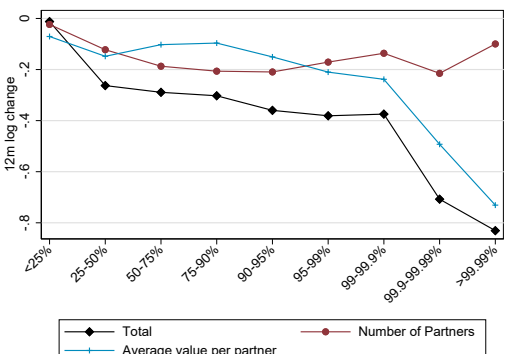


Source: Oxford COVID-19 Government Response Tracker & Our world in data.

Number of Partners vs Avg Value per partner

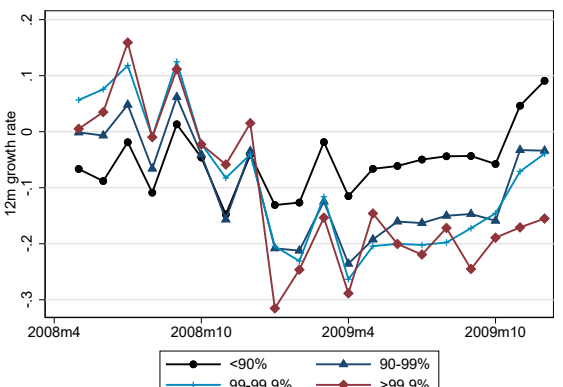
Number of Partners vs Avg Value per partner

- Not driven by a breakup of connections with more clients.
- Instead, average exports per client fall by more for top exporters
- Focus on intra-EU exports, and intensive margin of transactions. Then decompose $\Delta \log(X_{fsj}) = \Delta \log(N_{fsj}) + \Delta \log(\bar{X}_{fsj})$



Top exporters overreact in crisis times

- Very similar growth rates prior to Covid
- Similar role of top exporters during the GFC



Note: Balanced Panel of exporters for each size bin. Exporters grouped into size bins based on their total exports in 2019.

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