

## International Trade Dependence and Inventory Dynamics

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In recent years, firms engaging in international trade have been increasingly exposed to unexpected events or shocks originating from abroad. For instance, the COVID-19 pandemic and resulting supply-chain disruptions, including bottlenecks and increased costs for shipping goods internationally, have significantly affected firms that rely on global markets for production inputs or product sales. The risk of trade disruptions has also increased with heightened geopolitical conflicts, such as the war in Ukraine and the growing tensions between the US and China.

Inventories are critical for smoothing the impact of shocks.<sup>1</sup> For instance, firms with high inventories of

intermediate inputs have a wider range of options when responding to supply shocks and may be well equipped to weather the shocks without much disruption: Firms can run down their inventories while increasing efforts to replenish them via imports or domestic alternatives. In contrast, firms with low inventories are more vulnerable to production disruptions.

We investigate the extent to which firms more engaged in international trade have increased their inventories since facing recent shocks, relative to firms with lower global exposure, using industry-level data on trade exposure and inventories of intermediate inputs across US manufacturers.

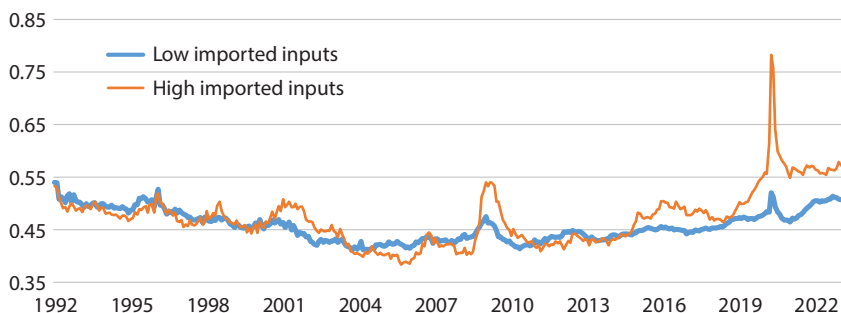
### Input Trade Dependence by Industry, 2019

Industry code	Industry	Imported inputs share	Input inventories-to-sales ratio
327	Nonmetallic mineral products	9%	53%
311	Food and beverage and tobacco products	9%	33%
321	Wood products	11%	61%
323	Printing and related support activities	12%	43%
332	Fabricated metal products	12%	65%
322	Paper products	15%	49%
313	Textile mills and textile product mills	15%	64%
339	Miscellaneous manufacturing	15%	63%
326	Plastics and rubber products	16%	53%
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334	Computer and electronic products	17%	78%
337	Furniture and related products	20%	58%
335	Electrical equipment, appliances, and components	21%	76%
333	Machinery	21%	87%
325	Chemical products	22%	48%
331	Primary metals	22%	73%
315	Apparel and leather and allied products	23%	75%
336	Motor vehicles, bodies and trailers, and parts; Other transportation equipment	23%	41%
324	Petroleum and coal products	31%	23%

NOTE: The horizontal dashed line indicates the median for input trade dependence (16.2%).

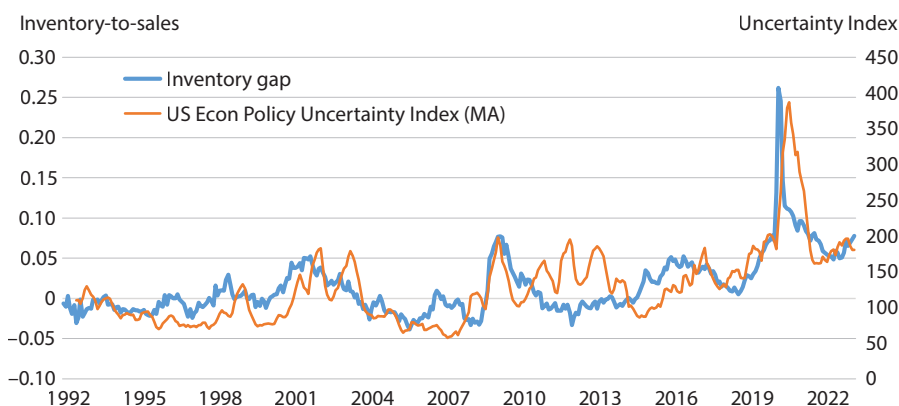
SOURCE: US Census Bureau, Bureau of Economic Analysis, and authors' calculations.

Figure 1  
**Input Inventories-to-Sales, by Input Trade Dependence**



SOURCE: US Census Bureau, Bureau of Economic Analysis, and authors' calculations.

Figure 2  
**Inventory Shares and Economic Uncertainty**



SOURCE: US Census Bureau, Bureau of Economic Analysis, Economic Policy Uncertainty, and authors' calculations.

### Input Trade Dependence and Inventories Across Manufacturers

We first analyze the extent of trade dependence across manufacturing industries, using data from the Bureau of Economic Analysis’s Input-Output Accounts, which separate total intermediate input use across industries by source.<sup>2</sup> Specifically, we measure input trade dependence as the share of intermediate inputs that are imported. We report these values in the table, along with input inventories-to-sales ratios across 18 manufacturing industries, for 2019.

We see that input trade dependence varies somewhat across industries—from 9% of total inputs for nonmetallic mineral products to 31% for petroleum and coal products. We also split industries into two groups: those below and those above the median for input trade dependence (16.2%). We find a substantial variation in inventories across industries, with industries less trade dependent exhibiting slightly lower average inventories (54% vs. 62%) in 2019. We investigate whether these differences have increased further following recent shocks.

### Inventory Dynamics

Using data from the US Census Bureau’s [Manufacturer’s Shipments, Inventories, and Orders](#) survey, we plot in Figure 1 input inventories-to-sales ratios over time, separated by low and high shares of imported inputs corresponding to the two industry groups. We see it is not always the case that industries with high shares of imported inputs have higher inventories; the two groups exhibit roughly the same shares from 1995 through 2019 (except for a few years throughout that span). Starting around 2019, however, we observe a sharp divergence in imported input shares between the two groups. This gap grows even larger during the COVID-19 pandemic, as well as around 2001 and 2009. These observations lead us to believe that firms engaging in international trade adjust their inventories relatively more during times of crises or heightened uncertainty. These findings are consistent with previous studies connecting international trade and risk with firms’ reliance on inventories to smooth shocks.<sup>3</sup>

## The Role of Uncertainty

Figure 2 confirms the relationship between inventory dynamics and uncertainty: We plot the inventory gap—the difference between inventory shares of the two groups in Figure 1—against the News-Based Economic Policy Uncertainty Index for the United States.<sup>4</sup> Indeed, these two series exhibit strong comovement, with a correlation value of 0.71. As firms become more uncertain about economic policies, they may also become more uncertain of what the future entails for trade and their imported inputs. As a result, firms more likely to be affected by lack of foreign inputs will stock up on them, and the gap between low and high trade-dependent input inventories increases. When times are more certain, this is less of a concern, and the gap shrinks.

## Concluding Remarks

Our findings point to the importance of inventories as a tool to buffer shocks. Although all firms hold inventories to combat against unexpected changes in demand or supply, firms that are heavily dependent on inputs sourced from abroad are more likely to be wary of shocks, and their inventories are consistent with this. ■

## Notes

<sup>1</sup> Leibovici, Fernando and Dunn, Jason. “Supply Chain Disruptions and Inventory Dynamics.” Federal Reserve Bank of St. Louis *On the Economy Blog*, August 2023; <https://www.stlouisfed.org/on-the-economy/2023/aug/supply-chain-disruptions-inventory-dynamics>.

<sup>2</sup> See <https://www.bea.gov/industry/input-output-accounts-data> and <https://apps.bea.gov/iTable/?isuri=1&reqid=151&step=1>.

<sup>3</sup> Alessandria, George; Kaboski, Joseph P. and Midrigan, Virgiliu. “Inventories, Lumpy Trade, and Large Devaluations.” *American Economic Review*, 2010, 100(5), pp. 2304-39. See also Maria Jose Carreras (2021, working paper): [Increasing Inventories: The Role of Delivery Times](https://www.fred.stlouisfed.org/series/USEPUNewsSINDXM).

<sup>4</sup> To smooth out this series, we focus on the 6-month moving average. See Baker, Scott R.; Bloom, Nick and Davis, Stephen J. “Economic Policy Uncertainty Index: News-Based Index for the United States [USEPUNewsSINDXM].” FRED®, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/USEPUNewsSINDXM>.