



## The effects of tariff rates on the U.S. economy: what the Producer Price Index tells us

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A tariff is a tax levied on an imported good with the intent to limit the volume of foreign imports, protect domestic employment, reduce competition among domestic industries, and increase government revenue. To understand the impact tariffs may have on domestically manufactured goods, this article uses the Producer Price Index (PPI) to examine price change before and after tariffs are levied. To expand the analysis, the article looks at additional variables such as changes in employment in targeted industries and changes in the number of imported goods.

The U.S. steel tariffs of 2002 and the U.S. tire tariffs of 2009 provide helpful examples of tariff policy implemented to aid struggling U.S. industries.

The imposition of tariffs has long intended to aid American industry extending back for more than 300 years, with mixed results. The Tariff Act of 1789 was the first tariff levied by the U.S. government in an effort to pay off debts incurred during the Revolutionary War. Because there was no income tax at that time, taxing imports was the main way the new government could generate revenue. Additionally, there was a belief that U.S. manufacturing should be a larger part of the economy. The United States government felt that if they taxed textiles and iron from overseas, it would give U.S.-made textiles and iron products a price advantage over their foreign competitors.<sup>1</sup>

This **Beyond the Numbers** article uses data from the Producer Price Index Program, along with additional information, such as changes in employment in targeted industries and changes in the quantity of imported goods, to better understand the impact tariffs may have on markets for domestically manufactured goods.

The PPI measures the average change in price that domestic producers receive for the sale of their products. Tariffs are explicitly excluded from the PPI because they are considered a tax. Domestic producers do not retain tariffs, but rather, collect them on behalf of the U.S. Customs and Border Protection agency.<sup>2</sup> Although tariffs are not included in the PPI, they can indirectly affect the prices measured by the program. Domestic producers will often adjust pricing decisions in reaction to price changes of imported goods, which are affected by new or revised tariff rates. For example, if a tariff is imposed on a good imported into the United States, a domestic producer of the same good may decide that they can increase prices to maximize revenue while remaining competitive in the market. The domestic producer's price increase would be reflected in the PPI as it directly affects the revenue received by the producing company. However, if a foreign country levied a tariff on certain U.S. exports, this could result in a decline in the number of exports consumed by the foreign country, as they would become more expensive. A decrease in export demand would likely result in additional domestic supplies being available, which could ultimately lead to lower prices of domestic goods.

Moreover, if a country imposes tariffs or quotas on imports and a foreign country retaliates with their own tariffs on the other country's imported goods, this could lead to heightened trade tensions. If trade tensions escalate, it could further reduce international trade, resulting in what is commonly referred to as a "trade war." As mentioned in the paragraph above, the implications of a trade war are difficult to assess. There can be both advantages and disadvantages to trade wars. First, a trade war may help facilitate growth of domestic industries. Secondly, it can help shield domestic industries against unfair competition abroad. Lastly, a trade war can also help lower a nation's trade deficit. Trade deficits occur when the value of imports to a country outweigh the value of its exports. However, if a trade war escalates, it could tarnish the relationship between the two countries. In addition, a trade war could lead to a rise in prices for consumers, because of fewer choices for a particular good.<sup>3</sup>

To understand the impact tariffs may have on domestically manufactured goods, we look at variables in addition to the PPI, such as changes in employment in targeted industries and changes in the quantity of imported goods. The U.S. steel tariffs of 2002 and the U.S. tire tariffs of 2009 provide helpful examples for which a global free-trade environment was viewed as an impediment to struggling industries. Conversely, we refer to the PPI for various agricultural products such as soybeans, pork, and fruits to examine the impact of tariffs on U.S. exports in 2018. Many of these agricultural products exhibited price declines due to tariffs, which also led to increases in domestic

inventories. However, while inventories rose above anticipated levels, one should keep in mind that inventories also are affected by other factors, such as the commodity's production cycle.

## U.S. steel tariffs of 2002

In March 2002, the United States attempted to protect the domestic steel industry from foreign dumping by placing new tariffs on certain imported steel products.<sup>4</sup> The steel tariffs ranged from 8 percent to 30 percent on certain steel imports from all countries except Canada, Israel, Jordan, and Mexico.

To analyze the tariff effect on steel prices in 2002, we look at the PPI for [hot rolled steel sheet](#). For the 3-month period ending in March 2002, the PPI for hot rolled steel sheet increased 2.9 percent. Prices continued to advance through the second quarter at a rate of 5.1 percent. In the third quarter of 2002, the increase in the PPI for hot rolled steel sheet accelerated an additional 9.0 percent, totaling 17.9 percent for the first 9 months of 2002.

Hot-rolled steel sheet is only one type of steel, and many factors besides tariffs affect domestic steel prices; therefore, we should also examine the PPI for steel as a whole. For the 3-month period ending in March 2002, when the tariffs were initially levied, the PPI for [steel mill products](#) increased a modest 0.5 percent. Prices advanced at a higher rate in the second quarter of 2002, jumping 4.9 percent. In the third quarter of 2002, the index for steel mill products climbed 5.0 percent. However, analyzing the PPI for steel as a whole masks certain important distinctions between different steel products. Finished steel products pass through a variety of manufacturing stages, which distribute the varied effects of tariffs throughout the array of manufacturers within the economy. These manufacturers include producers of fabricated metals, machinery and equipment, transportation equipment and parts, chemical manufacturers, petroleum refiners, tire manufacturers, and nonresidential construction firms.

The vast majority, 98 percent of these producers that used steel inputs in their production processes, were small businesses employing fewer than 500 workers.<sup>5</sup> The economic implications for small firms meant that they were "price takers," meaning these firms were too small to have the market power to influence prices, and instead, had to accept the higher input costs related to the steel tariffs.

Downstream industries, which rely heavily on steel products as inputs, were affected by higher input prices. For example, within the construction sector, purchase prices for hot rolled steel bars, plates, and structural shapes increased as a result of tariffs. In the second quarter of 2002, after tariffs went into effect, the PPI for [hot rolled steel bars, plates, and structural shapes](#) climbed 2.9 percent. Price increases continued throughout much of the remainder of 2002, perhaps reflecting U.S. producers of structural steel adjusting their prices in response to tariffs.

Also within the manufacturing sector, domestic producers of fabricated structural metal products were affected by the steel tariffs. Fabricated structural metal products include a wide array of finished and semi-finished products composed of steel, such as steel plate, sheet metal products, storage and pressure tanks, and other fabricated metal products used in industrial buildings. In the second quarter of 2002, the PPI for [fabricated structural metal products](#) climbed 0.8 percent. In the third quarter, prices advanced an additional 0.6 percent. Although the rise in prices for fabricated structural metal products may seem modest, this index captures a wide variety of products that may be moved by other market forces that affect producer pricing, such as competition among producers and the leeway producers have to increase their prices despite a rise in their material costs.

Also during this period, producers of automobiles faced intense competition from domestic as well as foreign automakers. As automobile consumers became accustomed to zero-percent financing, cash-back discounts, and other incentives, producers of automobiles became price-takers in the retail marketplace, reducing prices. In fact, producers in the motor vehicles and equipment sector lost a total of \$36.1 billion from the fourth quarter of 2001 through the third quarter of 2002.<sup>6</sup>

## U.S. tire tariffs of 2009

In September 2009, the United States increased tariffs on new passenger car and light truck tires imported from China. From their normal tariff rate of 4 percent, Chinese tires were subjected to an additional 35-percent ad valorem tariff duty (a tax imposed on the basis of the monetary value of the taxed item) in the first year, 30 percent ad valorem tariff in the second year, and 25 percent ad valorem tariff in the third year.<sup>7</sup>

## Foreign tire producers

Following the tariff increase, U.S. tire imports from China fell from approximately 13 million tires in the third quarter of 2009 to 5.6 million tires during the fourth quarter of 2009, a 67-percent decrease. Although U.S. imports of Chinese tires fell following the tariff increase, total tire imports rose, reflecting the substitution of a greater number of imports from other countries. Other foreign producers, primarily located in Asia and Mexico, benefitted by gaining more access to the U.S. market. Prior to the tariffs, market share of car tire imports from China was 30 percent in the second quarter of 2009. Following the imposition of tariffs, the market share of car tire imports from China dropped to approximately 14 percent by the end of the fourth quarter of 2009.<sup>8</sup> In 2010, market share of car tire imports from China stabilized in the 13- to 15-percent range. By the third quarter of 2011, the market share of car tire imports from China fell even more, to around 11 percent.

## Domestic tire producers

From the perspective of domestic tire manufacturers, we can examine the change in the PPI for tires (including passenger car pneumatic tires, and truck and bus pneumatic tires) to understand the reaction of domestic tire producers to the levied tariffs. During the first three quarters of 2009, the overall PPI for [tires](#) fell substantially, as much as a 3.4-percent quarterly rate in April. After the U.S. imposed tariffs on tires imported from China in September 2009, prices increased 3.7 percent in the fourth quarter. Specifically, the PPI for [passenger car pneumatic tires](#) climbed 4.3 percent and the index for [truck and bus pneumatic tires](#) rose 2.7 percent in the fourth quarter of 2009. The fourth quarter turnaround in producer prices for tires was quick and consistent.

Even though the tariff rates for imported tires were set to decline in 2010 and 2011, to 30 percent and 25 percent, respectively, prices for tires increased in those years. The PPI for [tires](#) rose 8.0 percent in 2010 and jumped 11.2 percent in 2011. During the same period, the PPI for [passenger car pneumatic tires](#) climbed 6.7 percent and 7.2 percent. Perhaps having the largest impact on the substantial rise in tire prices was the index for truck and bus pneumatic tires. In 2010, [truck and bus pneumatic tires](#) advanced 10.6 percent, then sharply rose 15.5 percent in 2011. While prices for tires increased in 2010 and 2011, it is important to note that raw materials used for tire manufacturing, such as synthetic rubber, also jumped during the same period. The index for synthetic rubber climbed 12.5 percent in 2010 and 17.5 percent in 2011. Weeks of flooding in Thailand brought a halt to rubber tapping, creating a natural rubber shortage. Thailand accounts for nearly 31 percent of the world's natural rubber, most of which is used in car tires.<sup>9</sup> Also contributing to the increase in tire prices was a rise in demand for

automobiles and light trucks. From September 2009 to when the tariffs expired in September 2012, sales of passenger cars and light trucks climbed 39.9 percent.<sup>10</sup>

From an economic standpoint, the impact of tire tariffs was mixed. The tire tariff initiative saved about 1,200 jobs in the tire manufacturing industry, but at a cost of approximately \$1.1 billion to domestic consumers in the form of higher prices. Consequently, the additional money that domestic consumers spent on purchasing tires reduced their spending on other retail goods, indirectly lowering employment in the retail sector.<sup>11</sup> Although the intent of the tire tariff initiative was to reinvigorate a struggling domestic tire industry, its effect had unintended consequences on other measures of the U.S. economy.

## Tariffs affecting U.S. agricultural exports, 2018–19

All other things being equal, when foreign countries impose tariffs on exports of U.S. goods, the increased costs of these goods usually result in lower demand in the importing country, creating a supply surplus in the exporting country. As a result, U.S. prices of the goods typically decrease as supplies pile up, while U.S. producers attempt to find new markets for their products. Additionally, U.S. producers may lower their prices in anticipation of imposed tariffs to remain competitive in the global marketplace.

### U.S. soybean exports

Soybeans are a major agricultural commodity that China usually imports from the United States in large quantities. In July 2018, China raised its tariff on U.S. soybeans from 3 percent to 25 percent. In 2018, soybean exports to China fell to \$3.1 billion, from \$12.2 billion in 2017.

As a result of China's soybean tariff, inventories in the United States rose to 3.74 billion bushels in 2018, an increase of 18.0 percent from 2017 levels. This led to declines in soybean prices. Price decreases began in May 2018, with the PPI for [soybeans](#) moving down 3.0 percent, followed by a 6.2-percent decline in June, which may reflect U.S. farmers anticipating the tariff impact. Prices dropped an additional 9.9 percent in July, when the tariffs officially went into effect. Tariffs were one of the numerous variables affecting soybean prices, exports, and inventories. These factors included increased plantings in the United States and anticipation for a larger crop in 2018, but lower exports overall from May to July also contributed to the increase in soybean inventory.

The cyclical nature of China's purchases of U.S. soybeans, usually rising in October, did not happen in 2018. Instead, China substituted Brazilian soybeans for its usual U.S. purchases and did so despite lower prices for U.S. product.<sup>12</sup> Following a trade agreement between the United States and China in the fourth quarter of 2018, [soybean](#) prices jumped 12.9 percent. With this agreement, China agreed to purchase U.S. agricultural products in exchange for a delay in tariff increases on Chinese products entering the United States.<sup>13</sup> Despite this agreement, in August 2019, China announced an added 5-percent tariff on soybeans on the existing 25-percent soybean tariff.<sup>14</sup> In October, to help farmers ease the downside effects of the additional tariffs, the U.S. Department of Agriculture (USDA) provided up to \$12 billion in aid to the agricultural industry. Under this initiative, USDA committed to making direct payments to farmers of selected commodities subject to tariffs, buying up surplus quantities of some commodities, and providing funding for additional trade promotion efforts.<sup>15</sup> Soybean farmers received nearly \$4.7 billion in payments, the largest share of the Market Facilitation Program, which also provided aid to U.S. producers of corn, cotton, dairy products, hogs, grain sorghum, and wheat.<sup>16</sup> From a PPI standpoint,

this aid provided price insurance to farmers and encouraged future plantings heading into the next growing season.

In November 2019, China imported 2.6 million tons of soybeans from the United States, the largest monthly shipment since the tariffs were enacted in early 2018. The increase in imports was the result of tariff waivers issued by China to firms importing U.S. soybeans. These waivers allowed Chinese buyers to import U.S. soybeans, tariff free. The waivers were granted in anticipation of a partial trade deal between the U.S. and China.<sup>17</sup> In the fourth quarter of 2019, [soybean](#) prices increased 7.2 percent, following a 0.9-percent advance in the prior 3 months. On an annual basis, prices for [soybeans](#) turned up 2.3 percent in 2019, compared with an 8.3-percent decline in 2018.

## U.S. pork exports

In July 2018, China and Mexico placed tariffs on U.S. pork products. Prior to these tariffs, there already was a 12-percent tariff on U.S. pork exports to China, implemented in January 2004, as part of the U.S. and China World Trade Organization (WTO) Accession Agreement on pork.<sup>18</sup> In April 2018, China announced an additional 25-percent tariff on pork imports from the United States. As part of the July 2018 round of tariffs, China added an additional 25-percent tariff, resulting in a total tariff of 62 percent, according to the USDA Global Agriculture Information Network (GAIN) reports. Also in July 2018, Mexico, the largest market for United States pork exports in terms of quantity in metric tons, doubled an existing 2010 tariff on U.S. pork exports, from 10 percent to 20 percent.

To illustrate how the tariffs affected domestic pork prices in the United States, we can look at the PPI for [pork](#) and analyze the price changes throughout the periods the tariffs were in effect. From December 2003 to April 2018, prior to the retaliatory tariffs levied in 2018, the PPI for pork increased 20.7 percent. However, this increase is not exclusively the result of Mexico's tariffs in 2010 or the bilateral trade agreement between the United States and China. Many other market factors could have contributed to the rise in prices, for example, shrinking pork inventories, increased demand, disease outbreaks, weather, and rising feed costs.<sup>19</sup> The PPI for [pork](#) declined 4.7 percent from April to July after the first duty was levied in April 2018, and another 2.0 percent from July to August after the second round of tariffs were implemented in July. U.S. pork exports to China declined 18 percent in the first half of 2018.<sup>20</sup>

Overall, export sales for U.S. pork slowed in 2018, causing growing stockpiles domestically. Hog inventory for 2018 amounted to 74.6 million head, up 2 percent from 2017, and the largest inventory since 1943. The increased supply of pork is also attributed to rising U.S. meat production, which reached record levels in 2018, totaling 102.4 billion pounds.<sup>21</sup> As a result of increased pork inventories and relatively lower prices, consumers and restaurants shifted their demand from chicken to pork and beef. Grocery stores and restaurants launched marketing campaigns and sales incentives to help fuel pork and beef demand.<sup>22</sup>

By mid-2019, China suffered a rapid spread of African swine fever, destroying the world's largest herd of swine.<sup>23</sup> Despite a decline in swine inventory by September 2019, China imposed an additional 10-percent tariff on imports of U.S. pork, raising the total duty to 72 percent. This additional duty on U.S. pork imports came after the United States in August issued an additional 15-percent levy on \$112 billion of Chinese goods. However, trade tensions between the two countries de-escalated in September 2019 when the United States postponed a 5-percent increase on Chinese imports. In response, China exempted U.S. pork from additional tariffs. The decline in trade

tensions, combined with China's inventory loss, created significant export opportunities for the United States pork industry. The United States exported 5.89 billion pounds of pork worldwide in 2019, an increase of 10 percent from 2018. Pork exports accounted for 26.9 percent of total 2019 U.S. pork production.<sup>24</sup> In the fourth quarter of 2019, [pork](#) prices rose 7.7 percent, following a 0.5-percent decrease in the prior 3-month period. On an annual basis, prices for [pork](#) jumped 18.2 percent after falling 8.8 percent in 2018. As with soybeans, U.S. pork producers were beneficiaries of the Market Facilitation Program in October 2019, from which the USDA issued \$290 million in assistance to U.S. hog farmers affected by tariffs. From a PPI standpoint, the impact of this aid provided price insurance to hog farmers and helped determine farrowing decisions for the next season.

## U.S. fruit exports

In July 2018, China levied additional tariffs on a number of U.S. agricultural product exports. These tariffs reduced the volume of fruit exports to China.<sup>25</sup> USDA trade statistics reveal that the value of U.S. fresh fruit exports to China reached \$231 million from November 2016 to October 2017. In contrast, exports fell to \$124 million from November 2018 to October 2019. Cherry exports to China declined from \$122 million in 2017 to \$76 million in 2019, while apple exports decreased from \$20.7 million in 2017 to \$13 million in 2019.<sup>26</sup>

Following the imposition of tariffs, the PPI for [fresh fruits and melons](#)—which includes apples, cherries, oranges, and plums among other types of fresh fruits—fell 10.1 percent in August. Among fresh fruits and melons, prices for [plums](#) decreased 25.4 percent in August 2018, while prices for [apples](#) were unchanged after a series of advances in prior months.

To ease the effects of the tariffs on U.S. farmers, the USDA purchased surplus commodities in October 2019, as was done for surplus soybeans and pork. The USDA purchased \$83 million of fresh apples, \$104 million of citrus fruits, and about \$22 million in plums.<sup>27</sup> Following these purchases, the PPI for [fresh fruits and melons](#) increased 18.4 percent in the fourth quarter of 2019. However, prices for these agricultural products are typically higher during the winter months due to off-season availability. Therefore, it is unclear to what degree this increase in prices was driven by increased demand through the USDA program in response to the tariffs, or other factors.

## Summary

It is difficult to predict precisely how a protective tariff will influence prices and trade flows. It is worth keeping in mind that tariffs may have a spillover effect into other industries, as was the case in 2002 with steel tariffs. In the tire sector, U.S. tariffs resulted in shifting multi-lateral trade volumes and increasing volatility in domestic producer prices. Conversely, tariffs on U.S. exports for a wide range of goods revealed how decreased access to foreign markets for U.S. producers might affect domestic producer prices and their ability to remain competitive. As the examples described here demonstrate, the long-term impact of tariffs on domestic U.S. producer prices can be tracked using PPI data. These data, used in conjunction with other information, also can help measure the overall economic effects of tariffs.

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## NOTES

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<sup>2</sup> U.S. Customs and Border Protection, *Trade*, <https://www.cbp.gov/trade>. Also see, <https://www.cbp.gov/trade/programs-administration>, U.S. Customs and Border Protection, *Programs and Administration*.

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<sup>4</sup> International Trade Administration, *Steel Import Monitor*, <https://www.trade.gov/steel-import-monitor>. Dumping is a practice that occurs when a foreign producer sells a product in the U.S. at a price that is below that producer’s sales price in the country of origin (home market), or at a price that is lower than the cost of production.

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