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Comparing NAICS-based Producer Price Index industry net output data and International Price Program import data

Data users have expressed interest in analyzing trends in prices for domestically produced products versus imports by comparing Bureau of Labor Statistics (BLS) producer price indexes (PPIs) to BLS import price indexes (MPIs). Because BLS publishes both PPIs and MPIs classified according to the North American Industry Classification System (NAICS), potential exists for comparing price trends using NAICS-based PPIs and MPIs. There are, however, four important potential differences between PPIs and MPIs that data users should consider before comparing the two series. This article explains these potential differences and presents a new data table for assessing the comparability of NAICS-based PPIs and MPIs.

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Data users have expressed interest in comparing trends in prices for domestically produced products versus imports using U.S. Bureau of Labor Statistics (BLS) data. BLS publishes both producer price indexes (PPIs) and import price indexes (MPIs) classified according to the North American Industry Classification System (NAICS).[1] NAICS-based PPIs measure price change for the domestically produced net output of specific industries or industry groups, while NAICS-based MPIs measure price change for imports to the United States produced by foreign firms.[2]

Because both PPIs and MPIs use the NAICS-based classification system, the potential exists for comparing price trends for domestically produced products using PPIs and imported products using MPIs. However, four potential differences between PPIs and MPIs must be considered before one compares the two series. In some cases, these differences could make comparisons between PPIs and MPIs inappropriate. This article explains these potential differences and presents a new data table to help data users assess the comparability of industry-

based PPIs and MPIs. The table could also be used to explain limitations caused by differences in measurement objectives and composition when data users compare PPIs and MPIs.

The article begins by explaining potential differences that data users should be aware of when comparing PPIs with MPIs. The next section introduces a new data table that they can use to help determine comparability between PPIs and MPIs at the 4- and 5-digit NAICS levels. We then provide examples that compare PPIs and MPIs for three different industry groups. The examples present issues associated with comparing the two series and highlight how users of BLS data can use the new data table to evaluate the comparability of PPIs and MPIs.

Differences between PPI and MPI NAICS data

There are four important potential sources of differences between PPIs and MPIs that should be considered before these indexes are used to compare domestic and imported price trends. In general, these differences relate to index methodology, relative-importance values, net weighting, and sample compositions. This section describes these potential sources of differences.

Primary, secondary, and miscellaneous production

As many as three kinds of production may exist within an industry. Every industry produces primary products, which are products made mainly, but not necessarily exclusively, by that industry. In addition, some industries produce secondary products or miscellaneous receipts, which are goods or services made chiefly by some other industry.

PPI industry net-output indexes measure price changes for the total production of domestic industries including primary products, secondary products, and miscellaneous receipts. The PPI can capture these detailed data through industry-level sampling and through direct consultation with establishments included in the PPI survey. MPIs measure price changes for imports of primary products of industries using directly collected establishment data; MPIs exclude prices for secondary products and miscellaneous receipts produced within the industry. The MPI sample is selected from the U.S. Customs and Census Bureau trade frame on a product-level basis, and products are categorized into the NAICS industry in which they are classified as primary, regardless of the industry in which they were produced.[3] NAICS-based MPIs are therefore designed to measure price changes only for primary products produced abroad and imported by a given industry or industry group.

Among industries in which secondary production or miscellaneous receipts make up a large share of domestic production, comparisons between PPIs and MPIs may be less valid. By definition, products included in the secondary product and miscellaneous receipts categories of a PPI are not comparable to those included in an MPI, which only includes primary products.

Relative importance of industries within industry groups

Within the NAICS structure, the broadest level of aggregation is the 2-digit sector level. Progressively narrower groupings of industries are represented by increasingly longer codes. Six-digit codes are used to identify individual industries, while 2- through 5-digit codes are used to identify industry groups. NAICS-based import indexes are published at 5-digit and higher levels of aggregation. NAICS-based PPIs are published for 6-digit industries and higher levels of aggregation. Consequently, comparisons between MPIs and PPIs can only be made at levels of

aggregation above the 6-digit industry level. Most 2-, 3-, 4-, and 5-digit NAICS within mining and manufacturing have PPI and MPI counterparts.

When comparing PPIs and MPIs for higher-level NAICS categories, an important point to consider is the relative importance of industries included in the NAICS category.[4] A relative importance shows the percentage an industry constitutes of the overall aggregate NAICS category at a specific point in time. Within an aggregate NAICS index composed of industries 1 through *n*, an industry's relative importance for month *c* is calculated using the following formula:

$$RI_{i,c,a} = [(I_{i,c,a} / I_{i,b,a} * W_{i,b,a}) / (\sum_{i=1}^{n} I_{i,c,a} / I_{i,b,a} * W_{i,b,a})] * 100,$$

where

$RI_{i,c,a}$ is the relative importance of industry *i* in period *c* to aggregate index *a*,

$I_{i,c,a}$ is the index value for industry *i* in period *c* included in aggregate index *a*,

$I_{i,b,a}$ is the index value for industry *i* in the base period *b* included in aggregate index *a*, and

$W_{i,b,a}$ is the weight for industry *i* in the base period *b* within aggregate index *a*.[5]

As the formula shows, relative-importance values are affected by both weights and index changes. Accordingly, if a component index increases at a faster rate than other component indexes from the base period to the current period, that component's relative importance will increase relative to the other components.

Comparing PPIs and MPIs for aggregate NAICS categories tends to be problematic if the relative-importance values of industries within the NAICS category are substantially different for the PPI and the MPI. In such instances, the compositions of the indexes themselves likely differ, causing some users to deem the indexes incomparable.

Net-output weights

In compiling price indexes for 6-digit NAICS industries as well as for aggregate industry groups, the PPI program uses net weights. Net weights exclude the value of transactions for products produced and sold within an industry or industry group. Net weights are constructed by multiplying gross weights (which include intra-industry transactions) by net-output ratios. A net-output ratio measures the proportion of the value of a product an industry or industry group does not consume and is calculated using the following formula:

$$NOR_{c,i} = 1 - (Use_{c,i} / \sum_{i=1}^{n} Use_{c,i}),$$

where

$NOR_{c,i}$ is the net-output ratio for commodity *c* produced by industry or industry group *i* ,

$Use_{c,i}$ refers to the use of commodity *c* by industry or industry group *i*, and

$\sum_{i=1}^{n} Use_{c,i}$ is the total use of commodity *c* by all 1-through-*n* industries.

The purpose of net weighting is to eliminate multiple counting of price changes from PPIs. In industry-based output price indexes, multiple counting occurs when a price index contains prices for industry net output as well as prices for inputs used to produce the output. In such cases, a change in the input price could potentially be counted twice in the index: first as a change in the price of the input commodity and second as a change in the price of the output commodity (resulting from the change in the input price).[6]

In contrast to PPIs, MPIs do not use net weights. With MPIs, multiple counting is not a concern because all output is sold by foreign firms to domestic buyers. Thus all items are, in effect, net outputs. For this reason, it is not necessary to construct MPIs using net weights, and there is no multiple counting in the gross-weighted indexes.

Because net weights are used to construct PPIs but not MPIs, PPIs and MPIs could differ even in cases in which the composition of the two indexes is very similar on a gross-weighted basis. In instances in which PPI net weighting leads to substantial differences between PPI and MPI weights, comparisons of price movements between PPIs and MPIs could be problematic because the composition of indexes is different.

Within 6-digit NAICS product mix

In some instances, higher level PPIs and MPIs appear comparable because of the PPI's percent primary production, industry relative-importance values, and the net-output ratios employed by PPI. Nonetheless, they still may be incomparable because of differences in the mix of products included in the PPI versus MPI lower level 6-digit industry indexes.[7] For example, both the PPI and MPI for NAICS 334111 measure price changes for the output of computer equipment manufacturing. However, the products included in the PPI and MPI could differ substantially if the output produced domestically by NAICS 334111 differs from that imported by the same industry. The PPI might, for example, consist mostly of laptop computers, whereas the MPI may include tablets and notebook computers in addition to laptops. Unfortunately, because the publication of the items that compose the PPI and MPI is restricted to protect the confidentiality of surveyed companies, determining industry product composition for these indexes is difficult. Usually, data users will need to rely on sources outside BLS (if any can be found) to find additional information about domestic versus imported industry product mixes.[8]

Summary

This section described four potential differences that affect comparisons of PPIs and MPIs for NAICS categories. Often, these differences can be attributed to production patterns of domestic producers versus producers of U.S. imports, or are the result of trade patterns. For example, different relative levels of domestic and foreign production by industries within an aggregate NAICS category could cause PPI and MPI industry relative-importance values to differ for that NAICS category. Regarding trade patterns, foreign and domestic firms within an industry may produce a similar set of products, but the foreign firms may only export a subset of these products to the United States, causing the compositions of the PPI and MPI for the industry to differ. In other cases, such as the percent primary versus secondary and miscellaneous production, differences between PPI and MPI data result from methodological differences between the two indexes. Regardless of the cause, in instances in which differences between PPIs and MPIs are relatively large, comparisons of domestic to imported price trends become less reliable.

A new table for comparing PPI industry net-output price indexes to MPIs

In March 2018, BLS began publishing a table of information that can be used to help determine the comparability of PPIs and MPIs for 4- and 5-digit NAICS categories. (The table also includes information about 6-digit NAICS industries because they are the building blocks for 4- and 5-digit NAICS-based PPIs and MPIs and can therefore be used to understand the composition of these higher level NAICS indexes). This table is available at https://www.bls.gov/ppi/comparability-of-ppi-and-mpi.htm and will be updated periodically. The table assists data users in determining comparability between PPIs and MPIs by providing data on three of the four areas of potential differences addressed above. An excerpt of the table is shown below.

The first column provides the title of the industry or industry group included in the table. The second column specifies NAICS industry codes for the data. In column two, 4- and 5-digit industry groups are followed by a set of one or more 6-digit industries. The set of industries directly following an industry group shows those included in the group. The third and fourth columns provide the relative-importance values of industries to the 4- or 5-digit MPI and PPI industry groups, respectively. For example, table 1 shows that in December 2016, soft drink manufacturing accounted for 11.59 percent of the MPI for beverage manufacturing and 48.13 percent of the PPI for beverage manufacturing. The fifth column provides the net-output ratios the PPI program applies to each industry's weight when constructing 4- or 5-digit PPI industry group indexes. The PPI relative-importance values included in this table are based on net weights. Net-output ratios are therefore reflected in the PPI relative-importance values. The main use of net-output ratios in this table is to help determine whether net weighting is the cause of differences between the PPI and MPI relative-importance values or whether differences are due to other causes. For example, the table shows that NAICS 327212 (other pressed and blown glass and glassware manufacturing) makes up a relatively larger share of NAICS 3272 (glass and glass product manufacturing) in the MPI than the PPI. The PPI applies a net-output ratio of 0.926 to all industries included in glass and glass product manufacturing. The difference in PPI versus MPI industry relative-importance values for NAICS 3272 is consequently not the result of PPI net-output ratios and must be due to other factors. The final column provides the percentage of primary production for each 4- and 5-digit NAICS-based PPI. For example, 81.94 percent of the PPI for NAICS 3341 is primary production. The remaining 18.06 percent of the index consists of secondary or miscellaneous production and, as discussed earlier, consists of products that are not comparable with those in the corresponding MPI category.

Table 1. Producer Price Index and Import Price Index comparability statistics, December 2016

Industry	NAICS code	Import Price Index relative importance	Producer Price Index		
			Relative importance	Net-output ratio	Percent primary
Beverage manufacturing	**3121**	100.00	100.00	—	94.52
Soft drink manufacturing	**312111**	11.59	48.13	0.9763	—
Bottled water manufacturing	**312112**	1.30	3.83	0.9763	—
Ice manufacturing	**312113**	0.60	0.97	0.9763	—
Breweries	**312120**	22.58	26.96	0.9976	—
Wineries	**312130**	33.47	12.79	0.9771	—
Distilleries	**312140**	30.47	7.32	0.9396	—
Glass and glass product manufacturing	**3272**	100.00	100.00	—	93.95

See footnotes at end of table.

Table 1. Producer Price Index and Import Price Index comparability statistics, December 2016

Industry	NAICS code	Import Price Index relative importance	Producer Price Index		
			Relative importance	Net-output ratio	Percent primary
Flat glass manufacturing	**327211**	18.54	13.09	0.926	—
Other pressed and blown glass and glassware manufacturing	**327212**	33.44	17.12	0.926	—
Glass container manufacturing	**327213**	23.51	21.78	0.926	—
Glass product manufacturing made of purchased glass	**327215**	24.50	48.01	0.926	—
Millwork	**32191**	100.00	100.00	—	91.16
Wood window and door manufacturing	**321911**	27.62	53.24	0.9584	—
Cut stock, resawing lumber, and planing	**321912**	0.00	21.29	0.9584	—
Other millwork (including flooring)	**321918**	72.38	25.47	0.9584	—
Computer and peripheral equipment manufacturing	**3341**	100.00	100.00	—	81.94
Electronic computer manufacturing	**334111**	56.55	55.46	0.9739	—
Computer storage device manufacturing	**334112**	10.50	11.47	0.6527	—
Other electronic component manufacturing	**334118**	32.95	33.06	0.9463	—

Note: NAICS = North American Industry Classification System.

Source: U.S. Bureau of Labor Statistics.

Examples of PPI-to-MPI comparisons

This section provides three examples of how users might use the new information in the comparability statistics table when making potential comparisons between PPI and MPI NAICS-based data. Although the new table is intended to provide users with information that facilitates analysis of PPI and MPI comparisons, determining the level of comparability necessary to make valid comparisons is subjective and remains the responsibility of the user. The examples provide some suggestions for users who are considering making comparisons between two sets of indexes that have different measurement objectives.

Semiconductors and other electronic equipment manufacturing (NAICS 3344)

The NAICS 3344 industry group includes establishments primarily engaged in manufacturing semiconductors and other components for electronic applications. The group contains the following six industries:

- NAICS 334412 — bare printed circuit board manufacturing;
- NAICS 334413 — semiconductor and related device manufacturing;
- NAICS 334416 — capacitor, resistor, coil, transformer, and other inductor manufacturing;

- NAICS 334417 — electronic connector manufacturing;
- NAICS 334418 — printed circuit assembly, electronic assembly, manufacturing; and
- NAICS 334419 — other electronic component manufacturing.

For analysis purposes, table 2 is an excerpt for NAICS 3344 from the overall PPI–IPP comparison table.

A comparison of December 2016 6-digit PPI and MPI industry relative-importance values for NAICS 3344 implies that, on an industry-by-industry basis, the components of the PPI and MPI are fairly similar. For both the PPI and MPI, the semiconductor and related device manufacturing industry accounts for the largest share of the overall industry group. The share is larger for the MPI than PPI, with semiconductor and related device manufacturing accounting for approximately 59 percent of the MPI and 48 percent of the PPI. For both the PPI and MPI, the printed circuit assembly manufacturing industry makes up the second largest share of the overall category, accounting for about 21 percent of the MPI and 23 percent of the PPI. The industry for other electronic component manufacturing composes about 12 percent of the PPI and 6 percent of the MPI, and for both is the third largest industry included in the overall category. An analysis of relative-importance values shows that the industry composition of the PPI and MPI for NAICS 3344 is similar enough not to disqualify comparisons of the PPI and MPI. However, keeping relative-importance differences in mind is still important when comparing PPI data with MPI data for NAICS 3344.

Users may also want to consider how PPI net-output ratios affected the relative-importance values. The net-output ratios PPI applies to individual industry weights when compiling the net-output price index for NAICS 3344 are all similar, ranging from 0.8731 to 0.9290. Such differences in PPI industry net-output ratios are too small to contribute to any of the larger differences in relative-importance values between the PPI and MPI. Instead, relative-importance differences must be the result of differing production or trade patterns and price movements between foreign versus domestic producers within NAICS 3344.

Finally, table 2 shows that primary production accounts for approximately 91 percent of the PPI for NAICS 3344, implying that secondary and miscellaneous production together account for around 9 percent of the overall index. Therefore, a reasonable conclusion is that a secondary and miscellaneous production level of 9 percent is not high enough to deem the PPI and MPI incomparable.

Table 2. Producer Price Index–Import Price Index comparability statistics for semiconductor and other electronic equipment manufacturing, December 2016

Industry	NAICS code	Import Price Index relative importance	Producer Price Index		
			Relative importance	Net-output ratio	Percent primary
Semiconductor and other electronic component manufacturing	**3344**	100.00	100.00	—	90.65
Bare printed circuit board manufacturing	**334412**	3.04	7.93	0.8731	—
Semiconductor and related device manufacturing	**334413**	58.56	47.76	0.9290	—

See footnotes at end of table.

Table 2. Producer Price Index–Import Price Index comparability statistics for semiconductor and other electronic equipment manufacturing, December 2016

Industry	NAICS code	Import Price Index relative importance	Producer Price Index		
			Relative importance	Net-output ratio	Percent primary
Capacitor, resistor, coil, transformer, and other inductor manufacturing	**334416**[(1)]	6.39	3.69	0.8731	—
Electronic connector manufacturing	**334417**	5.17	5.18	0.8731	—
Printed circuit assembly (electronic assembly) manufacturing	**334418**	20.75	23.30	0.8774	—
Other electronic component manufacturing	**334419**	6.08	12.14	0.8731	—

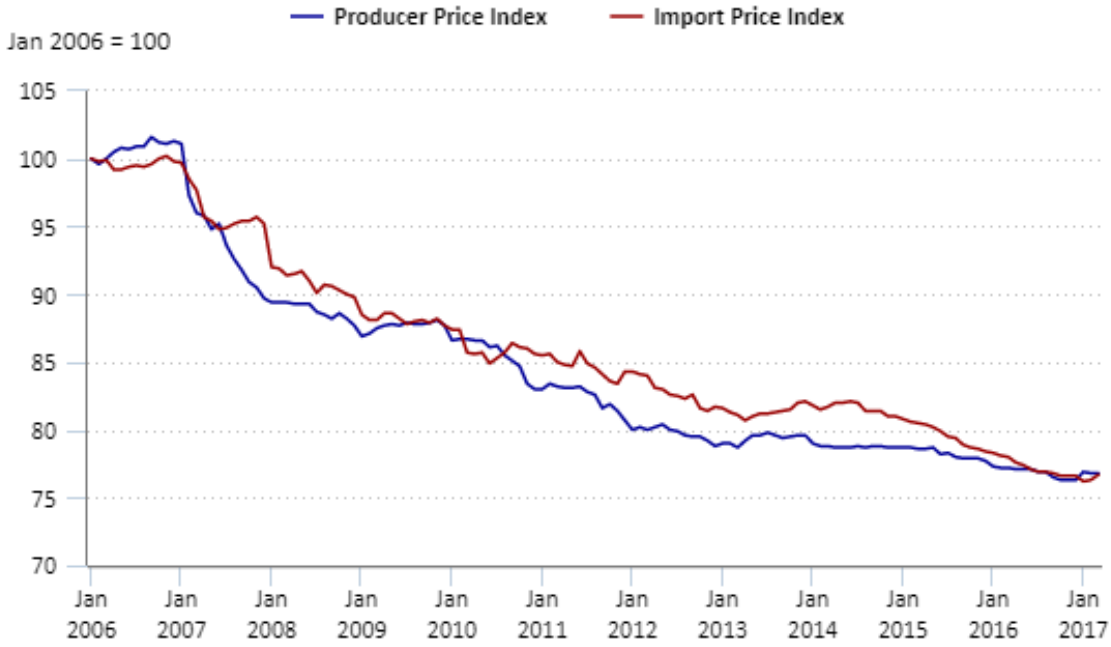
Note: NAICS = North American Industry Classification System.

(1) For this industry, the Producer Price Index (PPI) coding differs from NAICS. The PPI code for this index is 33441K.

Source: U.S. Bureau of Labor Statistics.

Figure 1 presents the PPI and MPI for NAICS 3344 (semiconductor and other electronic component manufacturing) from January 2006 through March 2017. Over that period, prices received by domestic producers of semiconductor and other electronic components fell 23.2 percent, and prices for imports decreased 23.3 percent. It is important to note that the data cannot show whether the absolute price level of imported semiconductors and other electronic components is lower or higher than those produced domestically. When data users compare PPIs and MPIs, no inferences can be made about differences or similarities in absolute price levels of domestically produced versus foreign-produced products. PPIs and MPIs can only be used to assess relative price trends in domestic versus foreign goods. Despite that limitation, analysis of PPI and MPI data does reveal that price trends of foreign and domestic producers within NAICS 3344 (semiconductors and other electronic components) have been similar over the last 12 years.

Figure 1. Producer Price Index and Import Price Index for semiconductor and other electronic component manufacturing (NAICS 3344), January 2006–March 2017



Click legend items to change data display. Hover over chart to view data.
Source: U.S. Bureau of Labor Statistics.

Communications equipment manufacturing (NAICS 3342)

The NAICS 3342 industry group consists of establishments primarily engaged in manufacturing wired telephone and data communications equipment, radio and television broadcast and wireless communications equipment, and all other communications equipment. NAICS 3342 includes these three 6-digit industries:

- NAICS 334210 — telephone apparatus manufacturing,
- NAICS 334220 — radio and TV broadcast and wireless equipment manufacturing, and
- NAICS 334290 — other communications equipment manufacturing.

Table 3 is an excerpt of the NAICS 3342 portion of the overall PPI–IPP comparison table.

Table 3. Producer Price Index–Import Price Index comparability statistics for communication equipment manufacturing, December 2016

Industry	NAICS code	Import Price Index relative importance	Producer Price Index		
			Relative importance	Net-output ratio	Percent primary
Communications equipment manufacturing	**3342**	100.00	100.00	—	85.01

See footnotes at end of table.

Table 3. Producer Price Index–Import Price Index comparability statistics for communication equipment manufacturing, December 2016

Industry	NAICS code	Import Price Index relative importance	Producer Price Index		
			Relative importance	Net-output ratio	Percent primary
Telephone apparatus manufacturing	**334210**	1.90	29.77	0.9776	—
Radio and television broadcasting and wireless communications equipment manufacturing	**334220**	96.37	61.49	0.9174	—
Other communications equipment manufacturing	**334290**	1.73	8.75	0.9923	—

Note: NAICS = North American Industry Classification System.

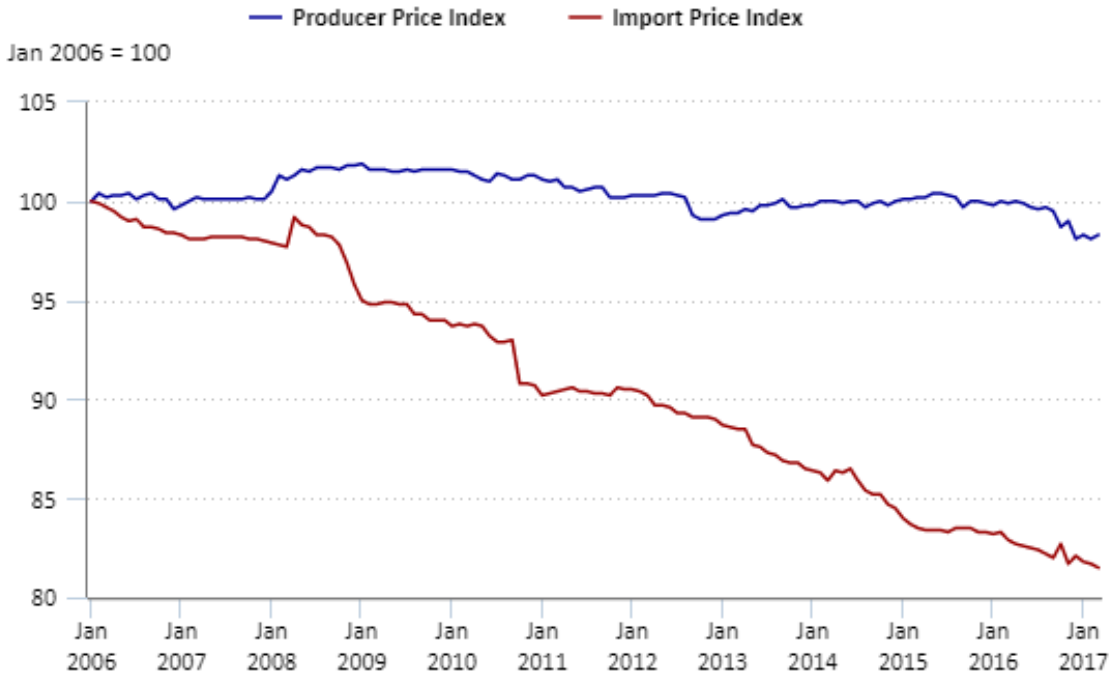
Source: U.S. Bureau of Labor Statistics.

Relative-importance values of the 6-digit industries included in the PPI and MPI for NAICS 3342 suggest significant compositional differences between the PPI and MPI for communications equipment manufacturing. The MPI is made up almost entirely of the industry for radio and TV broadcast and wireless equipment manufacturing. The industry for radio and TV broadcast and wireless equipment manufacturing also makes up a large share of the PPI; however, the more-than-61-percent share is substantially lower than that of the MPI. The industry for telephone apparatus manufacturing accounts for about 30 percent of the PPI but only less than 2 percent of the MPI. Finally, the industry for other communications equipment manufacturing makes up close to 9 percent of the PPI but less than 2 percent of the MPI. Analysis of industry relative-importance values for NAICS 3344 suggests that compositional differences between the two series likely make comparisons between the indexes problematic.

Looking at table 3, we see that primary production accounts for about 85 percent of the PPI for NAICS 3342, and the remaining 15 percent is secondary production and miscellaneous receipts. The relatively high level of secondary and miscellaneous production within the PPI indicates that comparing domestic versus imported price trends for communication equipment may not be possible with PPI and MPI data. Further complicating the comparison is that the products manufactured by the industry for radio and TV broadcast and wireless equipment likely differ between domestic producers and foreign importers. Products manufactured by this industry include transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment. The items included in the MPI for radio and TV broadcast and wireless equipment manufacturing (which accounts for almost all of the MPI for NAICS 3342) likely differ substantially from those included in the PPI for the same industry because the United States is a heavy importer but not producer of cell phones.

Figure 2 shows the PPI and MPI for communications equipment manufacturing from January 2006 to March 2017. Over the period, the PPI and MPI showed substantially different movements, with the PPI edging down 1.7 percent and the MPI dropping 18.5 percent. However, on the basis of the earlier analysis, conclusions about similarities or differences in domestic versus imported communications equipment price trends using PPI and MPI data are problematic because the indexes are not comparable in composition.[9]

Figure 2. Producer Price Index and Import Price Index for communications equipment manufacturing (NAICS 3342), January 2006–March 2017



Click legend items to change data display. Hover over chart to view data.
Source: U.S. Bureau of Labor Statistics.

Basic chemical manufacturing (NAICS 3251)

Establishments in industry group NAICS 3251 primarily manufacture basic chemicals. The grouping includes the following seven industries:

- NAICS 325110 — petrochemical manufacturing,
- NAICS 325120 — industrial gas manufacturing,
- NAICS 325130 — synthetic organic dye and pigment manufacturing,
- NAICS 325180 — other basic inorganic chemical manufacturing,
- NAICS 325193 — ethyl alcohol manufacturing,
- NAICS 325194 — gum and wood chemical manufacturing, and
- NAICS 325199 — all other basic organic chemical manufacturing.

Table 4 is an excerpt from the PPI–IPP comparison table describing NAICS 3251.

Table 4. Producer Price Index–Import Price Index comparability statistics for basic chemical manufacturing, December 2016

Industry	NAICS code	Import Price Index relative importance	Producer Price Index		
			Relative importance	Net-output ratio	Percent primary
Basic chemical manufacturing	**3251**	100.00	100.00	—	78.84
Petrochemical manufacturing	**325110**	3.73	14.38	0.4874	—
Industrial gas manufacturing	**325120**	0.37	5.62	0.8926	—
Synthetic organic dye and pigment manufacturing	**325130**	5.22	3.69	0.9605	—
Other basic inorganic chemical manufacturing	**325180**	22.48	22.22	0.8969	—
Ethyl alcohol manufacturing	**325193**	1.03	5.95	0.8263	—
Gum and wood chemical manufacturing	**325194**	7.49	3.61	0.8263	—
All other basic organic chemical manufacturing	**325199**	59.69	44.53	0.8263	—

Note: NAICS = North American Industry Classification System.

Source: U.S. Bureau of Labor Statistics.

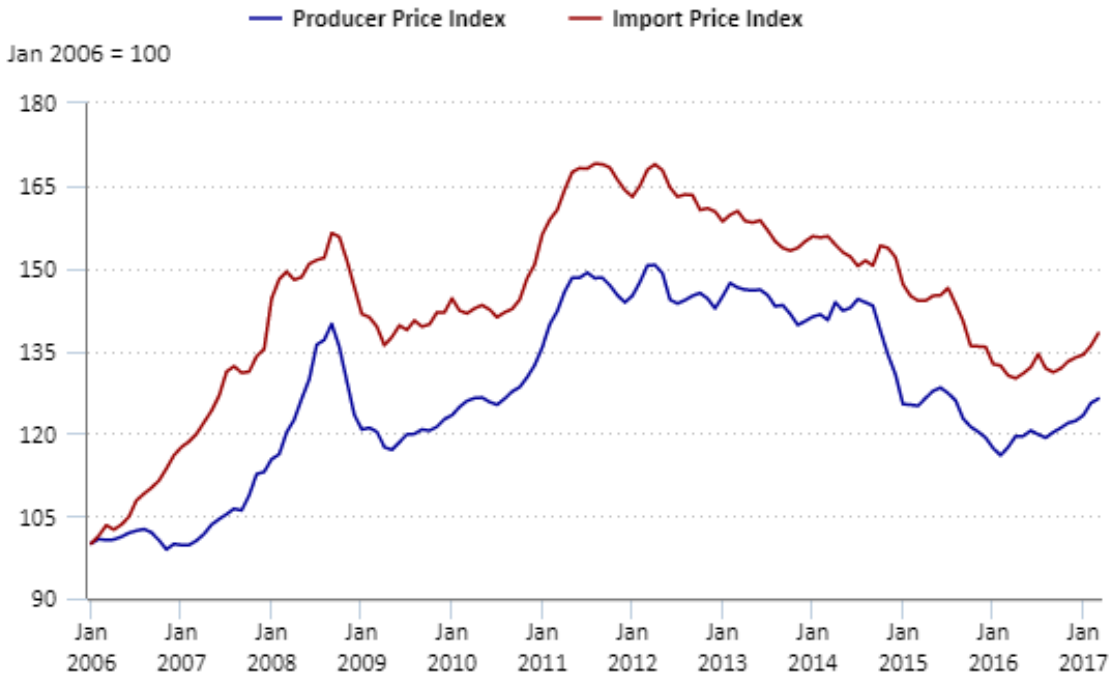
An analysis of the relative-importance values of basic chemical manufacturing industries suggests that, although the PPI and MPI have similarities, there are some differences between the indexes. For both the PPI and MPI, the industry for all other basic organic chemical manufacturing is the most important component. All other basic organic chemical manufacturing accounts for about 60 percent of the MPI and 45 percent of the PPI. The second largest component in both, accounting for roughly 22 percent of the MPI and PPI, is other basic inorganic chemical manufacturing. The industry for petrochemical manufacturing is the third largest component for PPI, accounting for about 14 percent of the overall grouping with a net-output ratio of 0.4874 but only accounts for around 4 percent of the MPI for basic chemical manufacturing. Within the MPI, the third most important component is gum and wood chemical manufacturing. When we take relative-importance values into account, we find that the comparability of the PPI and MPI for basic chemical manufacturing is ambiguous.

Additional differences, however, should be considered when users compare the data. The PPI for basic chemical manufacturing is made up of about 79 percent primary production and 21 percent secondary production and miscellaneous receipts. Consequently, about 21 percent of the PPI and MPI composition necessarily differ, which further reduces the comparability of the PPI and MPI for NAICS 3251.

Overall, the comparability of the PPI and MPI for basic chemical manufacturing is unclear. There are differences based on relative-importance values as well as the percentage of secondary products and miscellaneous receipts included in the PPI. However, despite these differences, most of the industries in NAICS 3251 produce products that largely come from fuel feedstocks. Therefore, there is a reasonable expectation that the indexes should have similar trends.

Looking at figure 3, we see that the PPI for basic chemicals rose 26.3 percent from January 2006 to March 2017. During the same period, prices for imports rose 38.2 percent. Despite the overall higher rate of increase in the MPI, the PPI and MPI trends were similar over most of the sample period. The main exception was from 2006 through early 2007, when the MPI increased and the PPI showed little change.

Figure 3. Producer Price Index and Import Price Index for basic chemical manufacturing (NAICS 3251), January 2006–March 2017



Click legend items to change data display. Hover over chart to view data.
Source: U.S. Bureau of Labor Statistics.

Conclusion

This article examined the potential of using PPI net-output indexes and MPIs to compare price trends in domestically produced and imported products. The article began by explaining four potential sources of differences between PPIs and MPIs that data users should consider before comparing domestic and imported price trends.

A new Producer Price Index–Import Price Index comparability statistics table providing data on three of the four areas of potential differences between PPI and MPI was also presented. The purpose of this table is to assist data users to make informed decisions regarding the comparability of PPI and MPI NAICS-based industry group price indexes. This table can be found at https://www.bls.gov/ppi/comparability-of-ppi-and-mpi.htm. Although the new tables and the examples within this article help to provide users with the information necessary to facilitate the analysis of PPI and MPI comparisons, determining the level of comparability necessary to make valid comparisons is subjective and the responsibility of the data user. Users should also keep in mind that even though many index comparisons match on the basis of relative importance values, NORs, and percent primary, differences in product mixes may still make comparisons problematic. Ultimately, all measures should be looked at in combination with

industry product composition as well as knowledge about general industry market conditions before final decisions on comparability are made.

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NOTES

1 NAICS uses a production-oriented conceptual framework to group establishments into industries on the basis of the primary activity in which they are engaged. Establishments using similar raw materials, capital equipment, and labor are classified in the same industry. Additional information can be found at https://www.bls.gov/bls/naics.htm.

2 Methodological information about PPI and MPI can be found at https://www.bls.gov/ppi/methodology.htm and https://www.bls.gov/mxp/methodology.htm, respectively.

3 The U.S. Customs and Census Bureau trade frame is the dollar value of all goods imported to the United States in a given year. The MPI sample is based on a 2-year lag of these data; for example, the 2018 trade frame contains data from 2016.

4 PPI calculates and publishes 6-digit industry indexes, whereas IPP calculates but does not publish 6-digit MPIs. Both programs, however, construct industry group indexes by aggregating industry level indexes.

5 MPI weights are based on Census value of imports data, while PPI weights are based on Census domestic value of shipments or revenue data. Information currently used to calculate weights throughout the PPI family of indexes is taken largely from the following censuses conducted by the Census Bureau of the U.S. Department of Commerce: (1) Census of Manufactures, (2) Census of Mineral Industries (which includes oil and gas production), (3) Census of Agriculture, and (4) Census of Service Industries. Other current sources of weighting include the Energy Information Administration of the U.S. Department of Energy and the National Marine Fisheries Service of the U.S. Department of Commerce. Weights are updated at approximately 5-year intervals. MPI weights are based on trade-value figures compiled by the Bureau of the Census for the base year.

6 The following hypothetical example is provided to further illustrate how PPI calculates net weights. The primary production of the car and light truck industries is cars and light trucks, respectively. Both of these industries, however, also produce automobile parts as secondary production. The total value of automobile parts produced across all industries is $100,000,000, with car and light truck manufacturers producing $1,000,000 and $500,000 of the total, respectively. Of the total $100,000,000 of automobile parts produced, car manufacturers consume $40,000,000 and light truck manufacturers consume $30,000,000. The net-output ratio for automobile parts for car manufacturers is calculated as follows:

$$NOR_{\text{auto parts,car mfg}} = 1 - (Use_{\text{auto parts,car mfg}} / \sum_{i=1}^{n} Use_{\text{auto parts},i})$$

$$= 1 - (\$40{,}000{,}000 / \$100{,}000{,}000)$$

$$= 0.6$$

This NOR calculation implies that car manufacturers consume 40 percent of automobile parts, and the remaining 60 percent are sold to industries other than car manufacturers. The net weight for car parts produced by car manufacturers is calculated by multiplying the gross weight by the NOR as follows: $\text{net weight}_{\text{auto parts,car mfg}} = 0.6 * \$1{,}000{,}000 = \$600{,}000$.

$$NOR_{\text{auto parts,truck mfg}} = 1 - (Use_{\text{auto parts,truck mfg}} / \sum_{i=1}^{n} Use_{\text{auto parts},i})$$

$$= 1 - (\$30{,}000{,}000 / \$100{,}000{,}000)$$

$$= 0.7$$

The above calculation shows that truck manufacturers consume 30 percent of automobile parts, and the remaining 70 percent are sold to industries other than truck manufacturers. The net weight for car parts produced by truck manufactures is then calculated by multiplying the gross weight by the NOR as follows: net $\text{weight}_{\text{auto parts, truck mfg}}$ = 0.7 * 500,000 = $350,000. The PPI constructs net-output price indexes through the use of data on detailed industry flows from input–output tables compiled by the Bureau of Economic Analysis (BEA) and from other detailed industry data. For additional BEA information, see https://www.bea.gov/industry/io_benchmark.htm.

7 See endnote 4.

8 Within its NAICS-based industry structure, PPI often publishes data to at least the 7-digit product level. Data users could examine this structure to help determine the domestic production of an industry. This type of data, however, is not available for MPIs.

9 Any user attempting to make such a comparison should at least note the significant limitations due to these differences in composition.

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