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U.S. Trade in Food and Agricultural Products was Resilient to COVID in 2020

John Bovay, Charlotte Emlinger, and Shamar Stewart

Selected presentation for the International Agricultural Trade Research Consortium's (IATRC's) 2021 Annual Meeting: Trade and Environmental Policies: Synergies and Rivalries, December 12-14, 2021, San Diego, CA.

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John Bovay, Charlotte Emlinger, and Shamar Stewart

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International Agricultural Trade Research Consortium
December 12, 2021

Introduction

How has COVID affected U.S. trade in food and agricultural products?

- How did COVID (illnesses and deaths) affect trade in 2020?
- How did COVID mitigation measures (government restrictions on activity) affect trade in 2020?
- How did individual mobility (a proxy for commercial activity) affect trade in 2020?

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- Analyze impacts of COVID on imports and exports of 701 commodities, 61 U.S. trading partners

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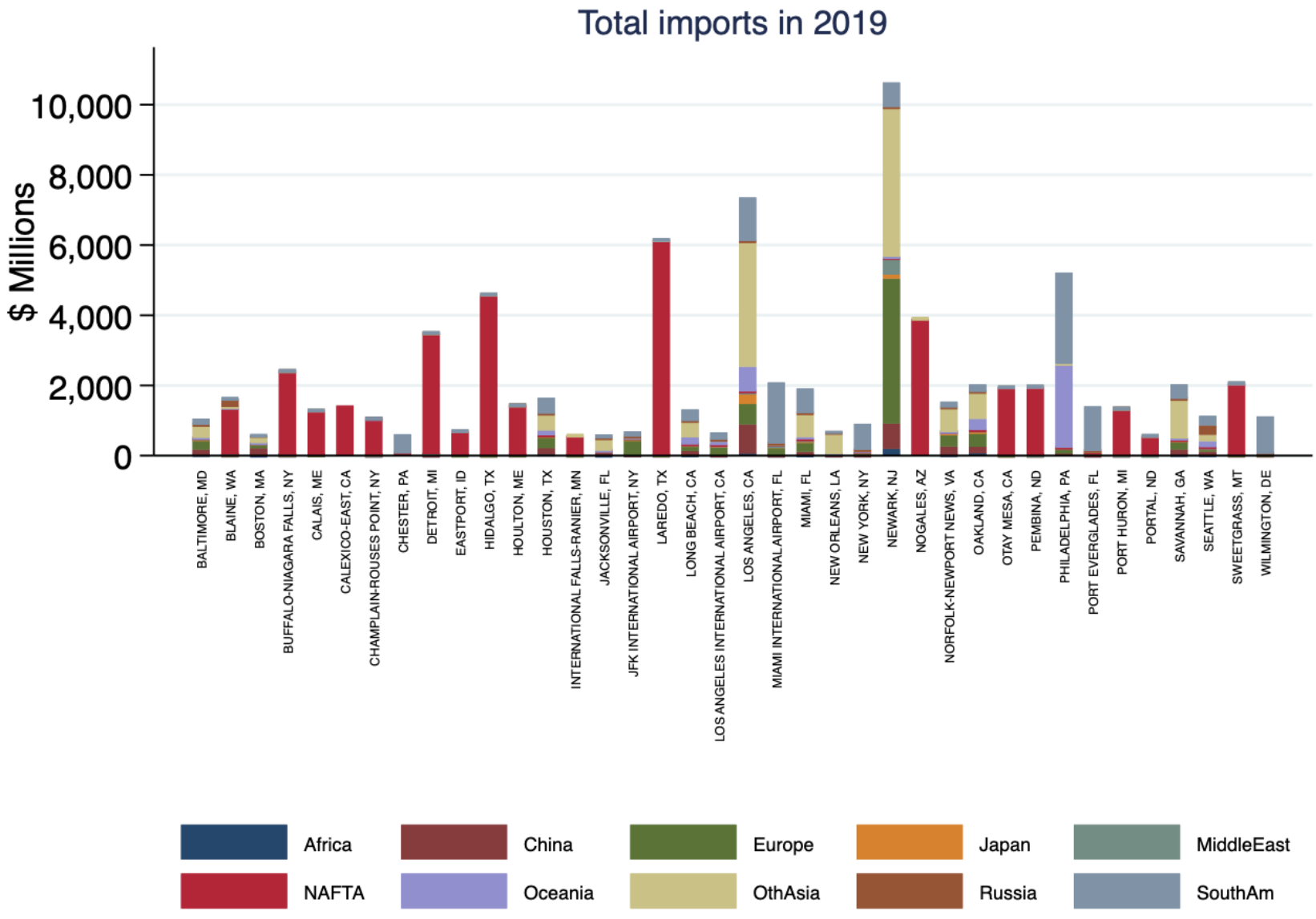
- Analyze impacts of COVID on imports and exports of 701 commodities, 61 U.S. trading partners
- Key takeaway: Preliminary results show very little impact

Data

- U.S. Census Bureau:
  - Monthly data on trade flows (total value and volume; by air; by sea)
  - Import and export data for U.S. trade with all partners
  - Available at the port level
  - Available at the HS6 code. Examples:
    - 070410: Cauliflower and headed broccoli, fresh or chilled
    - 070420: Brussels sprouts, fresh or chilled
    - 070490: Edible brassicas (cabbages etc) NESOI, fresh or chilled
  - Note: in this analysis, we only use data on import and export values (not volume)

Summary data visualizations

Import value by region, 2019, major ports



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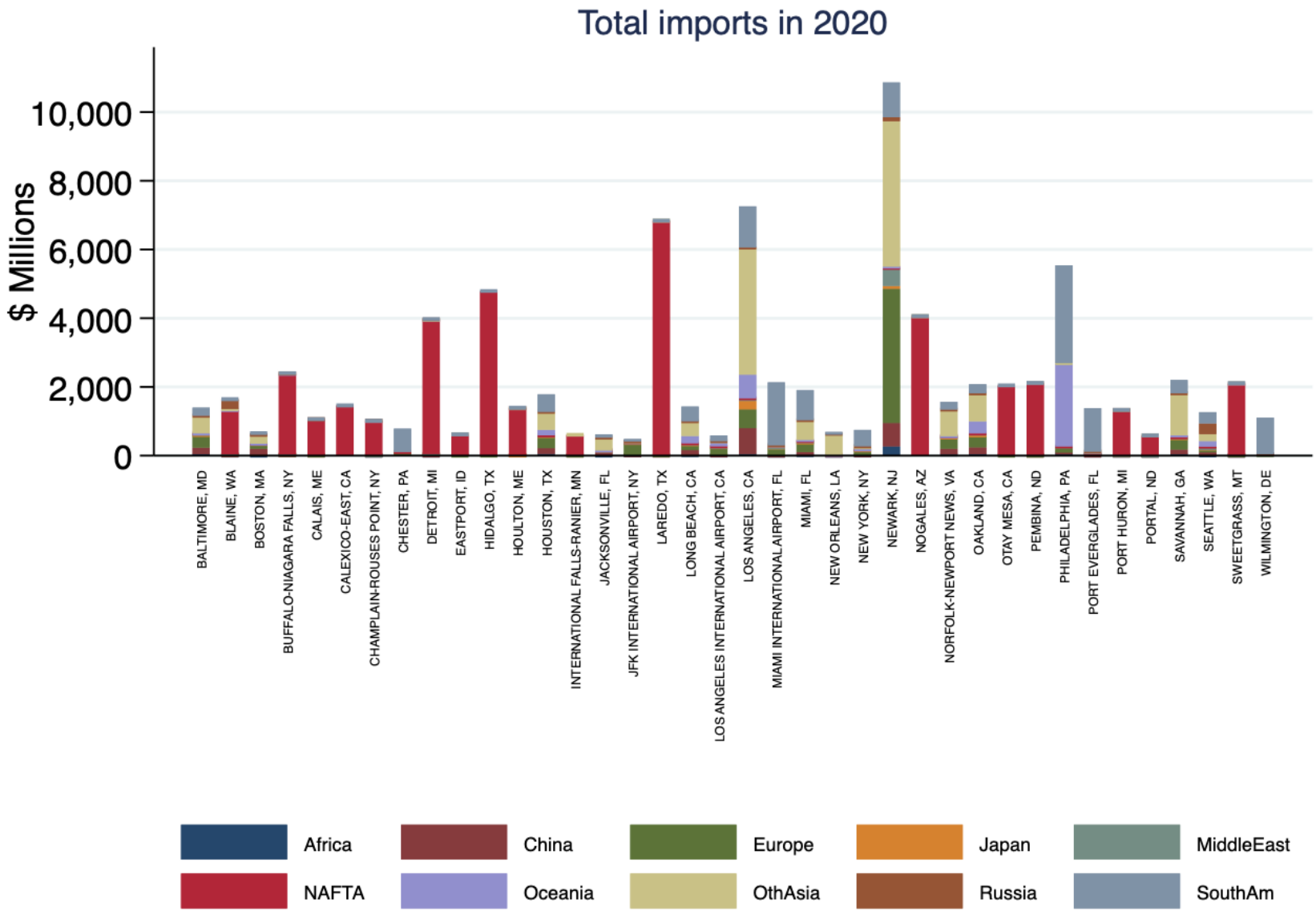
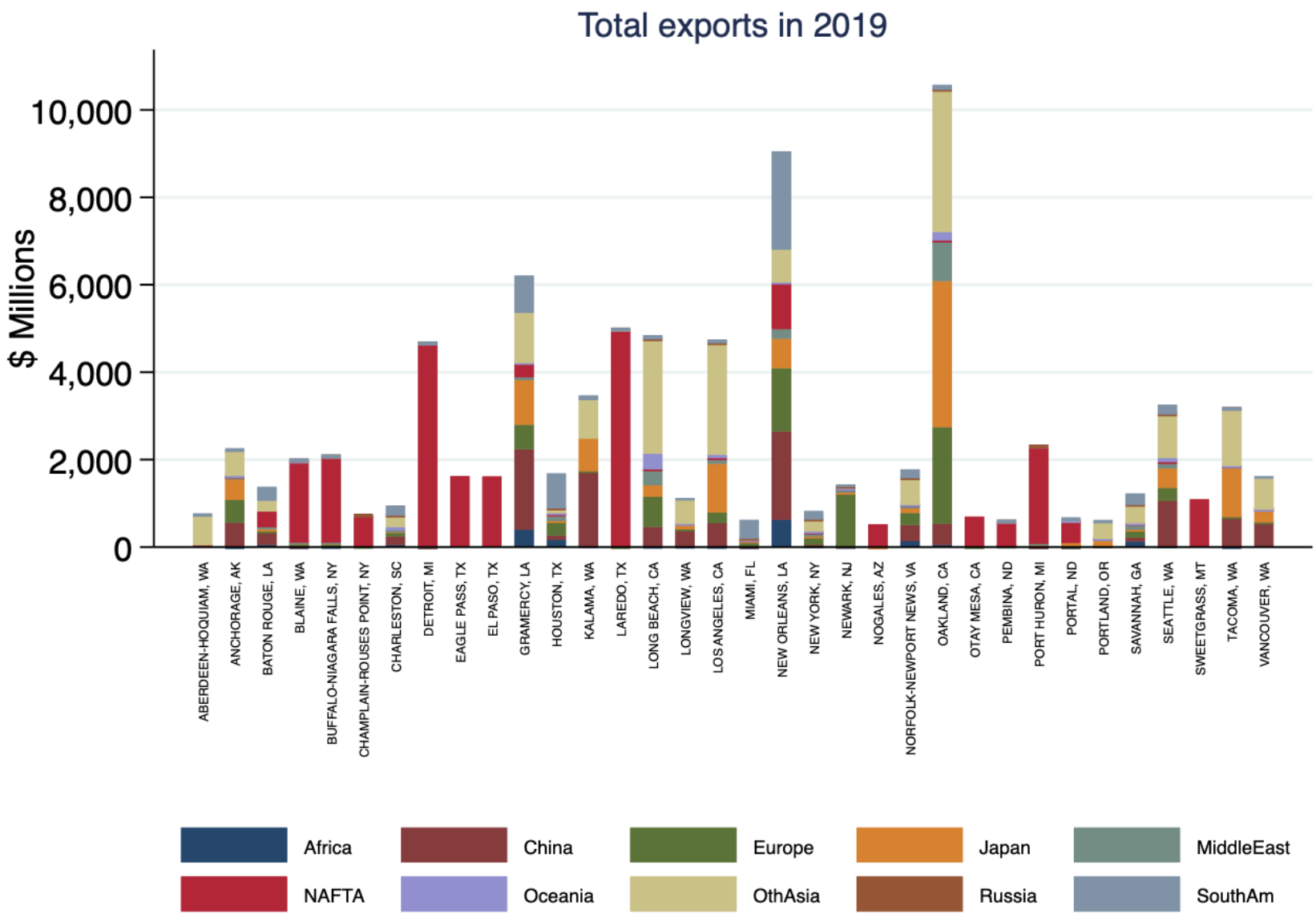


Export value by region, 2019, major ports



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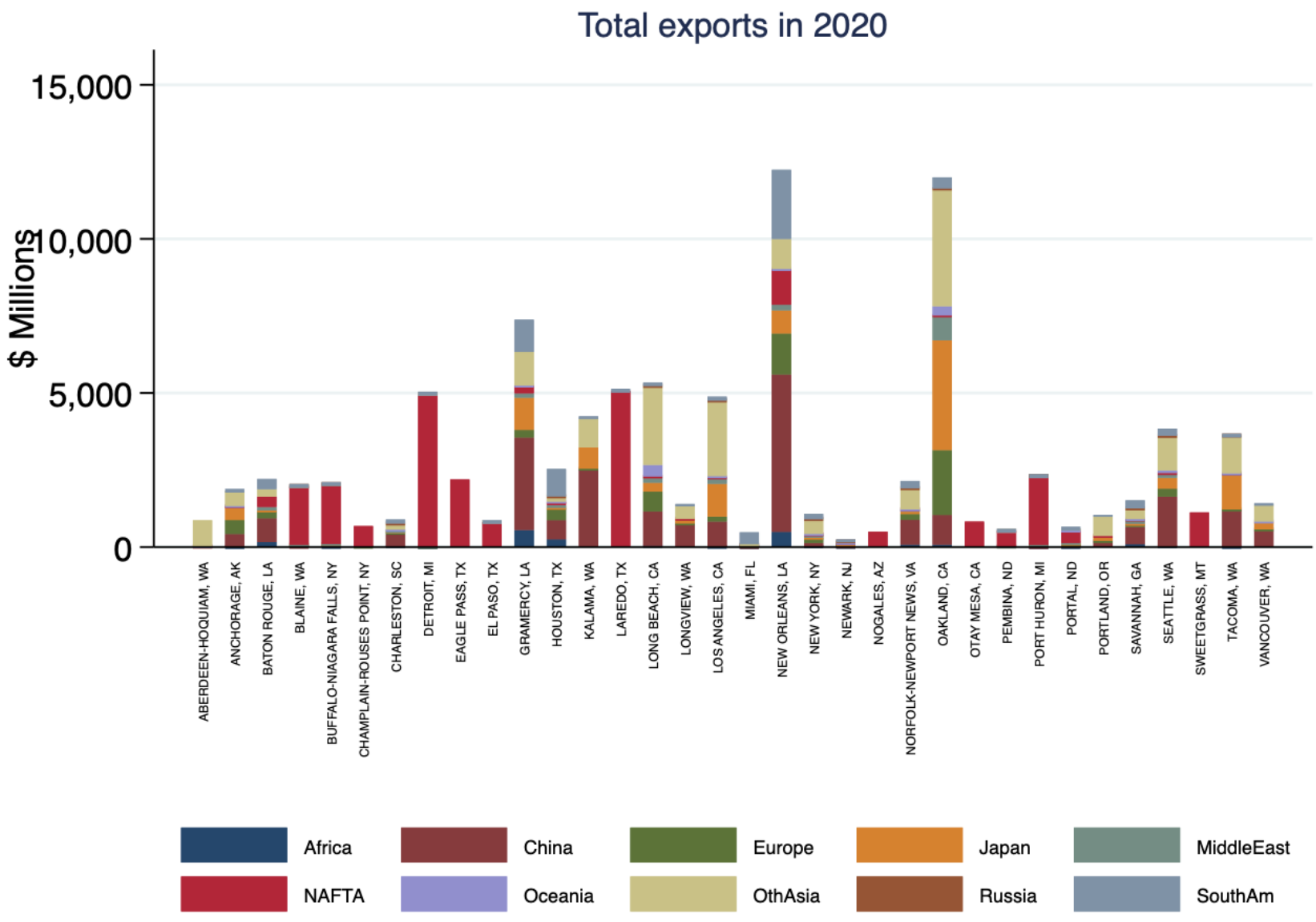
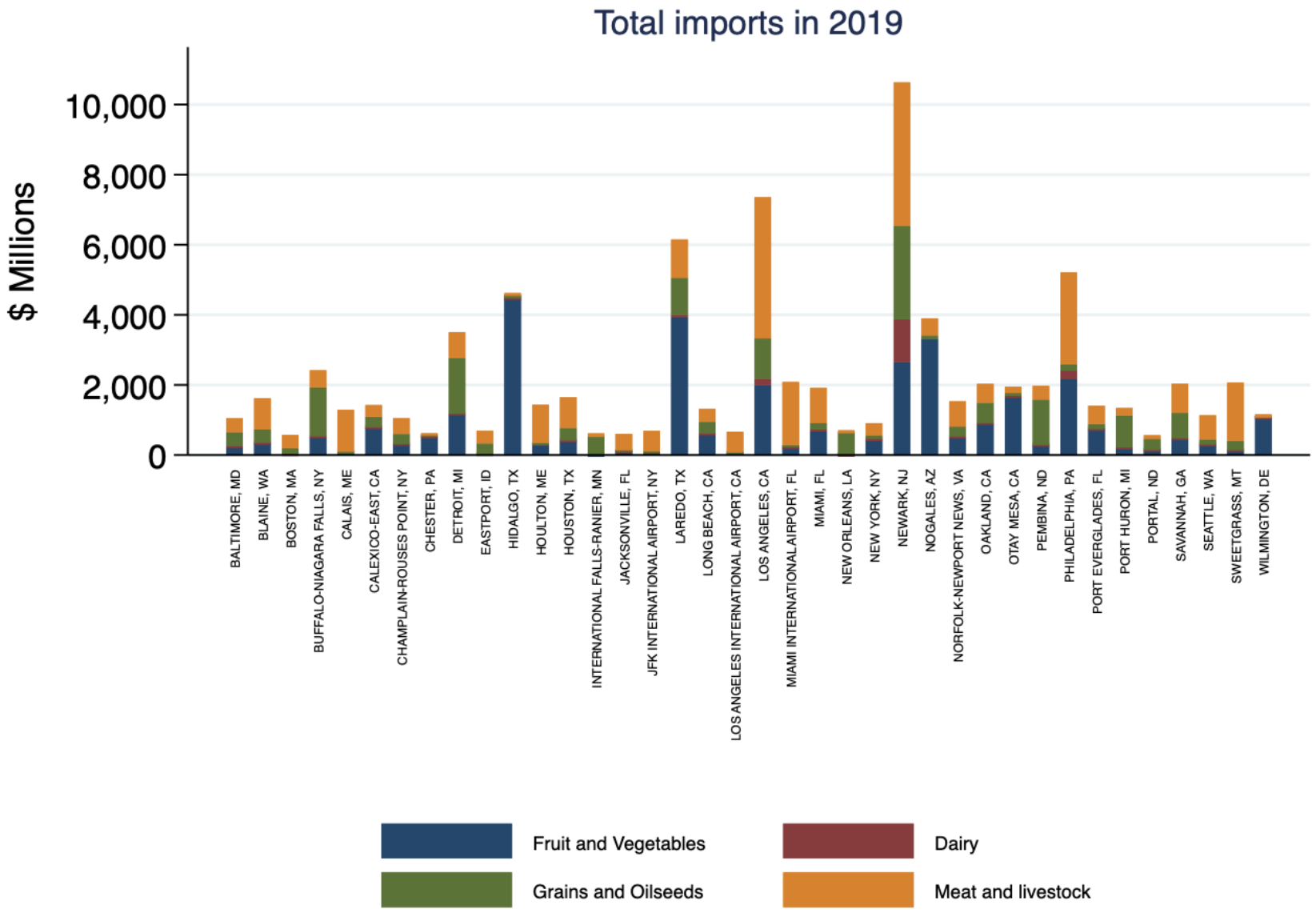


Import value by sector, 2019, major ports



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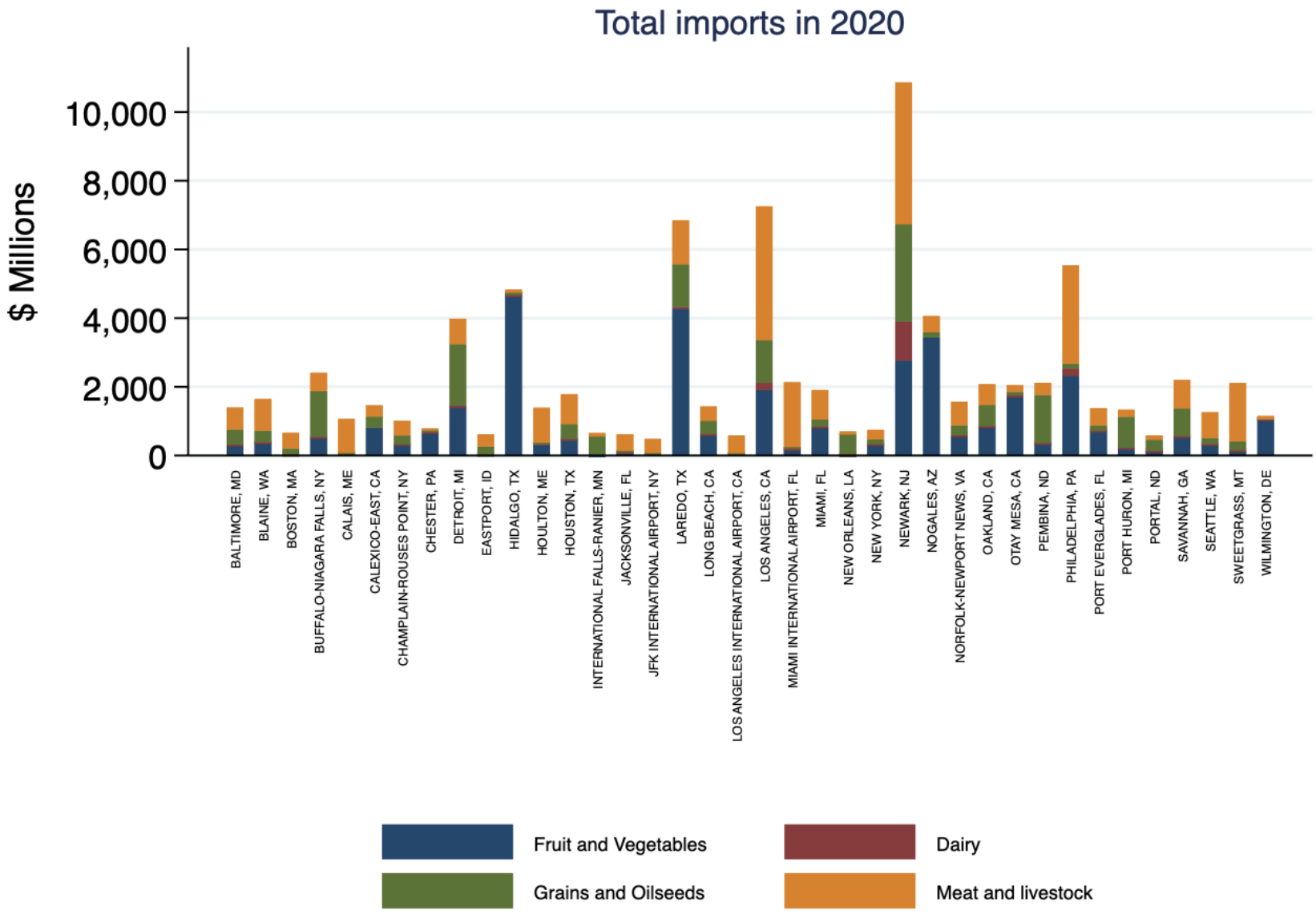

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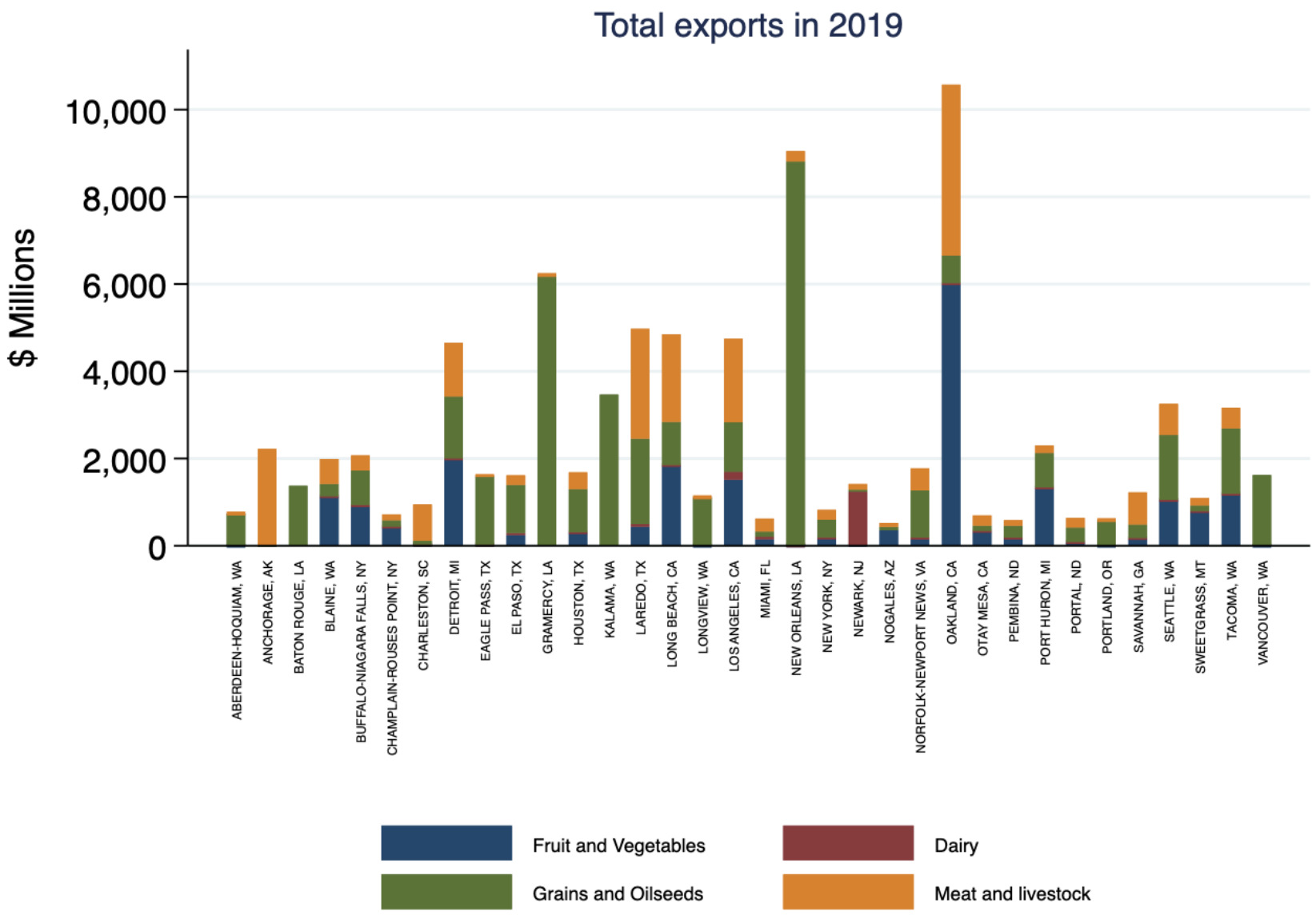

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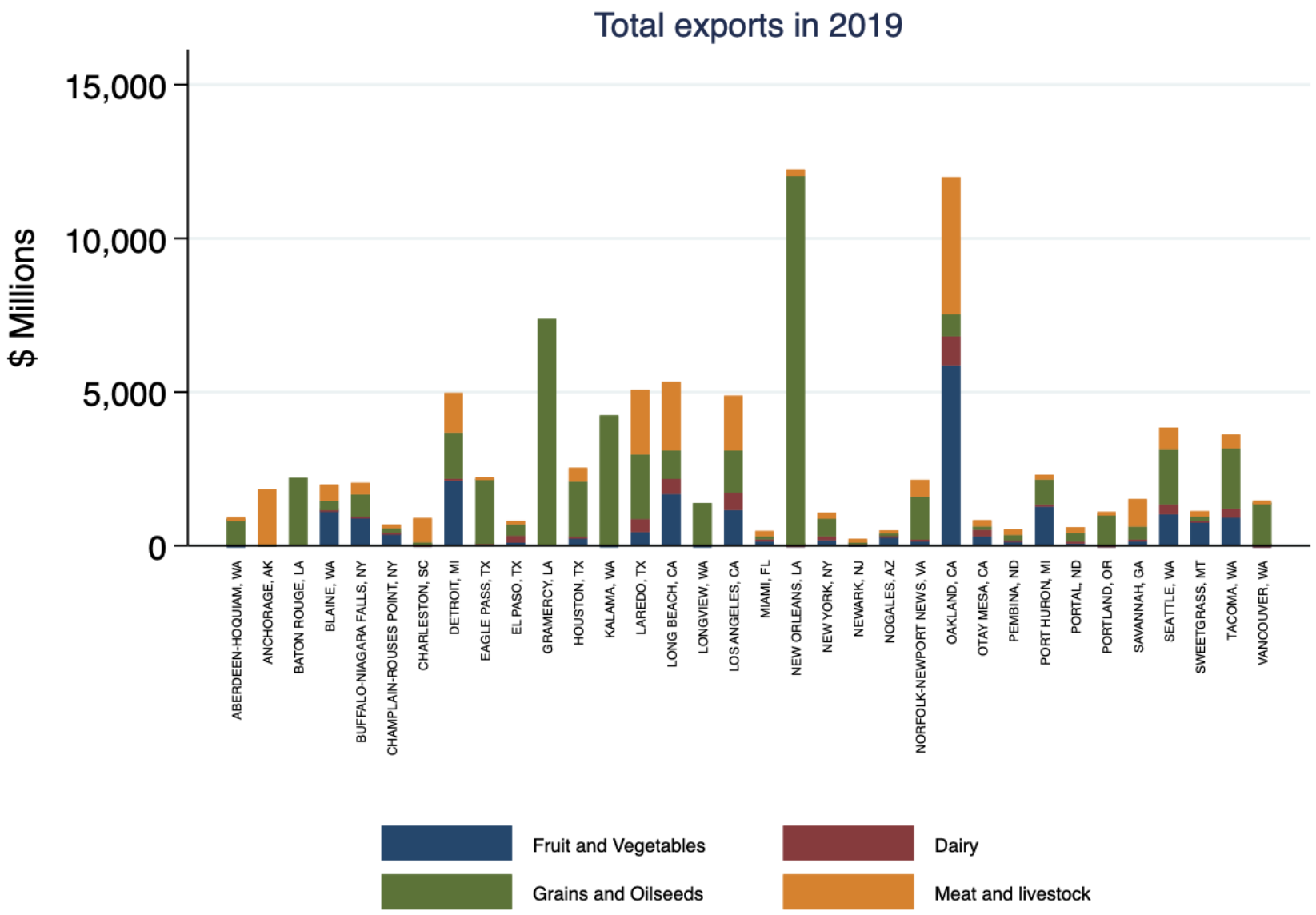
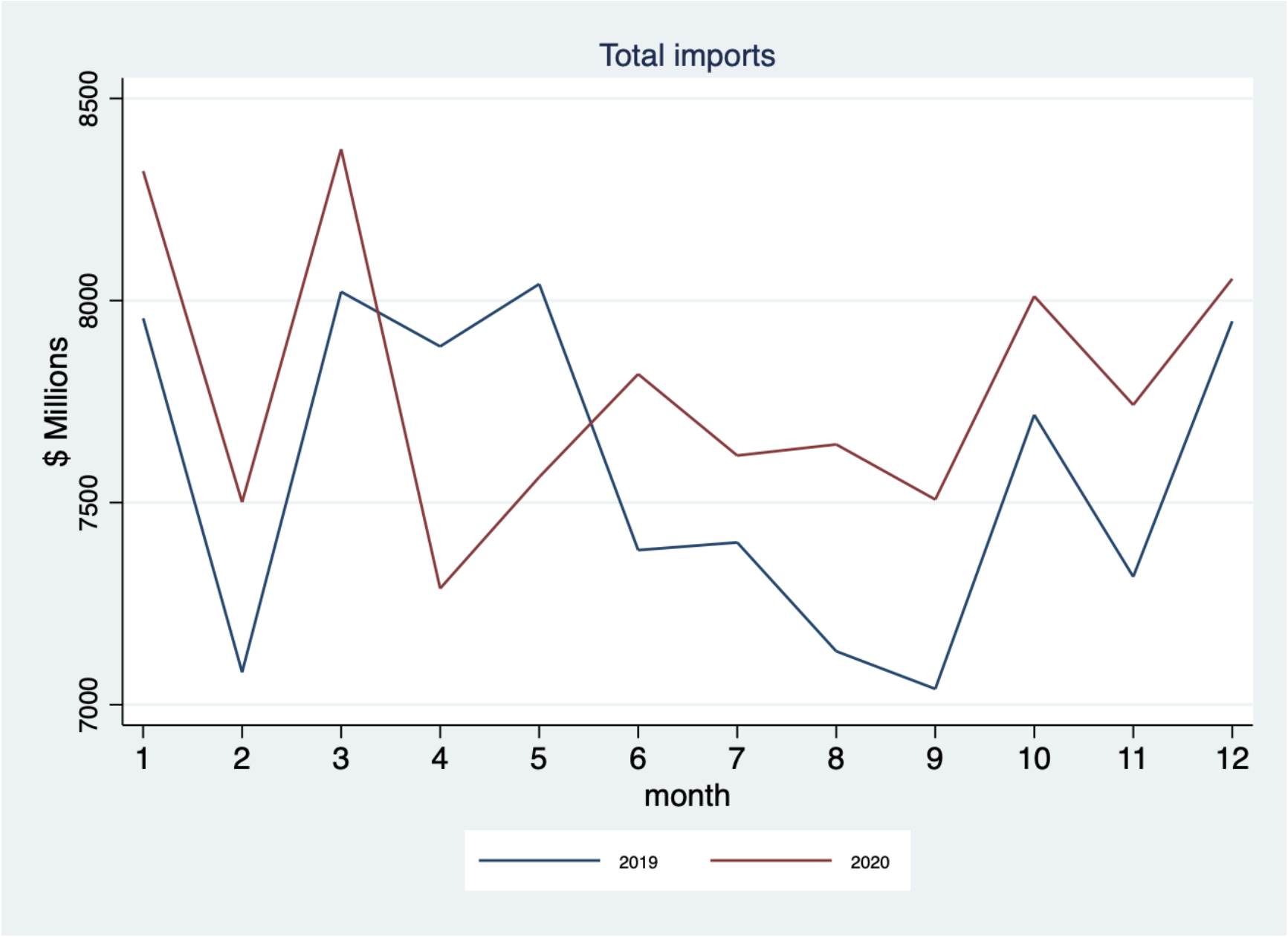
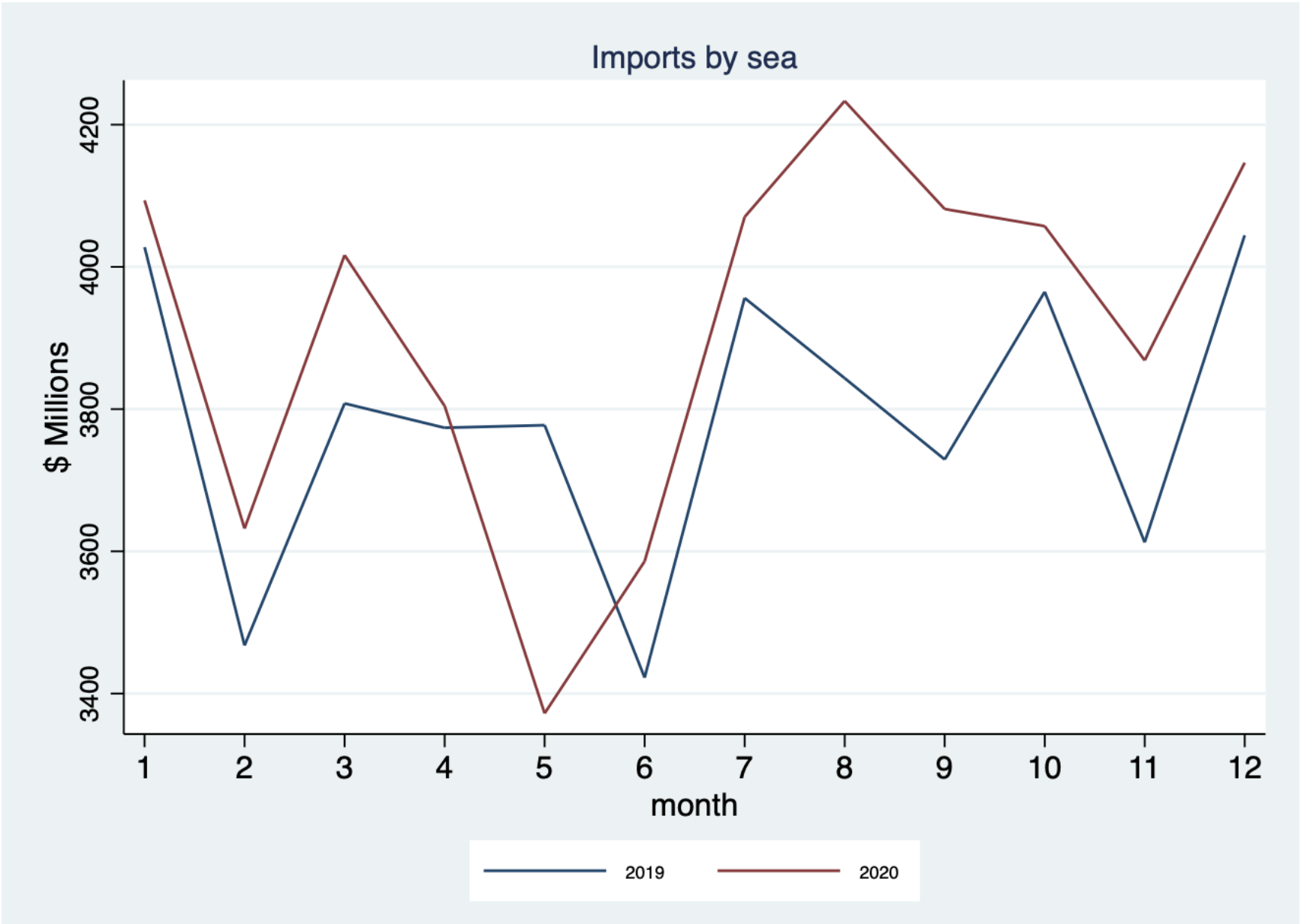


Import value, all commodities and ports, 2019 and 2020



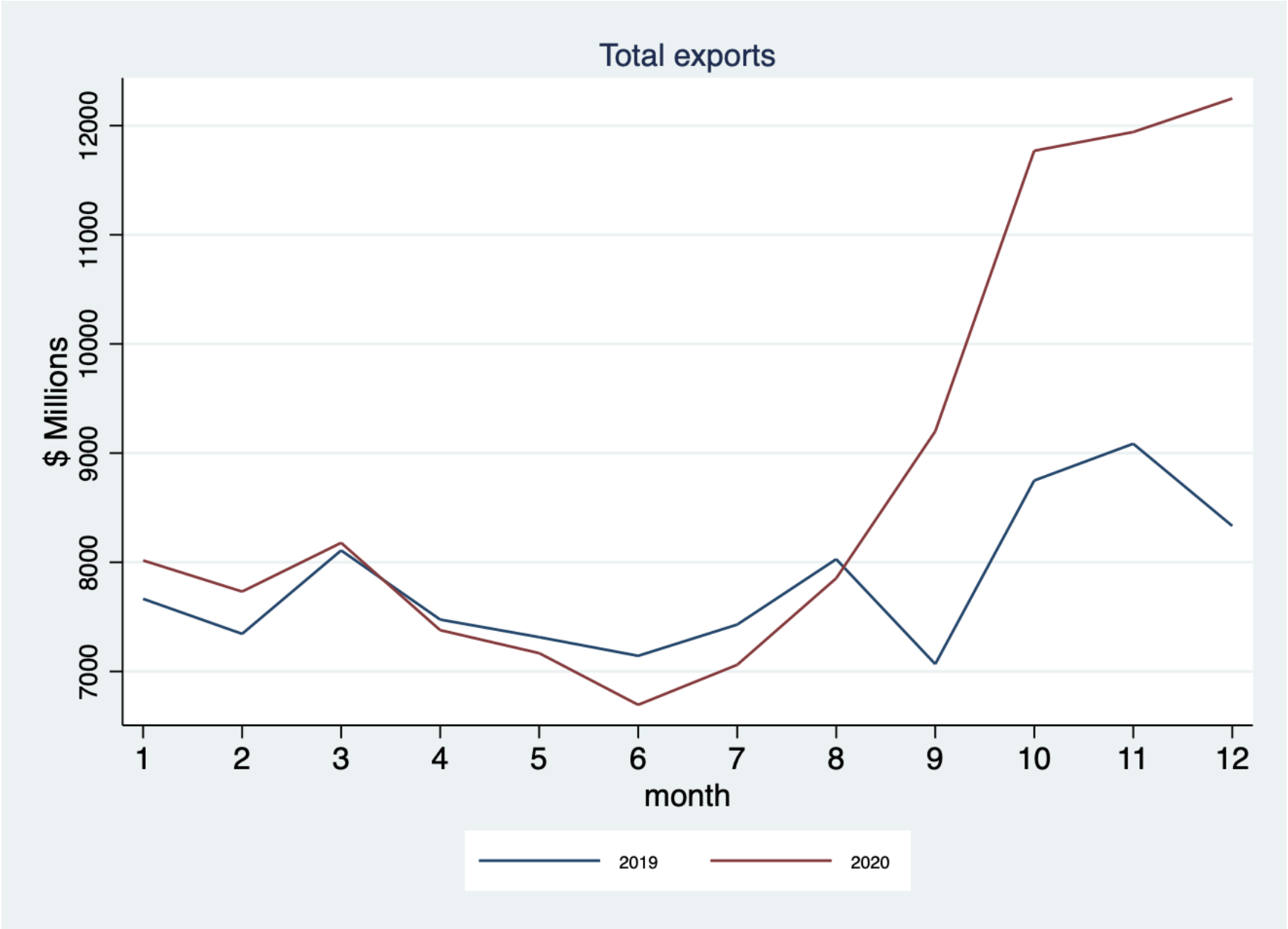
Import value, all commodities and ports (by sea), 2019 and 2020



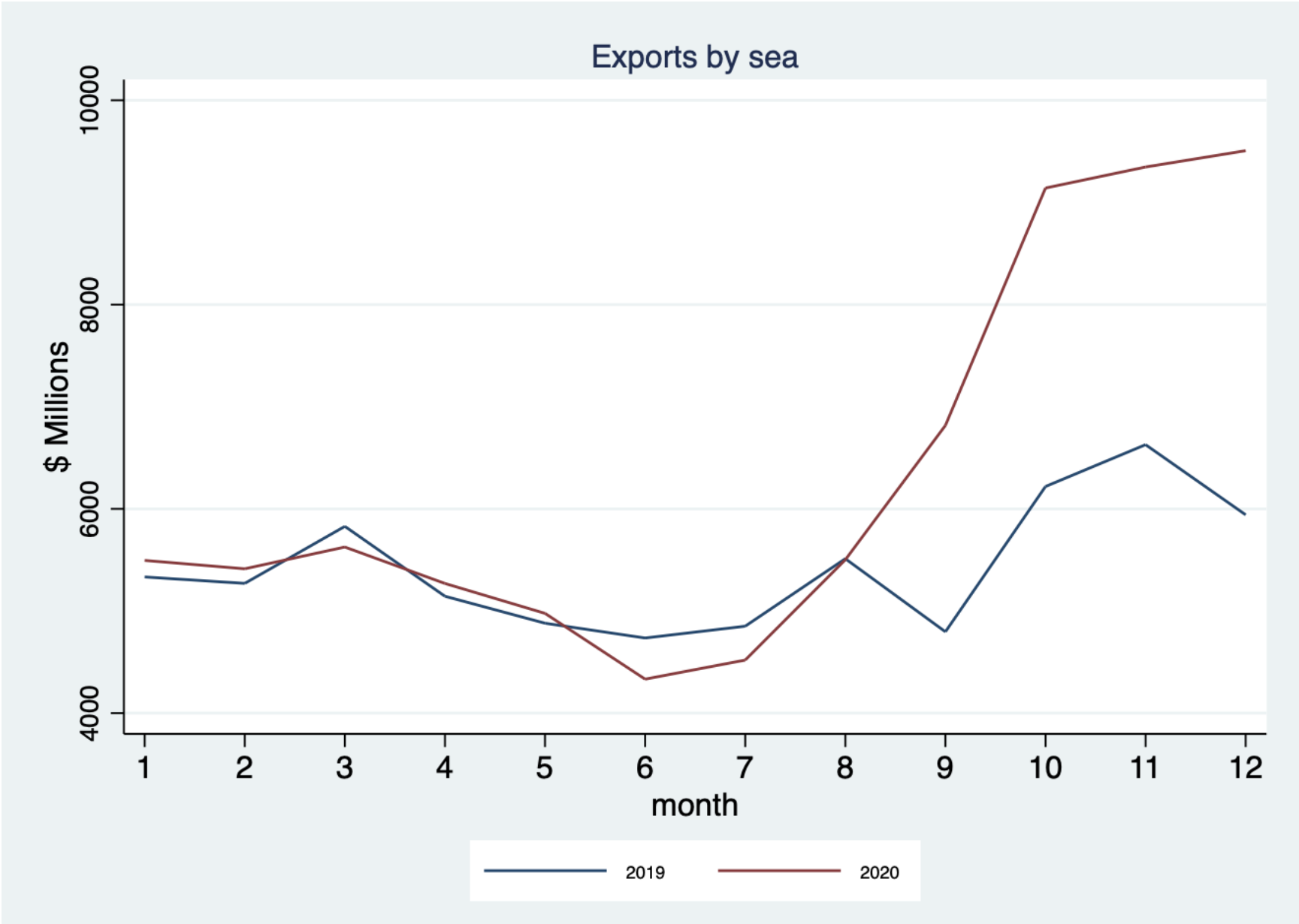
Import value, all commodities and ports (by air), 2019 and 2020

Import value, all commodities and ports (by sector), 2019 and 2020

Export value, all commodities and ports, 2019 and 2020



Export value, all commodities and ports (by sea), 2019 and 2020



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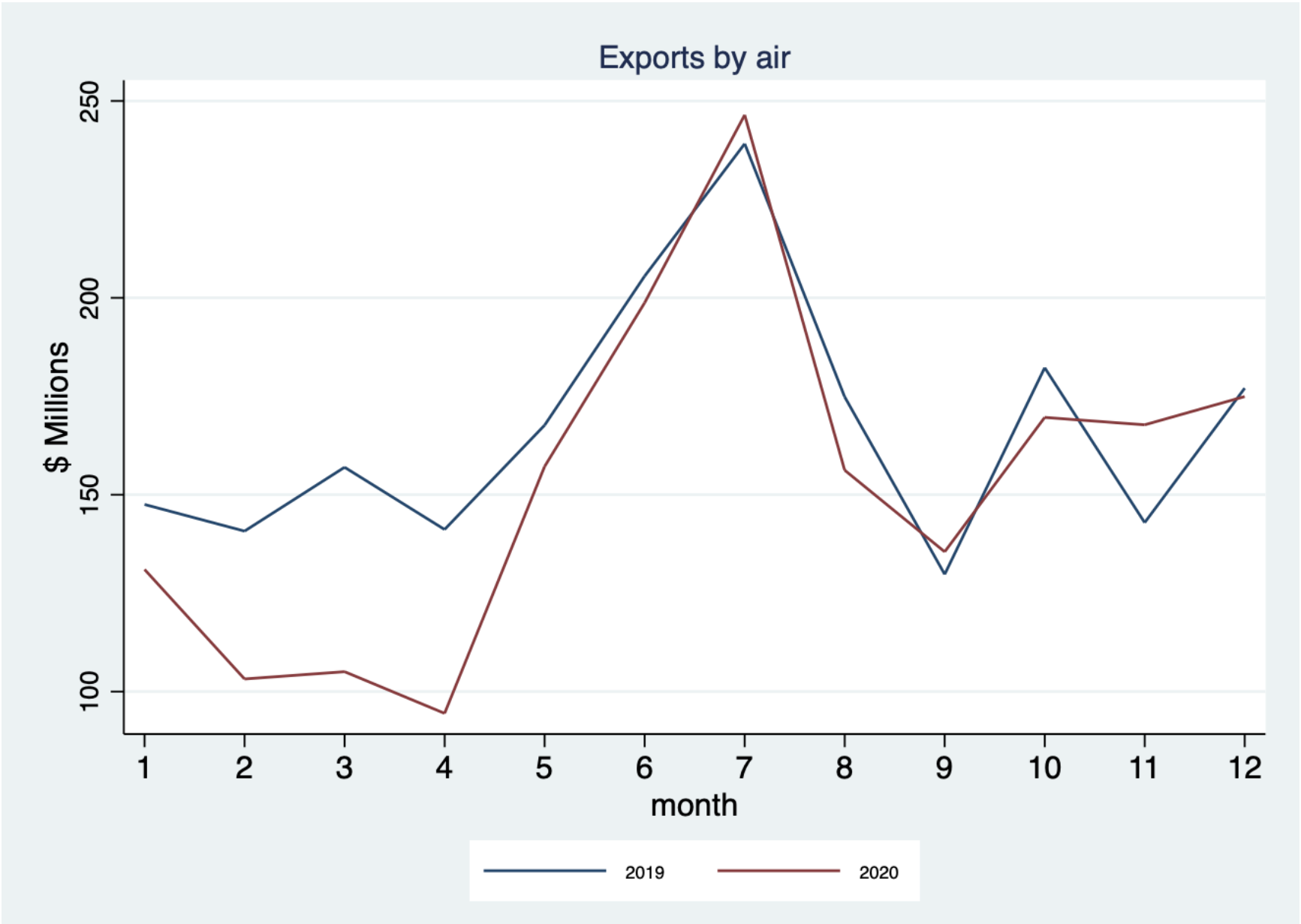
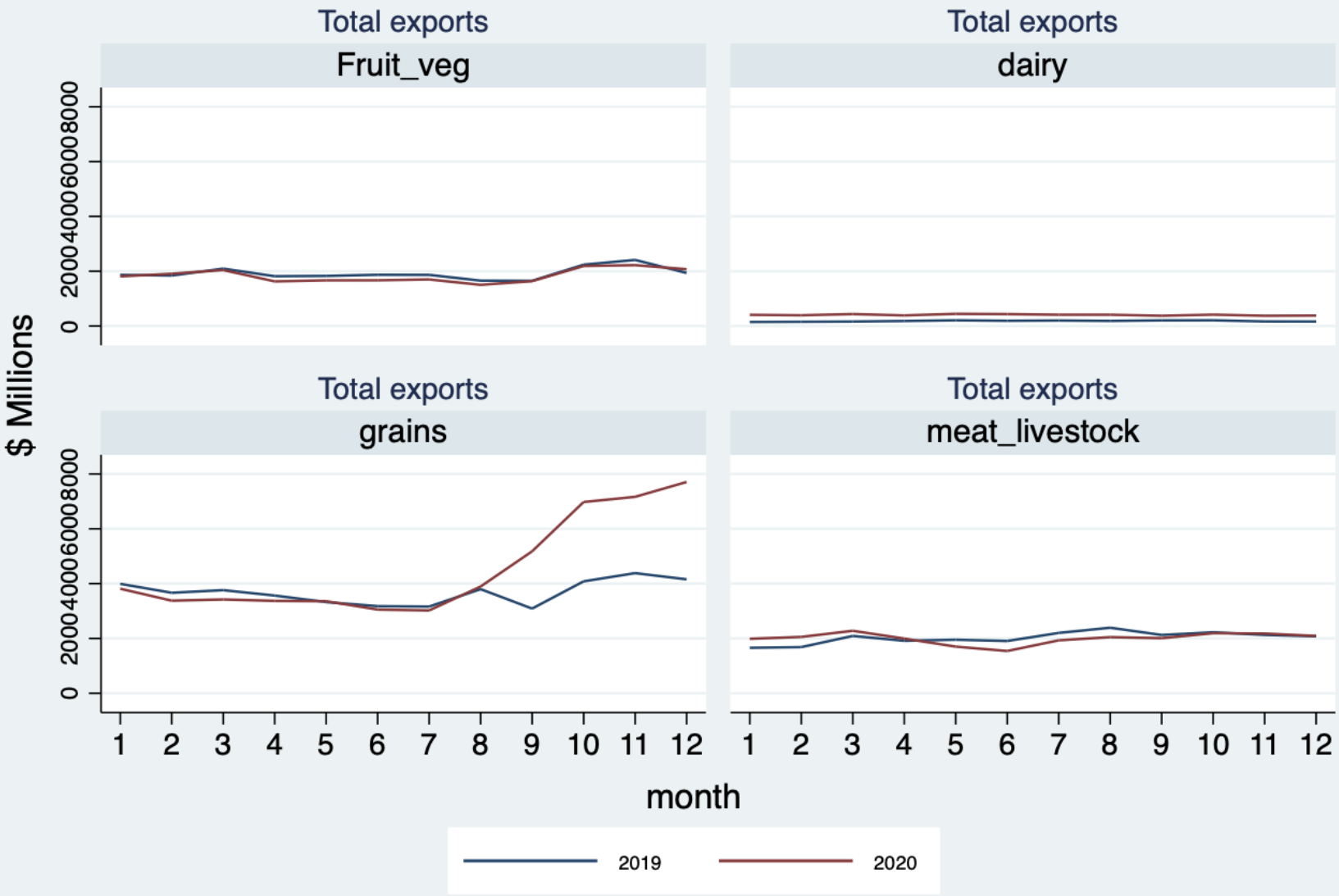


Export value, all commodities and ports (by sector), 2019 and 2020



Summary of graphical evidence

- Very little evidence of decreased trade in 2020 relative to 2019
- Were the decreases (variations) driven by COVID-related shocks?

Concurrent research

Concurrent research

- Arita, Grant, Sydow, Beckman (*Food Policy*, forthcoming)
- VT Trade Center in collaboration with USDA
- Finding: COVID deaths, government restrictions, and mobility decreased *global* agricultural trade by 5 to 10 percent in 2020

Empirical strategy

Empirical strategy

- Very little change in value of imports and exports from 2019 to 2020
- Where there was variation, was it driven directly by COVID?
- In other words, how much of the (admittedly small) variation in trade across 2019 and 2020 can be explained by:
  - COVID illnesses and deaths?
  - Government mitigation policies?
  - Personal mobility choices?
- Each of these types of *shocks* may be related to changes in demand or supply
- Model depends on the assumption that COVID-related shocks cause changes in imports and exports; not the other way around

Empirical strategy

- We exploit variation in:
  - County-level COVID illnesses and deaths for port counties, within the United States
  - Country-level COVID illnesses and deaths for trade partners
  - State-level personal mobility (data from Google)
  - Country-level personal mobility (data from Google) for trade partners
  - State-level mitigation strategies (University of Oxford database)
  - Country-level mitigation strategies for trade partners (Oxford)

Empirical strategy

- We also control for fixed effects
  - Port-partner-commodity-month (to focus on variation in the shock variables across years)
  - Port-partner-commodity and commodity-month (slightly more flexible: focuses in variation across months and across port-partner pairs)

Empirical strategy

- Poisson pseudo-maximum likelihood estimation (w/ HD FEs; Santos Silva and Tenreyro 2006; Correira et al. 2019) to properly characterize the asymmetric distribution of import and export values (with lots of zeros)
- Port-partner-commodity fixed effects control for time-invariant trade patterns
- Estimating equations:

$$x_{ipkmy} = \exp\{\mathbf{X}_{imy}\beta_1 + \mathbf{X}_{pmy}\beta_2 + u_{ipkm}\} + \varepsilon_{ipkmy} \quad (1)$$

$$m_{ipkmy} = \exp\{\mathbf{X}_{imy}\beta_1 + \mathbf{X}_{pmy}\beta_2 + u_{ipkm}\} + \varepsilon_{ipkmy} \quad (2)$$

where $\mathbf{X}$ includes all covid illness, death, mitigation, and mobility variables for trade partner i and U.S. port p

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- What do we mean by "no economically important effects"?
  - Precisely estimated trivial effects

Findings: details (effects of COVID variables in U.S. port counties and states)

- Peak COVID illnesses *increased* imports by sea at the port-partner-commodity level by \$1.17 per month ($p < 0.001$) and *decreased* imports by air by \$0.24 per month ($p < 0.001$)

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- Peak COVID illnesses in the United States *increased* exports at the port-partner-commodity level by \$0.42 per month ($p < 0.001$)
  - Similar effect sizes (and p-values) when looking at exports by air and sea alone
- Port–partner–commodity–month-of-year fixed effects

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- COVID deaths in the United States had no effect on imports (main specifications) or total exports; decreased exports by air by \$2.40 per month ($p < 0.001$)

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- Maximum reductions in retail and workplace mobility (64%) decreased imports by \$0.21 per month and increased exports by \$0.56 per month
- All results at the port-partner-commodity level; port–partner–commodity–month-of-year fixed effects

Findings: details (effects of COVID variables in trade partner countries)

- COVID cases in trade partner countries had no effects on U.S. imports or exports (main specifications)
- COVID deaths in trade partner countries increased U.S. imports by up to \$0.17 per month ($p = 0.001$) and decreased U.S. exports by up to \$0.01 per month ($p = 0.061$)

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Findings: additional discussion

- Results are similar whether or not we include China, Cuba, Dominican Republic, Iceland, Tunisia (no mobility data)

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- Very limited number of economically meaningful effects when analyzing results for individual 4-digit commodities
  - Cherry picking
- We find that U.S. imports and exports were impacted by no more than 0.01 percent (cf. Arita et al., 5–10 percent)

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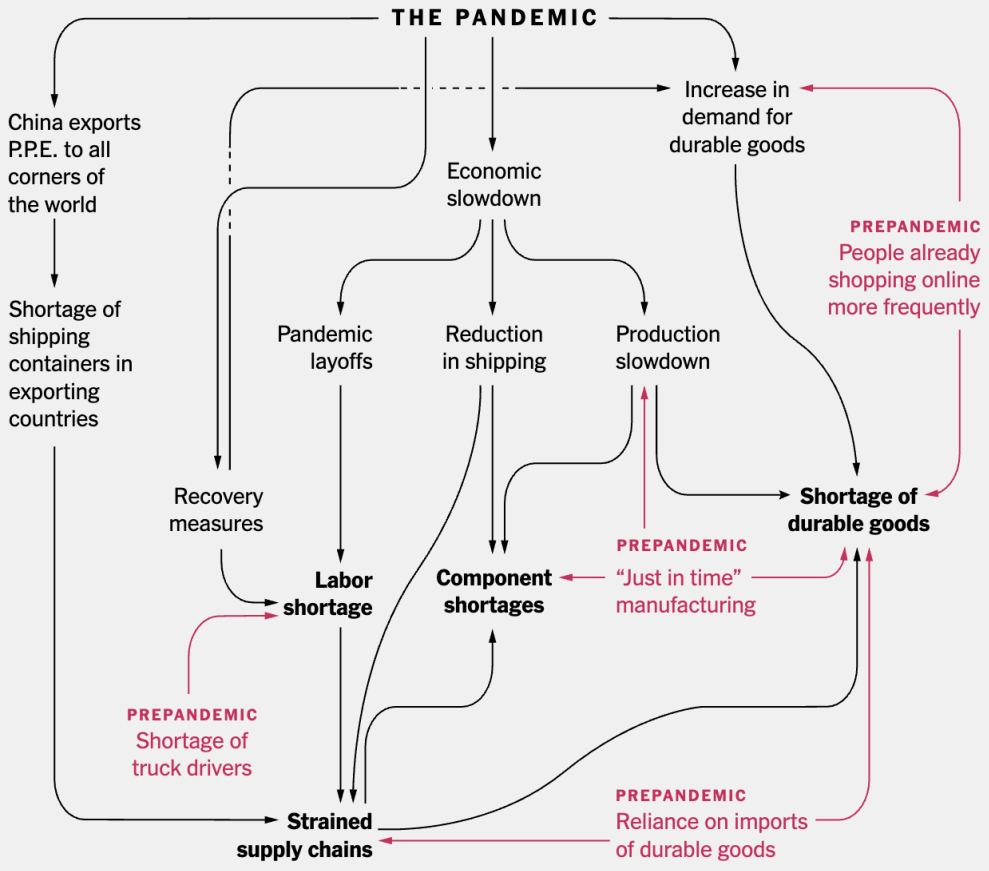
- Analyze how COVID affected the volume of trade (and the price of traded goods)
- Investigate how port specialization (e.g., Pacific v. Atlantic trade partners) may have affected the flow of goods
- Analyze other mechanisms for indirect impacts of COVID on trade (e.g., increased price of shipments, changes in U.S. employment, and financial relief programs)

Indirect effects of COVID

nytimes.com/interactive/2021/12/05/business/economy/supply-chain.html?searchResultPosition=2



With the holiday shopping season underway and the Biden administration pressing to force major ports to expand operations, the supply chain has become a central political issue.

It is also a key factor in rising inflation, which is deepening concerns about the fate of the global economy and its recovery from the lockdowns of the pandemic.

The supply chain issues are likely to last for many more months — if not years.

Contact information

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