THE UNIVERSITY OF BRITISH COLUMBIA

Locking down Exports

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Broader Question: Distance to Trade Puzzle

- Why does distance affect trade above what can be expected, given transportation costs?
- What does the fluctuation in travel caused by Canada's COVID-19 travel bans tell us?

Hypothesis:

1. Travel bans impact industries with more complex products [Cristea, 2011] as measured by Antràs et al. [2012]'s measure and GVAC.
2. GVAC performs better at identifying vulnerable industries than the Antràs's measure.

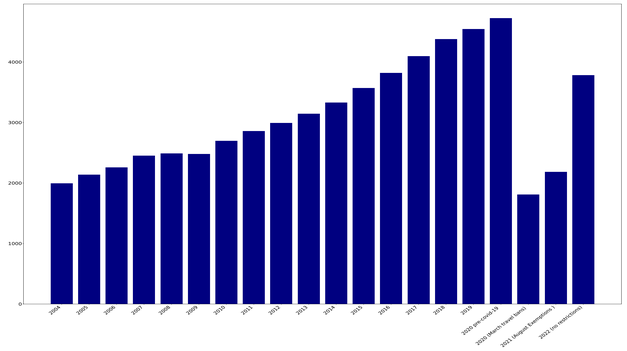


Figure 1. Passengers Boarded by Year Globally.

Previous Literature:

Two strands of the major literatures on travel's effect on trade are:

1. The "informative advertising" literature argues that sellers travel to match-make with buyers. They match-make by helping the buyers differentiate various products.
2. The "incomplete contract" literature states that business travel is a relationship investment.

Previous Empirical

- Poole [2009] examined the effect of visa changes due to 9-11 and the impact on trade with select countries.
- Cristea [2011] studied the relationship between business-class air travel and state exports across the US.
- This project is the first to estimate the casual relationship between travel and trade, in the context of a developed country.

Data:

- Trade data: Canadian exports to all countries, in a monthly frequency with 73 industries as classified by NAICS [Statistics Canada, 2023].
- Industry complexity: a novel GVAC measure.

Method:

- Exploit the travel bans that began in March 2020, as a natural experiment.
- Time Frame: August 2015 to December 2022 for the event-study (EQ:2), ends in October 2020, for difference-in-difference model (EQ:3)

Detrended Exports:

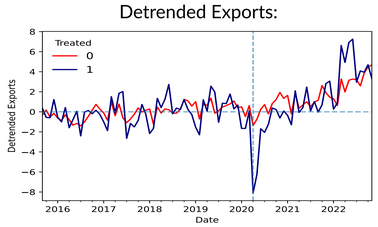


Figure 2. A comparison of exports in treated and control group with the time trend removed (established by pre-2020 data) by industry classification.In billions.

Google Value Added Complexity Measure: An application of Google Page-rank

- Antràs et al. [2012] developed an upstreamness measures, the production independence of an industry.
- The GVAC measure, inspired by the Antràs measure, measures product complexity.

The GVAC measure is calculated by applying the Google PageRank to a Canadian input-output table,

$$PR(A) = (1-d) + d\left(\frac{PR(T_1)}{C(T_1)} + \cdots + \frac{PR(T_n)}{C(T_n)}\right). \tag{1}$$

$PR(A)$ is an industry rank. $PR(T_1)$ is the rank of a commodity section. Here $C(T_i)$ is the number of industries that use the commodity, and d is a dampening factor that discounts going upstream [Brin and Page, 1998]. GVAC ranks are standardized.

CDF of GVAC

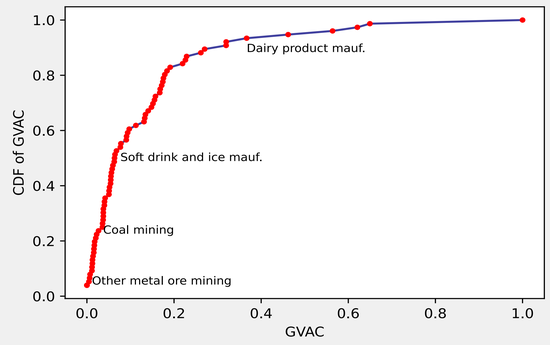


Figure 3. The Cumulative Distribution of the Google Value Added Complexity Measure the industries are marked based on the percentile of their value.

Empirical Design:

The event study equation is given by

$$Y_{itc} = \alpha_c + \sum_{t=1}^{T} \beta_{4,t} \sum_{c}^{C} \sum_{i=1}^{I} (D_{ict} \cdot \text{Month}_t) + \beta_{5,i} T_i + \beta_{0,i} + \epsilon_{ict}. \tag{2}$$

- Y_{itc} is exports of a given sector (i) at a given time (t) to a given country (c)
- α_c is country fixed effects.
- D_{itc} is a dummy variable denoting whether a observation is of an industry which lies above a given complexity cut-toff. $\beta_{5,i}$ is the time slope for a given industry, and $\beta_{0,i}$ is the intercept for a given industry.

For the tables the estimation equation is,

$$Y_{itc} = (\alpha_c) + \beta_2 \sum_{c}^{C} \sum_{i=1}^{I} (D_{ict} \cdot \text{April}_t) + \beta_{5,i} T_i + \beta_{0,i} + \epsilon_{ict}. \tag{3}$$

April_t indicates whether a given observation is in April or May 2020.

Event Study

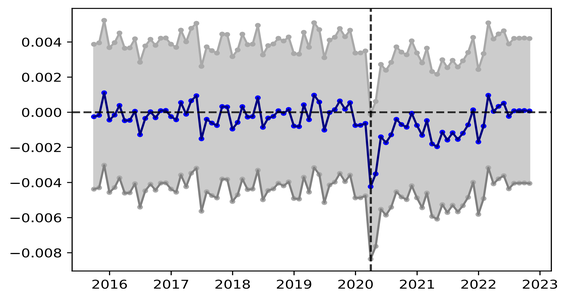
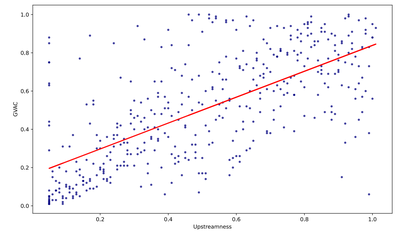


Figure 4. This plot shows the Interaction Coefficient of the treated condition and the month condition from equation 2. Ninety-five-percent confidence intervals are calculated assuming normality with standard deviations.

Event-study by deciles:

Control vs Treatment	Treated:Time April	Treated industries	Total Effect (B)	N-obs
10th vs 90th:	-3714.44 (1597.62)	8	-5.47	162288
20th vs 80th:	-1989.21 (812.09)	16	-5.86	347760
30th vs 70th:	-1361.68 (565.84)	24	-6.01	533232
40th vs 60th:	-1133.43 (441.69)	31	-6.47	695520
50th vs 50th:	-993.74 (353.63)	39	-6.87	880992

GVAC vs Antràs's measure (Q-Q-plot by industry ranking)



Antràs vs. GVAC Treatment by decile:

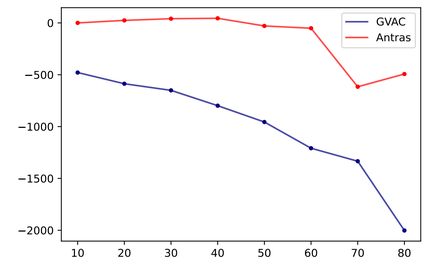


Figure 5. This graph shows the interaction terms in table 3. The X-axis is the percentile of the lower decile in the comparison to the adjacent decile, and the y-axis is the interaction term. The data was adjusted to be in billions. Data is provided by Statistics Canada.

Interpretation and Findings:

- The COVID-19 travel bans had a significant effect on Canadian exports. At least 15.64% of the decrease in aggregate exports from February and March to April and May, is attributable to the travel bans.
- The economic significance of this effect was predominately felt in the export of highly complex goods.

Findings:

1. Found robust evidence that industries with higher GVAC have a larger treatment effect, -2.35 B with top 90th vs bottom 10th percentile. Due to the size of sample this is a economically significant result.
2. Antràs et al. [2012]'s is less effective at indicating industries that are vulnerable to fluctuations in travel.

Conclusion:

- GVAC effectively identifies vulnerable industries
- Event-studies produce evidence for "face-to-face" frictions
- Trade stimulus during lock-downs should target vulnerable industries

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