

Inputs to Industry Price Indexes

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Introduction: input versus output price indexes

■ Industry output indexes

- ▶ measure the average change in prices for outputs produced by domestic industries

■ Input to industry indexes

- ▶ measure the average change in prices for inputs consumed by domestic industries

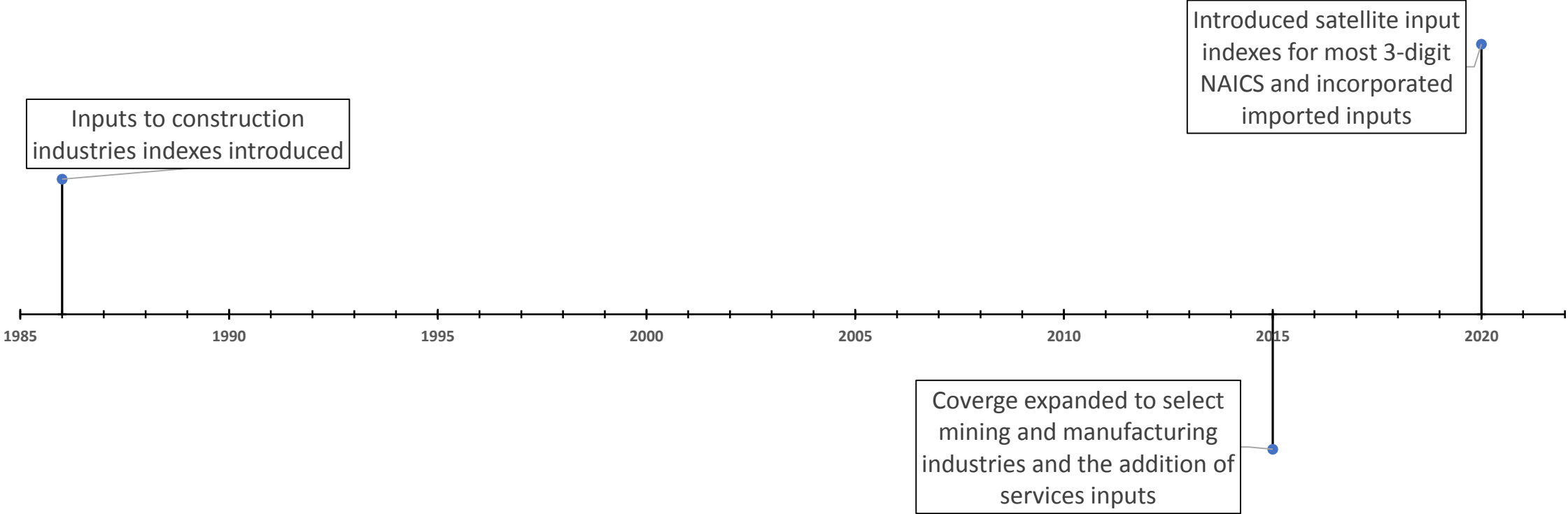


Introduction: potential uses of industry input indexes

- Industry level analysis
- Price transmission analysis
- Deflation
- Contract price adjustment



Introduction: background



Introduction: source data

- BLS PPI commodity indexes to measure price change for domestically produced industry inputs
- BLS NAICS-based import indexes (MPIs) to measure price change for imported industry inputs



Introduction: publication

- Introduced new set of input indexes experimentally with the release of August 2020 data
- Available for most 3-digit NAICS categories
- Measure price change for both domestically produced and imported inputs purchased by the NAICS grouping
- Available on the PPI webpage
- Updated monthly after both PPI and IPP release data



Methodology: product selection

- Bureau of Economic Analysis (BEA) Input-Output (I-O) “Use of Commodities by Industries” table used to determine inputs to an industry



Methodology: product selection – Use table, selected values

IO Industry code	IO Industry title	IO Commodity code	IO Commodity title	Use value
336	Transportation Equipment Manufacturing	221100	Electric power generation, transmission, and distribution	3214
336	Transportation Equipment Manufacturing	325510	Paint and coating manufacturing	3025
336	Transportation Equipment Manufacturing	326210	Tire manufacturing	3797
336	Transportation Equipment Manufacturing	327200	Glass and glass product manufacturing	4353
336	Transportation Equipment Manufacturing	331110	Iron and steel mills and ferroalloy manufacturing	29511
336	Transportation Equipment Manufacturing	33399B	Fluid power process machinery	4186
336	Transportation Equipment Manufacturing	334300	Audio and video equipment manufacturing	3231
336	Transportation Equipment Manufacturing	334413	Semiconductor and related device manufacturing	8999
336	Transportation Equipment Manufacturing	334511	Search, detection, and navigation instruments manufacturing	4108
336	Transportation Equipment Manufacturing	336310	Motor vehicle gasoline engine and engine parts manufacturing	20989
336	Transportation Equipment Manufacturing	336350	Motor vehicle transmission and power train parts manufacturing	28550
336	Transportation Equipment Manufacturing	336360	Motor vehicle seating and interior trim manufacturing	25043
336	Transportation Equipment Manufacturing	336412	Aircraft engine and engine parts manufacturing	27692
336	Transportation Equipment Manufacturing	423800	Machinery, equipment, and supplies	10762
336	Transportation Equipment Manufacturing	484000	Truck transportation	7844
336	Transportation Equipment Manufacturing	541100	Legal services	4818
336	Transportation Equipment Manufacturing	541610	Management consulting services	3496

Methodology: product selection – IO to MPI to PPI concordance

IO code	IO title	MPI code	MPI title	PPI code	PPI title
334413	Semiconductor and related device manufacturing	334413	Semiconductor and related device manufacturing	117839	Integrated microcircuits
				117847	Other semiconductor and related devices
326210	Tire manufacturing	326210	Tire manufacturing	071201	Tires
				071203	Tread rubber, tire sundries, and repair materials
541100	Legal services	NA	NA	451101	Legal services



Methodology: weights

- After the set of domestically-produced and imported commodities consumed by the industry are determined, BLS develops weights for each PPI and MPI index included in the industry input index
- The weight for a given commodity within the industry reflects the relative share of the commodity in relation to total industry inputs



Methodology: domestic weights

- Weights are derived from:
 - ▶ BEA's "Use of Commodities by Industries"
 - ▶ Census' wherever-made (WEM) value of shipments (VOS) data



Methodology: weights – domestic inputs

$$\text{DomesticWeight}_{c,i} = \text{Use}_{c,i} / (\sum_{i=1}^n \text{Use}_{c,i}) * \text{WEMVOS}_c$$

where

- ▶ *Domestic Weight*_{c,i} refers to the domestically produced weight of commodity c in the input index for industry i
- ▶ *Use*_{c,i} refers to use of commodity c by the industry i
- ▶ $\sum_{i=1}^n \text{Use}_{c,i}$ is the total use of commodity c by all 1 through n industries included in the use table
- ▶ *WEMVOS*_c is the domestic wherever-made value of shipments for commodity c.



Methodology: weights – domestic inputs

- Example: gross weight of domestically produced tires to inputs to transportation equipment manufacturing

$$DomWt_{t,te} = Use_{t,te} / \left(\sum_{i=1}^n Use_{t,i} \right) * WEMVOS_t$$

$$= 3,797 / 35,098 * \$18,468,070$$

$$= 0.1082 * \$18,468,070$$

$$= \$1,998,245$$

Methodology: imported weights

- Weights are derived from:
 - ▶ BEA's "Use of Commodities by Industries"
 - ▶ Census' import trade VOS



Methodology: weights – imported inputs

$$\text{Import Weight}_{c,i} = \text{Use}_{c,i} / (\sum_{i=1}^n \text{Use}_{c,i}) * \text{VOI}_c$$

where

- ▶ $\text{Import Weight}_{c,i}$ refers to the foreign produced weight of commodity c in the input index for industry i
- ▶ $\text{Use}_{c,i}$ refers to use of commodity c by the industry i
- ▶ $\sum_{i=1}^n \text{Use}_{c,i}$ is the total use of commodity c by all 1 through n industries included in the use table
- ▶ VOI_c is the value of imports for commodity c.



Methodology: weights – imported inputs

- Example: gross weight of imported produced tires to inputs to transportation equipment manufacturing

$$\begin{aligned} \text{ImptWt}_{t,te} &= \text{Use}_{t,te} / \left(\sum_{i=1}^n \text{Use}_{t,i} \right) * \text{VOI}_t \\ &= 3,797 / 35,098 * \$14,567,826 \\ &= 0.1082 * \$14,567,826 \\ &= \$1,576,239 \end{aligned}$$



Methodology: net weights

- As a final step, weights are converted to net weights by multiplying the gross weights by net input ratios
- Net input ratios reflect the portion of the value of commodity that is produced outside of the industry
- Applying net output ratio eliminates multiple counting by removing intra-industry transactions



Weight example: Inputs to transportation equipment manufacturing

Index	Relative importance
Inputs to 336, transportation equipment manufacturing	100.000
Domestically produced inputs	69.806
Imported inputs	30.194

Weight example: Inputs to transportation equipment manufacturing- selected PPI commodity indexes

Index code	Index title	Relative importance
054321	Industrial electric power	1.270
071201	Tires	1.030
101702	Semifinished steel mill products	0.883
101703	Hot rolled steel sheet and strip, including tin mill products	1.782
101704	Hot rolled steel bars, plates, and structural shapes	1.416
101707	Cold rolled steel sheet and strip	1.190
102501	Aluminum mill shapes	1.112
102802	Aluminum castings	1.543
117606	Search, detection, navigation & guidance systems and equipment	0.949
119408	Diesel, semidiesel, and dual-fuel engines for automobiles, trucks, and buses	1.301
119413	Parts & accessories for internal combustion engines, ex. aircraft & gasoline automotive engines	0.702
301202	Long-distance motor carrying	1.216
451101	Legal services	1.394
453201	Engineering services	0.918
454101	Administrative and general management consulting services	0.750



Weight example: Inputs to transportation equipment manufacturing-selected MPIs

Index code	Index title	Relative importance
32621	Tire manufacturing	0.699
3311	Iron and steel mills and ferroalloy manufacturing	2.135
332911	Industrial valve manufacturing	0.497
333618	Other engine equipment manufacturing	1.693
334310	Audio and video equipment manufacturing	0.616
334413	Semiconductor and related device manufacturing	1.066
336310	Motor vehicle gasoline engine and engine parts manufacturing	2.858
336320	Motor vehicle electrical and electronic equipment manufacturing	1.109
336330	Motor vehicle steering and suspension components (except spring) manufacturing	0.938
336340	Motor vehicle brake system manufacturing	0.613
336350	Motor vehicle transmission and power train parts manufacturing	3.503
336360	Motor vehicle seating and interior trim manufacturing	2.235
336412	Aircraft engine and engine parts manufacturing	3.310
336413	Other aircraft parts and auxiliary equipment manufacturing	1.380



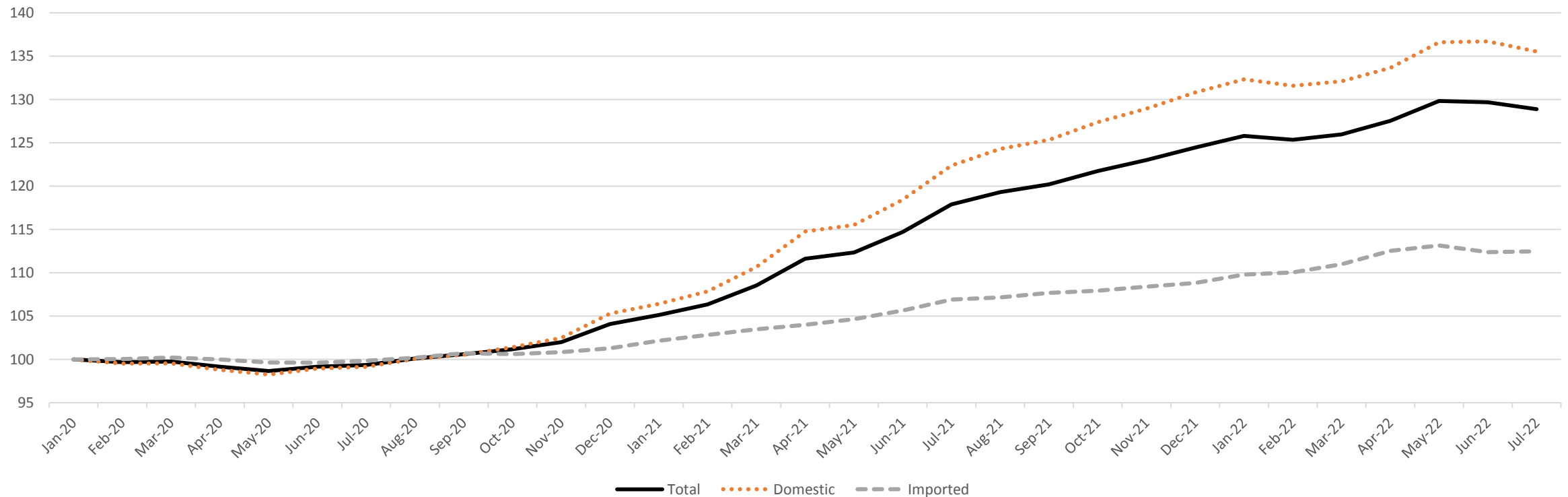
Publication structure

Title	Code
Inputs to 221, utilities, excluding capital investment and labor	IN221
Inputs to 221, domestically produced products	IN2211
Inputs to 221, domestically produced goods	IN22111
Inputs to 221, domestically produced services	IN22112
Inputs to 221, domestically produced maintenance and repair construction	IN22113
Inputs to 221, imported goods	IN2212



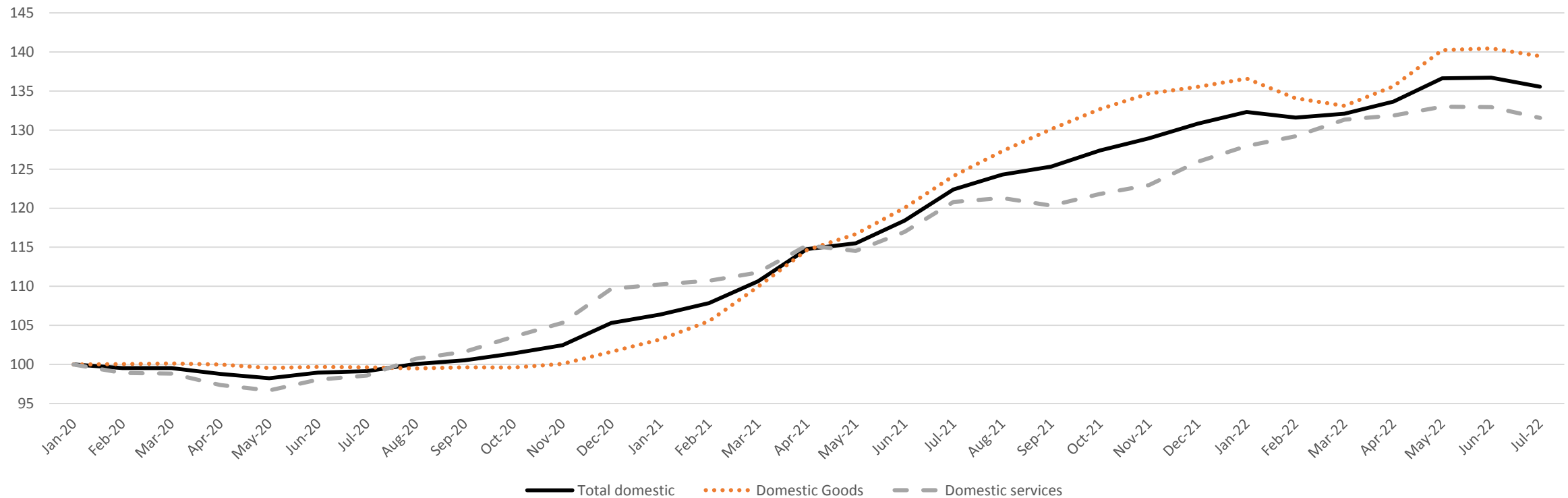
Use example: industry cost analysis

Inputs to 336, transportation equipment manufacturing, excluding capital investment and labor

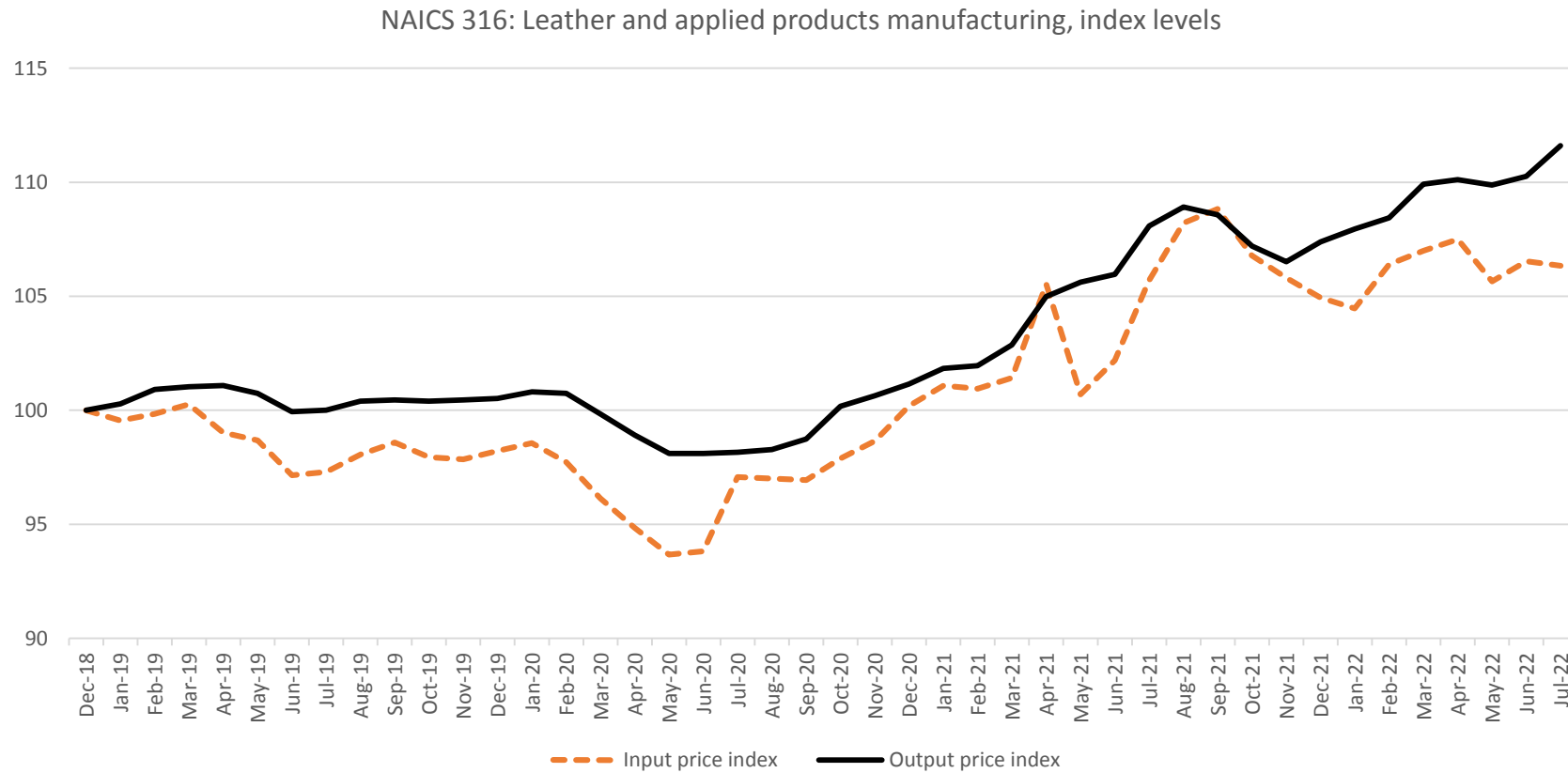


Use example: industry cost analysis

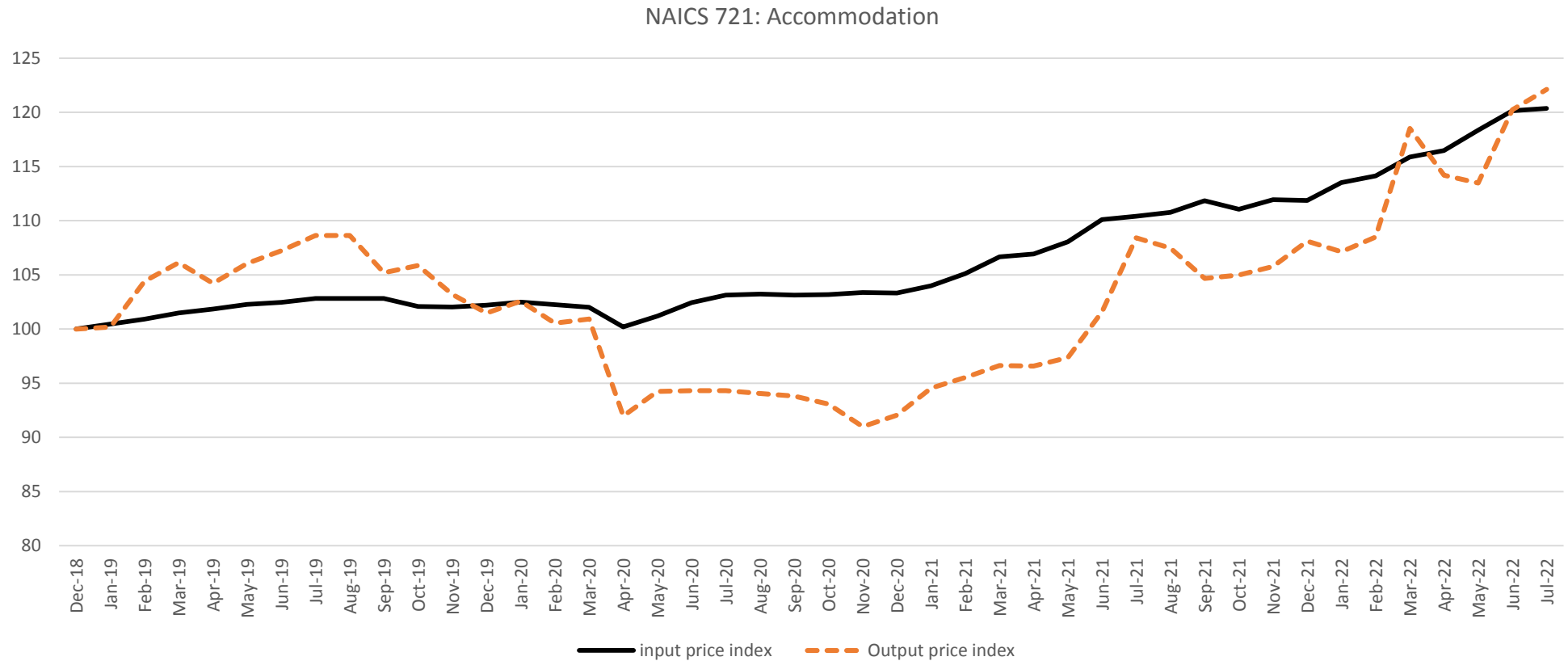
Inputs to 336, transportation equipment manufacturing, excluding capital investment and labor



Use example: price transmission



Use example: price transmission



Use example: deflation

2019	Price index: Social assistance NAICS 624	Price Index rebased	Nominal revenue (millions of dollars): NAICS 624 Social assistance	Real revenue (millions of dollars)
Q1	100.418	100.000	49,431	49,431
Q2	102.145	101.720	51,385	50,516
Q3	102.546	102.119	51,194	50,132
Q4	102.349	101.924	55,954	54,898

Index exclusions

- Excludes labor and capital investment
- Excludes imported services
- Excludes any domestically produced services that BLS does not publish PPIs for



Contact Information

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