Summary of variance estimates for PPI price changes, 2016

Final Demand-Intermediate Demand System

Final demand: The 1-month median absolute percent change for the final demand index in 2016 was 0.20 percent, and the accompanying standard error (SE) was 0.11 percent. (See table A, and table 1 of the 2016 PPI variance data release.) Two standard error values, plus and minus, provide a 95-percent confidence interval with regard to the true change in a reference statistic. Subtracting two SE values from the 1-month median absolute percent change for the final demand index in 2016 results in a range that includes zero, signifying marginally less than 95-percent confidence with regard to the direction of price movement. The *relative standard error* (RSE) values for the major components of the final demand index varied in 2016.[1] The confidence interval for the goods component of final demand, relatively speaking, was somewhat narrower than the services and construction components, based on calculations of RSE. The 12-month data for the final demand index in 2016 indicates that the median absolute percent change was 0.14 percent, and that the SE was 0.33 percent. (For eight months in 2016, the 12-month rate of change in the PPI for final demand ranged from -0.2 percent to 0.2 percent.) Based on RSE measures for 12-month estimates, the 95-percent confidence interval again was narrower for the final demand goods index than it was for the services and construction indexes; however, each component posted a substantially smaller RSE for its 12-month estimate, compared to its 1-month result.

Intermediate demand by commodity type: The 1-month median absolute percent change in the index for processed goods for intermediate demand was 0.40 percent in 2016, and the SE value was 0.13 percent. On a 12-month basis, the corresponding values were 3.86 percent and 0.30 percent. Comparing RSE values for the 1- and 12-month calculations within processed goods for intermediate demand, estimates for the food, energy, and core components paralleled those for the aggregate index. The index for unprocessed goods for intermediate demand provided similar results. While the reference statistics and SE values were generally larger in absolute terms, compared with the index for processed goods for intermediate demand, the RSE estimates were slightly smaller. Within the services for intermediate demand category, results aligned with those for final demand services. In general, 12-month SE values revealed narrower confidence intervals, on an RSE basis, than did the 1-month values. In addition, the component indexes for transportation and warehousing services and for services other than trade, transportation, and warehousing exhibited smaller RSE values than did the trade services component.

Intermediate demand by production flow: The production flow treatment of intermediate demand organizes business-to-business type transactions, excluding transactions relating to capital investment purchases, by production stage, as opposed to type of commodity. The same basket of transactions is used to calculate both treatments of intermediate demand, though weighting differences exist between the two treatments. In 2016, the SE values calculated for the production-flow system closely paralleled those calculated for the commodity-type system. First, the goods indexes posted relatively narrower 95-percent confidence intervals (i.e., smaller RSE values) than did the services and construction components of intermediate demand by production flow. Second, the relative accuracy of percent changes generally improved for 12-month changes compared to monthly price changes.[2]

PPI Commodity-Based Index Structure

The unique-to-PPI, commodity-based index structure comprises the detailed components used to construct the FD-ID aggregation system. Data users commonly use PPI commodity indexes to explain FD-ID index movements. Variance data are provided for 2-, 3-, 4-, and 6-digit commodity-based indexes. On a 1-month basis in 2016, about 20 percent of PPI commodity indexes for which SE values were available, 182 of 912, posted an RSE of under 50. (See table B, and table 2 of the 2016 PPI variance data release.) Just over 35 percent had an RSE between 50 and 100, while just under 45 percent had an RSE of 100 or more. On a 12-month basis, 616 of 1,503 PPI commodity indexes, just over 40 percent, posted an RSE of under 50. Roughly 30 percent of the indexes had an RSE between 50 and 100, and 30 percent had an RSE of 100 or more.[3]

NAICS-Based Index Structure

The basic unit for sampling and data collection in the PPI is the six-digit industry under the North American Industry Classification System (NAICS). For this structure, PPI variance data are available for selected industry sector indexes; 3-, 4-, and 5-digit industry group indexes; and for 6-digit industry indexes. (See table C, and table 3 of the 2016 PPI variance data release.)

Industry sector indexes: On a 1-month basis in 2016, 6 of 13 industry sector indexes had RSE values of under 50, 5 posted RSE values between 50 and 100, and 2 industry sector indexes had RSE values of 100 or more. On a 12-month basis, 9 of the 13 industry sector indexes had an RSE of under 50. The industry sector indexes with consistently narrow confidence intervals were the groupings for mining, manufacturing, transportation, and for delivery and warehousing industries.

3-, 4-, and 5-digit industry group indexes; and 6-digit industry indexes: On a 1-month basis in 2016, just under 15 percent of indexes, 88 of 682, had an RSE of under 50, roughly 40 percent had an RSE between 50 and 100, and just over 45 percent had an RSE of 100 or more. Reviewing these data by level of aggregation, 3- and 4-digit aggregate indexes generally had smaller RSE values, while 5- and 6-digit indexes mostly posted larger RSE estimates. On a 12-month basis, 428 of 1,034 PPI industry and industry group indexes, just over 40 percent, posted an RSE of under 50. Roughly 30 percent of indexes had an RSE between 50 and 100, or an RSE of 100 or more. Reviewing these data by level of aggregation, higher levels in general posted smaller RSE estimates.

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[1] This summary includes a discussion of Relative Standard Error (RSE). RSE is defined as the SE divided by the reference statistic, multiplied by 100. An RSE of less than 50 reflects an SE that is half as large as the reference statistic, suggesting a relatively narrow confidence interval and 95-percent confidence relative to no change. An RSE of 50 or more but less than 100 represents an intermediate level of confidence that does not provide 95-percent confidence relative to no change. An RSE of 100 or more generally identifies an index with a wide 95-percent confidence interval; however, if a reference statistic is close to zero, the usefulness of RSE as an analysis tool diminishes substantially.

[2] Stage 4 producers primarily produce final demand goods, services, and construction, stage 3 producers primarily produce output for stage 4, stage 2 producers primarily produce output for stage 3, and stage 1 producers generally produce output for stage 2. The stage-based indexes measure changes in prices paid by each stage for goods, services, and construction, excluding capital investment.

[3] For the 1- and 12-month RSE distributions discussed here and in the following section, indexes with median absolute percent changes of -0.1, 0.0, or 0.1 were excluded (other than the indexes for agricultural products, which are considered to reflect a census of information). As mentioned in note 1, when a reference statistic is close to zero, the usefulness of RSE as an analysis tool diminishes substantially.

Table A. Variance estimates for selected PPI Final Demand–Intermediate Demand indexes, 2016

Index	1-month median absolute percent change	1-month median standard error	12-month median absolute percent change	12-month median standard error	1-month relative standard error	12-month relative standard error
Final Demand						
Final demand	0.20	0.11	0.14	0.33	55.0	235.7
Final demand goods	0.46	0.10	2.09	0.19	21.7	9.1
Final demand foods	0.79	0.24	2.58	0.60	30.4	23.3
Final demand energy	2.56	0.47	11.21	0.72	18.4	6.4
Final demand goods less foods and energy	0.14	0.04	0.62	0.12	28.6	19.4
Final demand services	0.14	0.16	1.32	0.47	114.3	35.6
Final demand trade services	0.48	0.45	1.37	1.37	93.8	100.0
Final demand transportation and warehousing services	0.58	0.19	1.90	0.44	32.8	23.2
Final demand services, other	0.13	0.10	1.69	0.27	76.9	16.0
Final demand construction	0.05	0.06	0.92	0.21	120.0	22.8
Intermediate Demand (ID) by Commodity Type						
Processed goods for intermediate demand	0.40	0.13	3.86	0.30	32.5	7.8
Processed foods and feeds	0.82	0.28	4.53	0.59	34.1	13.0
Processed energy goods	1.64	0.52	11.81	1.18	31.7	10.0
Processed materials less foods and energy	0.23	0.09	1.77	0.20	39.1	11.3
Unprocessed goods for intermediate demand	2.15	0.21	11.79	0.40	9.8	3.4
Unprocessed foodstuffs and feedstuffs	3.18	0.00	10.55	0.00	0.0	0.0
Unprocessed energy materials	5.75	0.64	19.00	1.04	11.1	5.5
Unprocessed nonfood materials less energy	1.73	0.45	4.67	0.92	26.0	19.7
Services for intermediate demand	0.19	0.17	1.65	0.47	89.5	28.5
Trade services for intermediate demand	0.26	0.54	0.88	1.43	207.7	162.5
Transportation and warehousing services for ID	0.37	0.09	0.85	0.22	24.3	25.9
Services for ID, other	0.26	0.17	2.77	0.48	65.4	17.3
Construction for intermediate demand	0.09	0.11	1.49	0.43	122.2	28.9
Intermediate Demand (ID) by Production Flow						
Stage 4 intermediate demand	0.20	0.10	0.80	0.28	50.0	35.0
Total goods inputs to stage 4 intermediate demand	0.24	0.07	1.92	0.19	29.2	9.9
Total services inputs to stage 4 intermediate demand	0.19	0.18	1.29	0.49	94.7	38.0
Total construction inputs to stage 4 ID	0.09	0.11	1.49	0.43	122.2	28.9
Stage 3 intermediate demand	0.64	0.14	3.75	0.40	21.9	10.7
Total goods inputs to stage 3 intermediate demand	1.14	0.16	8.14	0.46	14.0	5.7
Total services inputs to stage 3 intermediate demand	0.23	0.21	1.43	0.52	91.3	36.4
Total construction inputs to stage 3 ID	0.09	0.11	1.49	0.43	122.2	28.9
Stage 2 intermediate demand	0.70	0.11	3.08	0.35	15.7	11.4
Total goods inputs to stage 2 intermediate demand	1.84	0.16	8.17	0.35	8.7	4.3
Total services inputs to stage 2 intermediate demand	0.25	0.17	2.51	0.51	68.0	20.3
Total construction inputs to stage 2 ID	0.09	0.11	1.49	0.43	122.2	28.9
Stage 1 intermediate demand	0.54	0.21	3.48	0.52	38.9	14.9
Total goods inputs to stage 1 intermediate demand	1.08	0.26	6.17	0.55	24.1	8.9
Total services inputs to stage 1 intermediate demand	0.37	0.27	0.45	0.73	73.0	162.2
Total construction inputs to stage 1 ID	0.09	0.11	1.49	0.43	122.2	28.9

Table B. Relative standard error (RSE) counts and percentages for selected PPI commodity-based indexes, 2016

1-month RSE counts and percentages			12-month RSE counts and percentages		
Category	Count	% total	Category	Count	% total
RSE < 50	182	20.0	RSE < 50	616	41.0
50 ≤ RSE < 100	334	36.6	50 ≤ RSE < 100	447	29.7
RSE ≥ 100	396	43.4	RSE ≥ 100	440	29.3
Total	912	100.0	Total	1,503	100.0

Note: Indexes with median absolute percent changes of -0.1, 0.0, or 0.1 percent were excluded from these counts. When the reference statistic is close to zero, the usefulness of RSE as an analysis tool diminishes substantially. These counts are based on values in table 2 of the 2016 PPI variance estimate release.

Table C. Relative standard error (RSE) counts and percentages for selected PPI industry-based indexes, 2016

1-month RSE counts and percentages			12-month RSE counts and percentages		
Category	Count	% total	Category	Count	% total
3-digit industry group			**3-digit industry group**		
RSE < 50	8	19.5	RSE < 50	27	50.9
50 ≤ RSE < 100	18	43.9	50 ≤ RSE < 100	15	28.3
RSE ≥ 100	15	36.6	RSE ≥ 100	11	20.8
Total	41	100.0	Total	53	100.0
4-digit industry group			**4-digit industry group**		
RSE < 50	16	14.7	RSE < 50	79	50.3
50 ≤ RSE < 100	56	51.4	50 ≤ RSE < 100	39	24.8
RSE ≥ 100	37	33.9	RSE ≥ 100	39	24.8
Total	109	100.0	Total	157	100.0
5-digit industry group			**5-digit industry group**		
RSE < 50	24	11.8	RSE < 50	128	42.4
50 ≤ RSE < 100	87	42.6	50 ≤ RSE < 100	91	30.1
RSE ≥ 100	93	45.6	RSE ≥ 100	83	27.5
Total	204	100.0	Total	302	100.0
6-digit industry			**6-digit industry**		
RSE < 50	40	12.2	RSE < 50	194	37.2
50 ≤ RSE < 100	117	35.7	50 ≤ RSE < 100	157	30.1
RSE ≥ 100	171	52.1	RSE ≥ 100	171	32.8
Total	328	100.0	Total	522	100.0
All categories			**All categories**		
RSE < 50	88	12.9	RSE < 50	428	41.4
50 ≤ RSE < 100	278	40.8	50 ≤ RSE < 100	302	29.2
RSE ≥ 100	316	46.3	RSE ≥ 100	304	29.4
Total	682	100.0	Total	1,034	100.0

Note: Indexes with median absolute percent changes of -0.1, 0.0, or 0.1 percent were excluded from these counts. When the reference statistic is close to zero, the usefulness of RSE as an analysis tool diminishes substantially. These counts are based on values in table 3 of the 2016 PPI variance estimate release.

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