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International Sourcing and Producer Prices in Chile micro evidence during covid-19

Jennifer Peña[§] and Elvira Prades[*]

[§] Central Bank of Chile

[*] Bank of Spain

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The views expressed in this presentation are those of the authors and **do not** necessarily represent the views of the Bank of Spain and the Eurosystem nor the Central Bank of Chile.

Motivation

- Covid-19 unprecedent shock: demand/supply.
- How Chilean firms are responding and adapting to it? Through which margins?
  - Domestic relationships → L, domestic supplier/clients Albagli, Fernández and Huneuus (2021).
  - In this work we want to explore links with foreign suppliers/clients. Exports and import dynamics *intensive margin* and *extensive margin*.
- What we can expect in terms of prices? Increasing concerns on the impact of supply disruptions on costs. We want to examine what happens to the bundle of imported intermediate inputs at the firm level.
- The merged firm-level dataset will allow us to assess different sources of heterogeneity:
  - **Consumption goods:** Indoor vs. Outdoor goods de Lucio et al. (2021)
  - **Intermediate goods:** (1) Input specificity Rauch. (1999) (2) Participation in Global Value Chains: firm that imports intermediates and exports intermediates.
  - The role of Covid-19 stringency index in trading partners.
  - Firm size, sector at 2/4-digit, firms more prone to disruptions on supply chains.

Dataset

- Firm level data: (1) Customs (V,Q,uv) DIN DUS (2) Firm-level data (turn,mate,wagebill,...) → on a monthly basis.
  - **Time span:** 2017m1-2021m5 (53 months and will be up-dated).
  - We will use 3 sources of data (at the firm-level):
    - **VAT/Electronic firm-to-firm receipts:** Firm characteristics (size, sector,...) and relationships with domestic suppliers/clients and. Total value of exports and total imports.
    - **Customs:** Information on firm-level transactions at HS-8 digit and trading partners, this allows to obtain more details on the relationships with foreign suppliers/clients.
    - **Unemployment insurance:** Unemployment Insurance, to account for labor relationships. Data includes workers who are receiving the benefits of the employment protection law. We consider permanent workers and fixed term / per work.
  - Basic cleaning ▸ CLEANING STEPS to guarantee consistency and keep high coverage ▸ COVERAGE.
  - Some sectors are excluded: Mining, EGW and Public Administration.

Table: SUMMARY STATISTICS

	Total					
	Full Sample		***non-Importers***		***Importers***	
	Mean	std.dev	Mean	std.dev	Mean	std.dev
Employment	15.0	145.4	13.6	120.9	20.5	216.6
Sales (thousands)	1.5	118.4	1.1	107.4	2.5	144.1
Capital per worker (thousands)	0.3	0.5	0.2	0.5	0.4	0.7
Sales per worker (thousands)	0.1	0.1	0.1	0.1	0.3	0.2
Export (thousands)	15.5	152.3	8.0	126.6	36.5	206.3
Export share in output	0.5	0.4	0.6	0.4	0.2	0.3
Imports (thousands)	9.6	117.9	.	.	9.6	117.9
Import share in sales	0.3	0.3	.	.	0.3	0.3
Import share in materials	0.5	0.4	.	.	0.5	0.4

Note: Based on dataset after basic cleaning. EGW, Mining and Public Administration sectors have been excluded. Monetary values are in Unidad de Fomento (UF).

Table: SUMMARY STATISTICS (PERMANENT)

	Total					
	Full Sample		***non-Importers***		***Importers***	
	Mean	std.dev	Mean	std.dev	Mean	std.dev
Employment	17.83	149.75	15.00	104.57	31.92	281.66
Sales (thousands)	3.16	168.24	1.67	125.36	46.02	623.76
Capital per worker (thousands)	0.28	0.56	0.26	0.52	0.42	0.71
Sales per worker (thousands)	0.15	0.17	0.15	0.16	0.31	0.22
Export (thousands)	18.48	164.29	9.78	138.86	37.90	208.94
Export share in output	0.47	0.39	0.57	0.39	0.24	0.31
Imports (thousands)	10.94	127.32	.	.	10.94	127.32
Import share in sales	0.34	0.27	.	.	0.34	0.27
Import share in materials	0.47	0.38	.	.	0.47	0.38

Note: Based on dataset after basic cleaning. EGW, Mining and Public Administration sectors have been excluded. Monetary values are in Unidad de Fomento (UF).

Dataset

- Around 600.000 firms each year, of which 4.000 only export, 11.000 only import and 1.700 are twoway traders.
- Permanent sample: circa 20.000 firms.

Imported varieties

Table: NUMBER OF PRODUCTS AND ORIGIN (DIN) BY SECTOR

	2019					
	Products			Origin		
12_sectors	Mean	Median	Max	Mean	Median	Max
Agro (n=5,579)	2.4	1.0	73	1.4	1.0	23
Manu (n=35,596)	5.8	2.0	146	2.6	1.0	43
Const (n=8,009)	3.0	1.0	93	1.5	1.0	17
Retail (n=122,194)	6.6	2.0	448	2.1	1.0	40
Transp (n=10,647)	3.2	1.0	120	1.7	1.0	20
Finan Act (n=2,878)	3.6	1.0	117	1.7	1.0	25
Hous Act (n=949)	2.6	1.0	29	1.3	1.0	7
Busi Act (n=19,443)	3.2	1.0	154	1.5	1.0	28
Pers Serv (n=11,262)	2.1	1.0	61	1.4	1.0	21
Total (n=216,557)	5.5	2.0	448	2.0	1.0	43

Note: After basic cleaning. We exclude Mining, EGW and Public Administration.

Exported varieties

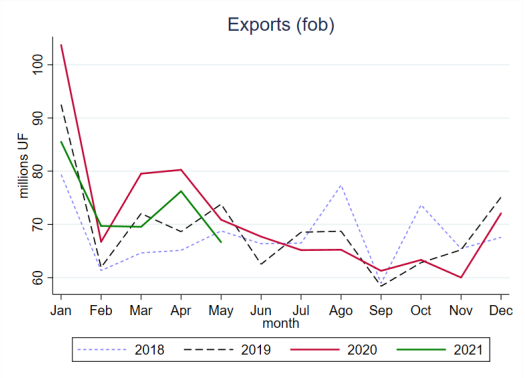
Table: NUMBER OF PRODUCTS AND DESTINATIONS (DUS) BY SECTOR

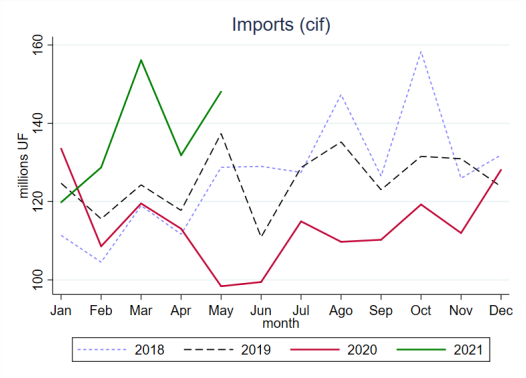
	2019					
	Products			Destinations		
12_sectors	Mean	Median	Max	Mean	Median	Max
Agro (n=2,613)	1.6	1.0	12	2.7	1.0	25
Manu (n=10,959)	3.0	2.0	65	4.2	2.0	67
Const (n=393)	3.0	1.0	106	1.2	1.0	4
Retail (n=14,407)	2.9	1.0	156	2.3	1.0	52
Transp (n=2,295)	2.2	1.0	114	3.4	1.0	87
Finan Act (n=653)	2.3	1.0	42	3.6	1.0	53
Hous Act (n=107)	2.3	1.0	10	2.6	1.0	16
Busi Act (n=2,182)	2.2	1.0	92	1.9	1.0	19
Pers Serv (n=193)	1.7	1.0	15	1.2	1.0	6
Total (n=33,802)	2.7	1.0	156	3.0	1.0	87

Note: After basic cleaning. We exclude Mining, EGW and Public Administration.

Trade developments

- Trade volumes.
  - → Exports fared relatively well during covid-19.
  - → While imports declined substantially with respect to previous years.





Number of firms by exporting/importing status

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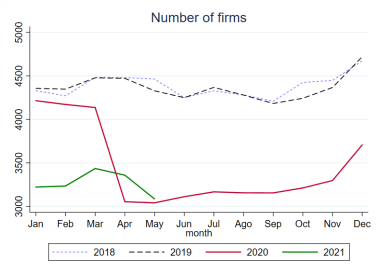
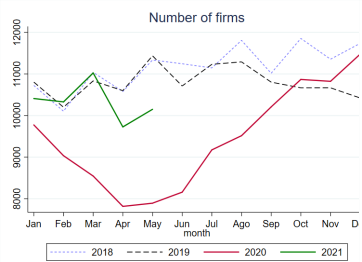
(a) Only exporters



Sharp decrease after April 2020. Mainly driven by the start of the pandemic (Chile declared state of emergency in March 2020). Probably small firms as exported volumes remained unchanged.

(b) Only importers



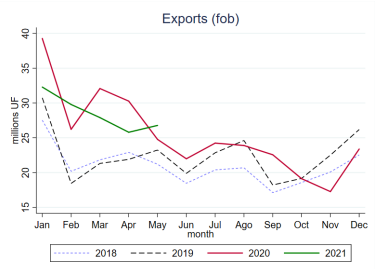
The number of importer firms declined during the heights of the stringency measures, and steadily increased to pre-crisis levels.

(c) Two-way traders

Few firms do both types of activities. Usually related to GVC activities. Recovery was quicker.

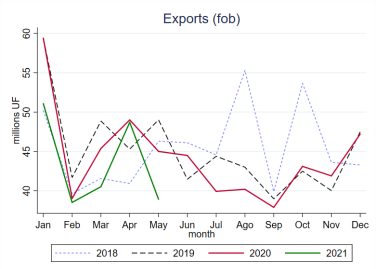
Export volumes by firm status

(a) Only exporters



In spite the rise of firms, volumes remained low...

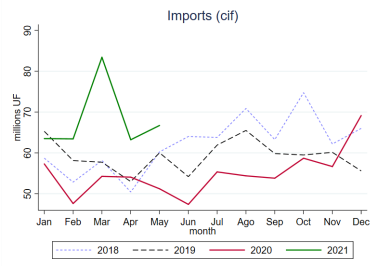
(c) Two-way traders



Recovery in terms of volumes also weakened.

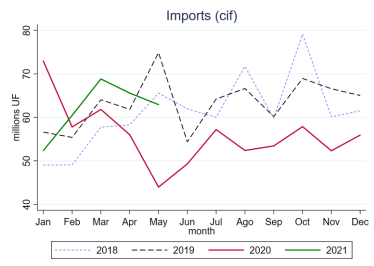
Import volumes by firm status

(b) Only importers



The number of importer firms declined during the heights of the stringency measures, and steadily increased to pre-crisis levels.

(c) Two-way traders



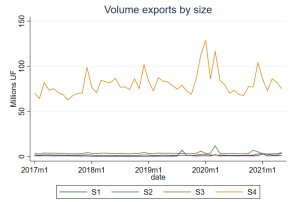
Volumes remained subdued.

Number of firms by firm size

(a) Number of firms

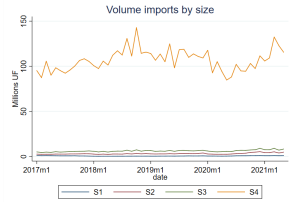
Few firms in stratum 4, the biggest firms in terms of annual turnover.

(b) Exported volumes



... they account for almost all the exported volume.

(c) Imported volumes

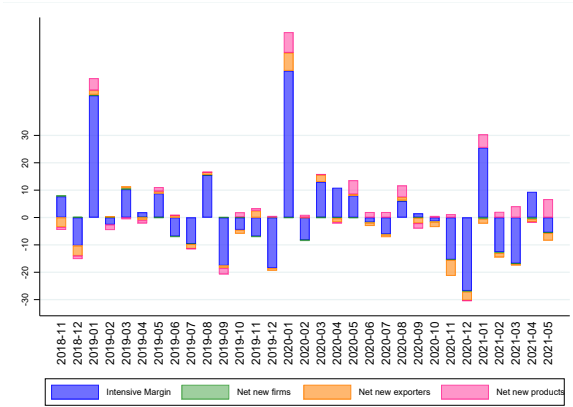


And the same holds for imports.

Note: stratum 1-2 (annual turnover<25,000 UF) / stratum 3 (25,000.01 UF < annual turnover<100,000 UF / stratum 4 (annual turnover>100,000.01 UF

Export dynamics

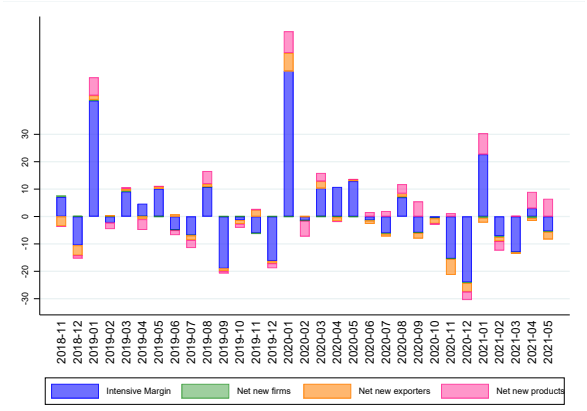
(a) Exports growth dynamics: product margin



- Exports fared relatively well.
- Dynamics mainly driven by the intensive margin.
- Net entry in new products.
- Firms stopping their exporting activity.

Export dynamics

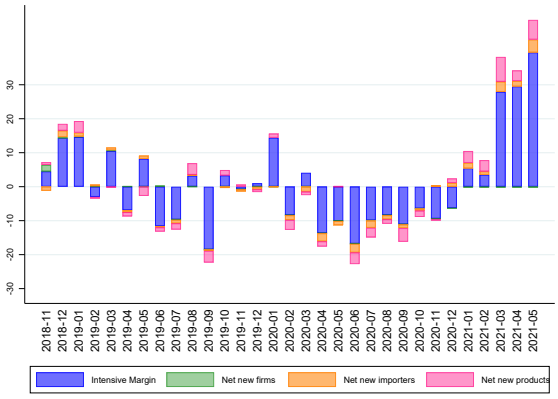
(b) Exports growth dynamics: destination margin



- Dynamics mainly driven by the intensive margin.
- Net entry in new destinations.

Import dynamics

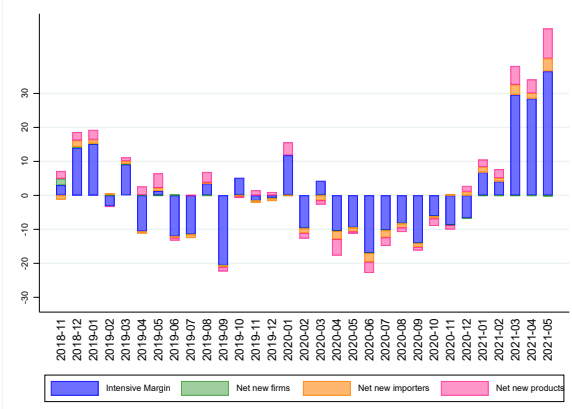
(a) Import growth dynamics: product margin



- The number of firms entering/exiting the import market is large, but when weighted by value explains very little.
- Dynamics mainly driven by the intensive margin, indicating that there is a high degree of concentration among a small number of (big) firms.
- Negative net entry in new products and firms exiting their import status. This has implications for the recovery. Concerns as regards international production network broken links and how easy will be to re-establish them (Huneuus (2019)) and possibly with new prices.

Import dynamics

(b) Import growth dynamics: origin margin

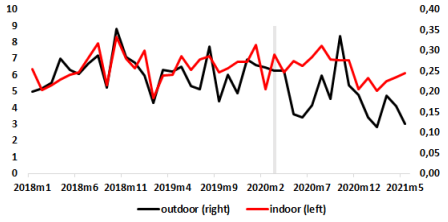


- The pattern is similar when accounting for countries of origin.
- Sharp recovery in imports since early 2021, with a non-negligible role of net new products and net new countries of origin.

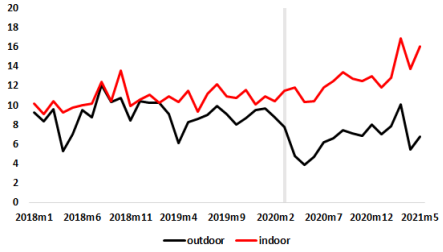
Consumption goods: Outdoor vs. indoor

- Based on de Lucio et al. (2021) classification.

(a) Exports



(a) Imports



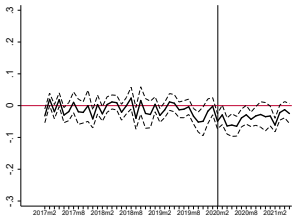
Empirical analysis: firm level

$$lnx_{it} = \nu_i + \beta_t + \gamma_X X_{it} + \epsilon_{it} \quad (1)$$

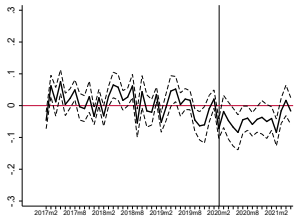
- **Dependent variables:** x_{it} exported/imported volumes, quantities, or unit values of firm i, to destination j, number of varieties at time t.
- **Controls:** firm size, industry (2-digit/4-digit), import/export ratio to sales, material to sales,...
- **Fixed effects:** firm level and time.
- **Standard errors cluster:** industry level.

Export dynamics: firm-level

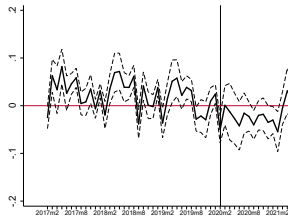
(a) Number of Products



(b) Number of Varieties



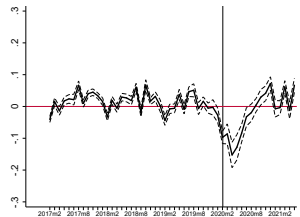
(c) Number of Countries



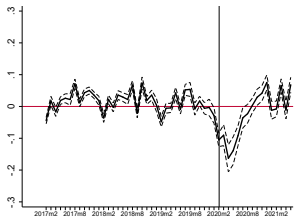
- Time dummies show that Chilean firms slightly reduced the average (ln) number of products, the number of destination countries and varieties (productdestination) since the start of the Pandemic.

Import dynamics: firm-level

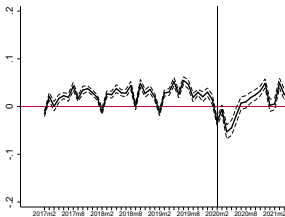
(a) Number of Products



(b) Number of Varieties



(c) Number of Countries



- Time dummies (with firm fixed effects) show a sharp drop in the average number of products imported relative to early 2017.
- Firm-level controls such as imports over sales are insignificant.

Unit Values: Manufacturing firms

- Unit values at the product-level.

$$UV_{ijkt} = \frac{\text{Value}_{ijkt}}{\text{Quantity}_{ijkt}} \tag{2}$$

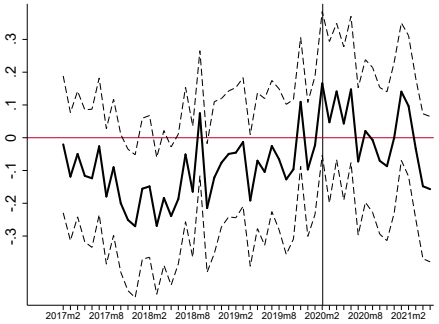
- Imported costs at the firm level. Index (weighted average) of unit values.

$$UV_{it} = \sum_{j=1}^{J} M_{ijk,t} M_{i,t} \frac{\text{Value}_{ijkt}}{\text{Quantity}_{ijkt}} \tag{3}$$

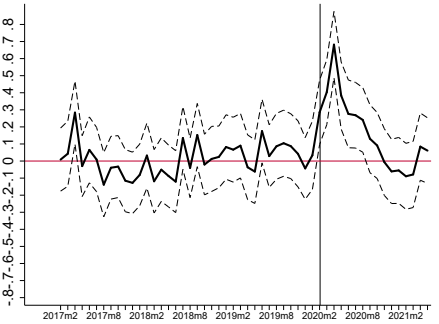
- Proxy for prices and proxy for foreign marginal costs at firm level. Some technical difficulties to construct a meaningful foreign cost index.

Unit Values: Manufacturing firms

(a) Exporter firms



(a) Importers



Empirical analysis: product-destination level

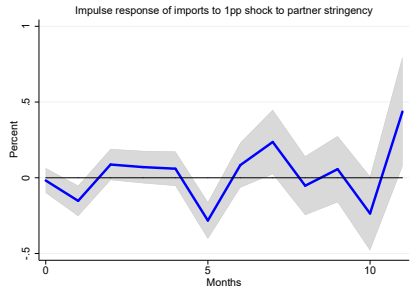
$$lnx_{ijkt} = \nu + \alpha \textbf{containment}_{jt} + \beta \textbf{cases}_{jt} + \gamma_{jk} + \gamma_{jt} + \epsilon_{ijkt} \quad (4)$$

- **Dependent variable:** x_{ijkt} exported/imported volumes, quantities, or unit values of firm i, to destination j of product k at time t.
- **Explanatory variables:** containment measures set by trading partners ▸ STRINGENCY.
- **Controls:** firm size, industry (2-digit/4-digit), ...
- **Fixed effects:** (firm $\times$ product $\times$ country) $\times$ time .

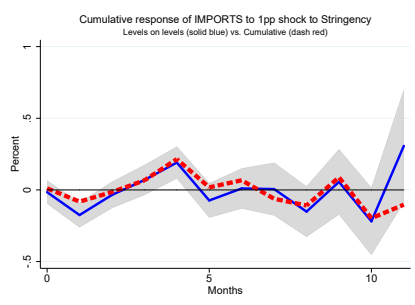
Impact of stringency measures

Imports - Intermediates We do not find any impact on import activity due to stringency measures by partner countries. Based on permanent importers.

(a) Levels

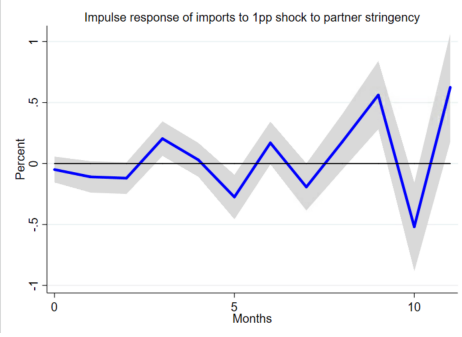


(b) Cumulated

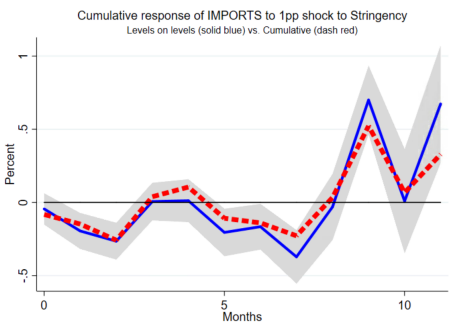


Imports - Consumption Same result for imported consumption goods.

(a) Levels

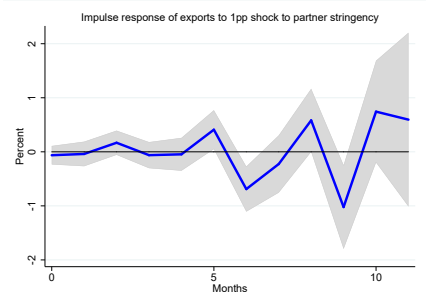


(b) Cumulated

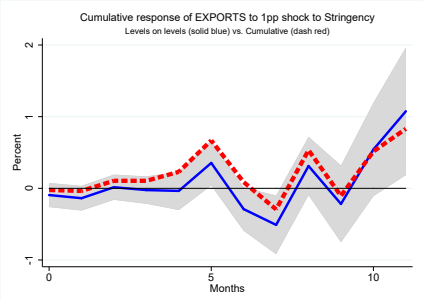


Exports - Intermediates Exports were not affected by stringency measures of destination countries.

(a) Levels

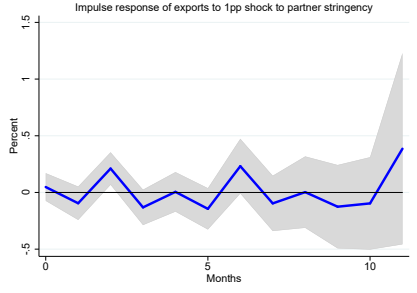


(b) Cumulated

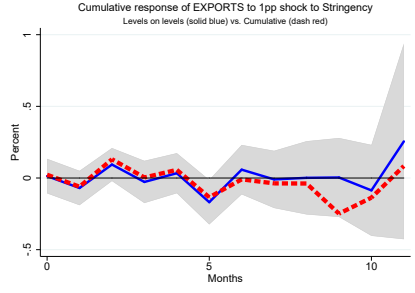


Exports - Consumption .

(a) Levels



(b) Cumulated



Analytical framework

- We will focus on firms in the manufacturing sector. As intermediate goods represent an important share of total imports.

- Intermediate goods at the firm level enter into their production function and has implications in terms of productivity through different channels → variety, quality, cheaper .... Halpern, Koren and Szeidl (2015) and Gopinath and Neiman (2015)

- Each intermediate good is assembled from a combination of a foreign and a domestic variety.

$$X_{ji} = [(B_{ji}X_{jiF})^{\frac{\theta-1}{\theta}} + X_{jiH}^{\frac{\theta-1}{\theta}}]^{\frac{\theta}{\theta-1}} \tag{5}$$

- The effective price of the composite good X_{ji} of the home P_{iH} and foreign variety P_{iF}:

$$P_{ji} = [P_{iH}^{(1-\theta)} + (P_{iF}/B_{ji})^{(1-\theta)}]^{1/(1-\theta)} = P_{iH}[1 + A_{ji}^{\theta-1}]^{1/(1-\theta)} \tag{6}$$

- Where $A = B\frac{P_{iH}}{P_{iF}}$ measures the price adjusted quality advantage of foreign products.

- Elasticity of substitution ▸ Import Shares, the role of input specificity Rauch. (1999).

The way ahead...

- Still many things to monitor carefully. Still preliminary work!
- We are characterizing the behaviour of firms at very dis-aggregated level during the Covid-19 $\rightarrow$ we find evidence of heterogeneous behavior among firms, according to sector, size and their trade relations abroad.
- Among all the angles that can be explored, we are specially interested in firm-level imported input costs and the role of supply disruptions. And we aim to evaluate how costs are transmitted to client prices along the production chain...
- ... by exploiting the information on B2B transactions ("FE") to account for indirect exporting/importing (see Marcel and Vivanco (2021)).
- Detailed information on imports by retailers, can also useful for capturing pent-up demand/supply disruption issues. As some products in the CPI basket registered sharp increases (clothing, electronics,...).

Thanks!

jpena@bcentral.cl

elvira.prades@bde.es

Cleaning steps

DATASET

- We take away firms with negative values in sales or wage bill.
- We take away firms with just one employee .
- We take away firms with highly volatile capital stock growth or value added. Winsorized at the 90th percentile.
- We take away firms with implausible sales to labor and sales to capital.
- Compute lpr and trim the distribution 1th and 99th percentile.
- We exclude sectors that might not be representative such as: mining, utilities: Electricity, Gas and Water and Public Administration.

Samples

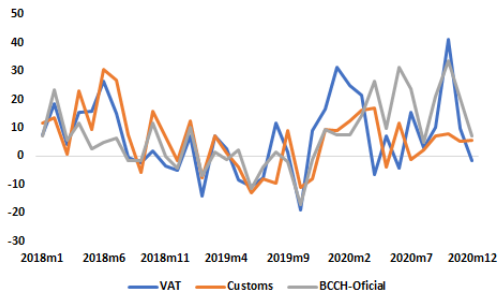
▸ DATASET

- **Permanent firms:** Firms that report every month (53 months): turnover, purchase of materials, employment,... .
- **Regular importers:** Firms that import on a regular basis, more than 6 (?) months per year.
- **Regular exporters:** Firms that export on a regular basis, more than x months per year.

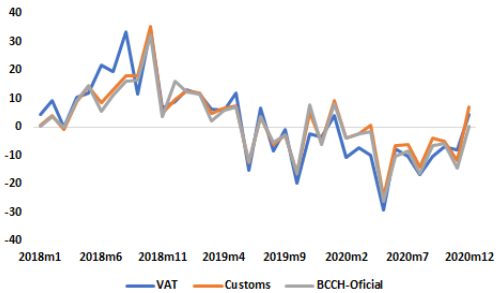
Coverage

DATASET

(a) Exports (year-on-year growth)

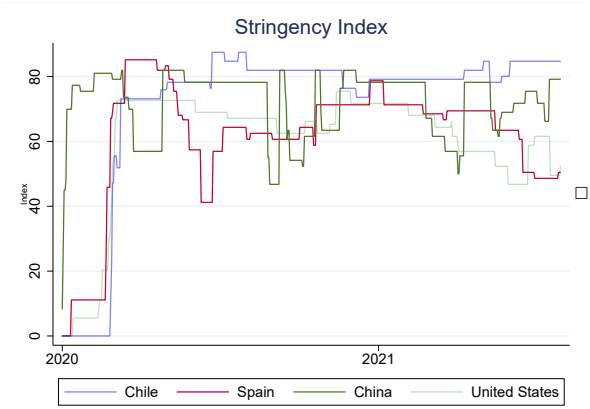


(b) Imports (year-on-year growth)



Stringency Index

BACK



Unit Values

Table: UNIT VALUES (DIN) BY SECTOR

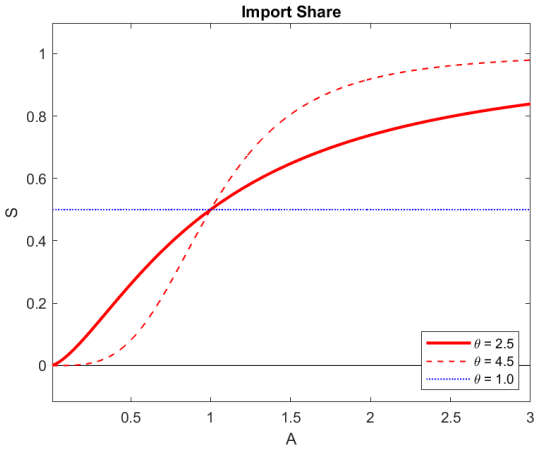
	2019		
12_sectors	Mean	Median	Max
Agro (n=7,939)	134.1	1.9	43,377
Manu (n=93,252)	77.2	0.6	411,654
Const (n=11,778)	143.2	2.3	154,123
Retail (n=254,115)	30.8	0.9	331,291
Transp (n=17,700)	142.4	3.9	258,743
Finan Act (n=4,791)	438.7	2.8	174,801
Hous Act (n=1,279)	161.7	2.1	52,010
Busi Act (n=29,477)	95.7	3.1	722,697
Pers Serv (n=15,321)	36.6	2.9	31,495

Note: After basic cleaning. We exclude Mining, EGW and Public Administration.

Source: Own calculations.

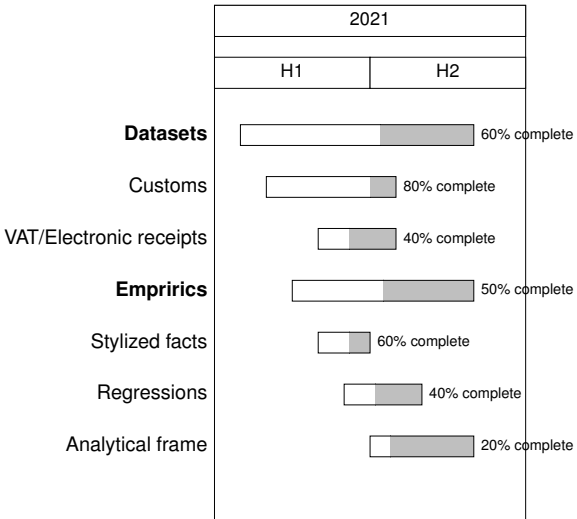
Import shares

BACK



- With unitary elasticity of substitution changes in relative prices do not affect the share in imports.
- Higher response to changes in A with higher elasticities of substitution.
- Based on Halpern, Koren and Szeidl (2015).

Project overview



To do list:

- ☐ We need to focus on the price side.
- ☐ and to analyze domestic links by merging our dataset with the “Factura Electrónica” B2B.
- ☐ ...

BACK

References

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