Do Tariffs Affect the Terms of Trade?

Evidence from U.S. Tariff Shocks

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Abstract

A classic economic question concerns the incidence of import duties and the extent to which domestic consumers or foreign exporters bear the burden of the tariff, yet direct empirical evidence on this question is scarce. This paper studies the impact of two large tariff shocks - the Smoot-Hawley increase in 1930 and the Underwood-Simmons reduction in 1913 – on monthly product-level import prices. In the case of Smoot-Hawley, the results suggests that, in 19 of 25 goods considered, import prices did not fall significantly when the higher duties were imposed, suggesting that domestic consumers paid the tariff in most cases. In the case of the Underwood-Simmons tariff reduction, import prices did not rise significantly in 12 of 15 cases. The paper also uses weekly data on the domestic and import price of raw sugar to examine the incidence of tariffs more directly. Here an interesting puzzle emerges: tariff reductions are completely passed through to domestic consumers, but only about a third of tariff increases are.

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1. Introduction

One of the classic questions in international economics concerns the incidence of import duties. Early economists assumed that domestic consumers paid the tariff through higher domestic prices. Bickerdike (1906) was among the first to note that a country might be able to shift the burden of its import tariffs onto foreign exporters by forcing them to reduce their price. Provided the foreign elasticity of export supply was not perfectly elastic, Bickerdike showed that some portion of a country's tariff would be absorbed by foreign exporters, leading him to formulate the elasticity condition for the "optimal" tariff on imports.[1]

Although the theory of tariff incidence is well developed, empirical evidence on the issue is relatively scarce. Most studies that address the issue do so very indirectly. For example, early computable general equilibrium models used to simulate the impact of tariff changes often reported large terms-of-trade effects as a result of unilateral trade liberalization (Whalley 1985). Subsequent research showed that these results were driven by the assumption that traded goods were differentiated by country of origin, an assumption that was needed to prevent complete specialization in the model but which also gave significant market power to countries even if they accounted for a small share of world production or consumption in any particular good.[2]

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[1] Before Bickerdike's contribution, it had been recognized that a country that had market power in terms of its exported goods might be able to improve its terms of trade through an export tax. Irwin (1996) discusses the evolution of ideas about using tariffs to improve the terms of trade.

[2] As a result, the tariff's effect on the terms-of-trade effect was an artifact of model specification. As Brown (1987) noted, "if the elasticity of substitution [between domestic and foreign goods] implies that the foreign demand elasticity is close to unity in the initial equilibrium, then no

Another approach focuses on whether the elasticity of import supply (or foreign export supply) is less-than-perfectly elastic such that import prices might fall if a tariff were imposed. Broda, Limão, and Weinstein (2008) estimate thousands of export supply elasticities and show that import duties in 15 developing countries are negatively correlated with those elasticities; i.e., higher duties were imposed on goods which are relatively inelastic in export supply. While this cross-sectional evidence is consistent with the optimal tariff argument, they present no evidence on whether the tariffs actually improved the terms of trade or their removal would deteriorate the terms of trade. (In fact, it seems unlikely that most of the countries in their sample, such as Belarus, Latvia, Lebanon, Oman, and Paraguay, could influence the price of their imports.) Magee and Magee (2008) also use estimated trade elasticities along with data on market shares to conclude that the United States actually has little scope to influence its terms of trade through policy measures.

Only a few studies provide direct empirical evidence on whether changes in a country's import tariffs affect its import prices. Winkelmann and Winkelmann (1998) find that New Zealand's extensive tariff reductions in the mid-1980s did not affect the country's import prices, although few would believe that New Zealand is a good example of a "large" country that could shift the burden of its import duties onto foreign exporters. The United States is more plausibly a large country, but even here evidence is scarce. Kreinin (1961) examined U.S. tariff changes resulting from the 1955 General Agreement on Tariffs and Trade (GATT) negotiations. He found that about half of the tariff reductions were passed through to consumer prices and about half absorbed by exporters in the form of higher export prices, but the use of annual data and the

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matter how high the initial level of protection, the model will always indicate that the current tariff is smaller than the optimal tariff."

inability to control for other factors makes this conclusion quite speculative. The best evidence comes from Feenstra (1989), who studied the impact of U.S. import duties on Japanese compact trucks and heavyweight motorcycles in the 1980s. He concluded that the domestic price of motorcycles increased by the full extent of the tariff and the domestic price of trucks increased by 60 percent of the tariff, implying that 40 percent of the duty was absorbed by foreign exporters. Beyond these efforts, however, there is a notable lack of evidence on the question.[3]

This paper aims to shed light on the question of tariff incidence by studying the impact of two large tariff shocks – the Smoot-Hawley tariff increase in 1930 and the Underwood-Simmons tariff decrease in 1913 – on product-level import prices. There are several reasons why these tariff changes are useful episodes in which to study the question of tariff incidence. First, the United States was most likely a "large" country in world trade at this time. The United States was the world's leading economic power in the twentieth century, accounting for nearly 20 percent of world GDP in both 1929 and 1913, according to Angus Maddison's (2006) data.[4] Second, the tariff changes were relatively large, amounting to about a 20 percent increase in the case of Smoot-Hawley and a 35 percent decrease in the case of Underwood-Simmons (Irwin 1998). Third, the tariff changes were put in effect immediately after being signed into law, Smoot-Hawley on June 18, 1930 and Underwood-Simmons on October 4, 1913. Fourth, the tariff changes were made unilaterally, without any negotiations with other countries. Fifth, many U.S. imports during this period were simple bulk commodities, such as cane sugar, raw wool,

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[3] Chang and Winters (2002) examine a slightly different issue, the impact of preferential tariff reductions within the Mercusor trade bloc on the export prices of non-member countries. This matter arises in the context of U.S. sugar duties, which will be examined below. There is, of course, a large literature on the pass-through of exchange rate changes to domestic prices.

[4] The United States accounted for 42 percent of world manufacturing production in 1926/29 and 36 percent in 1913 (League of Nations 1945, 13).

flaxseed, pig iron, and shelled almonds, so that the measurement of import prices is not complicated by product differentiation. Sixth, the tariff changes occurred during a period of fixed exchange rates under the gold standard, so exchange rate fluctuations do not need to be controlled for.

One might ask why it is necessary to go so far back in time to investigate whether tariffs can influence import prices. There are two major problems with using post-World War II U.S. data to address this question. First, average tariffs in the United States and in other developed countries have been so low that even large (percentage) tariff changes are incapable of bringing about large changes in import prices. Second, most of the post-war tariff reductions were phased in gradually over time to avoid shocking domestic import-competing industries.[5] These two factors – the low level of tariffs and the gradual phase-in of tariff reductions over time – make it difficult to identify any impact on import prices.[6]

This paper takes the very straightforward approach of simply looking at the large and abrupt changes in tariffs and seeing if they have any pronounced impact on import prices, controlling for other covariates. Such an approach has been a staple of empirical public finance, where Poterba (1996), Besley and Rosen (1999), and others have sought to determine the incidence of sales taxes based on the timing of changes in those taxes. This paper uses monthly data to examine the changes in import prices for individual products in the window around the

[5] For example, U.S. import duties were reduced by 35 percent in the Uruguay Round of GATT negotiations, but the trade-weighted average U.S. tariff only fell from 4.6 percent to 3.0 percent, changing the domestic price of imported goods by only 1.5 percent if fully passed through to consumer prices (Schott 1994, 61). In addition, this reduction was phased in over five years. Similarly, the NAFTA tariff reductions were phased in over a period of ten years.

[6] The only other major twentieth century U.S. tariff revisions are the Fordney-McCumber tariff of 1922 and the first GATT negotiating round in 1947. The former is problematic because enormous price volatility during the 1921-22 deflation and inflation makes it difficult to identify the impact of tariff changes, while the latter is the subject of a separate paper (Irwin 2010).

implementation of the Smoot-Hawley and Underwood-Simmons tariff, focusing mainly on the former.

The results can be briefly summarized as follows: in the case of Smoot-Hawley, there is no significant decrease in import prices in 19 of the 25 goods considered; in the case of Underwood-Simmons, there is no significant increase in import prices in 12 of the 15 goods considered. This is consistent with domestic consumers bearing most of the burden of the tariff, although it is not direct evidence. In a very few cases, this can be cross-checked with Bureau of Labor Statistics data on the domestic wholesale prices of imported goods, which seems to support this conclusion. For one commodity, raw sugar, weekly domestic and import price data permit a stronger conclusion to be made about tariff incidence, but also generate a puzzle: tariff decreases are fully passed-through to consumers, but only about a third of tariff increases are.

2. Data and Empirical Strategy

This section will describe the data and empirical approach with reference to the Smoot-Hawley tariff of 1930. A later section will consider the Underwood-Simmons tariff of 1913.

The basic data for this study comes from the Monthly Summary of Foreign Commerce, published by the Department of Commerce. During the 1920s and 1930s, this publication reported monthly average import prices for roughly 82 goods. According to the report, these prices are "based on the wholesale prices of articles in the markets of the countries from which imported," but they are very close to unit values. From these 82 goods, this paper examines a sample of 25 commodities, excluding sugar, which will be considered in a later section. Three

factors account for the reduction in sample size.[7] First, many of the goods could be imported duty free before and after the Smoot-Hawley tariff. (In fact, about two-thirds of U.S. imports by value could be imported without paying duty in 1929, mainly industrial raw materials and products that were not produced in the United States.) These include undressed furs of various types, cocoa beans, coffee, tea, raw silk, iron ore, tin bars and blocks, bananas, unrefined copper, and so forth. Second, the 1930 legislation did not change the tariff levied on many goods, such as coconut oil, currants, raisins, jute burlaps, and others. Finally, in several instances, the good in question encompasses a broad variety of individual products where the tariff code is complex and depends on product attributes. For example, the price of unmanufactured jute and jute butts may not refer to a single product and probably not even to a single tariff rate.[8]

Table 1 presents the imported products under consideration, with a few exceptions to be noted below. Most of these goods are fairly standard bulk commodities where significant product differentiation or product mix and quality concerns are not a major issue. The table presents data on the tariff rate before and after the Smoot-Hawley legislation; most of the duties are specific duties, and the ad valorem equivalent based on the average import price in 1929 is also presented. There are four cases of tariff reductions, in which case the test will be for an increase in import prices after the tariff change.

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[7] The sample is still much larger than Feenstra (2 goods), Poterba (3 goods), or Besley and Rosen (12 goods).

[8] For example, Schedule 10 (flax, hemp, jute, and manufactures of), paragraph 1019 of the Tariff Act of 1930 reads: "Bagging for cotton, gunny cloth, and similar fabrics, suitable for covering cotton, composed of single yarns made of jute, jute butts, or other vegetable fiber, not bleached, dyed, colored, stained, painted or printed, not exceeding sixteen threads to the square inch, counting the warp and filling, and weighing not less than fifteen ounces nor more than thirty two ounces per square yard, six-tenths of 1 cent per square yard; weighing more than thirty-two ounces per square yard, three-tenths of 1 cent per pound."

The goods in the table are ranked according to the potential impact of the tariff increase on the domestic price, assuming full pass-through. Many of the tariff changes would only bring about modest changes in domestic (or import) prices, which raises the question of whether the impact of the tariff can be identified relative to the normal fluctuations in the price. The table also indicates the principal supplying country and its share of U.S. imports in 1929. In most cases, the principal supplier provides about 50 to 90 percent of U.S. imports.

The empirical approach is similar to Feenstra (1989), Poterba (1996) and Besley and Rosen (1999). For each imported good, the basic specification is:

$$(1)\quad \Delta \log(p_M)_t = \alpha + \beta \cdot \Delta(1+\tau)_t + \mu \cdot \Delta \log (p_{WPI})_t + \sum \gamma_t \cdot month_t \quad + \varepsilon_t$$

where p_{Mt} is the foreign price of imported good at time t, τ is the (ad valorem) import tariff, and p_{WPIt} is the domestic wholesale price index at time t, and "month" is a set of dummy variables for each month.[9] The domestic wholesale price index controls for changes in the overall level of prices in that month. The parameter of interest is β, which indicates the elasticity of the import price (foreign export price) with respect to the import tariff and can be interpreted as the pass-through coefficient.

However, as already noted, most of the import duties at this time were specific rather than ad valorem. This muddles the interpretation of β as a pass-through coefficient since the magnitude of the specific duty relative to the price of the imported good is lost when logs are taken. Converting the specific duty into its ad valorem equivalent by dividing by the import price would be inappropriate because then the import price would appear on both sides of the equation. Instead, a dummy variable that represents the imposition of the tariff will be used,

[9] U.S. wholesale prices from the Bureau of Labor Statistics are available from the NBER Macro-history database (http://www.nber.org/databases/macrohistory/data/04/m04048c.db).

taking the value of one in July 1930. The coefficient on the dummy variable indicates the percentage change in the import price at the time of the tariff's imposition. The percentage pass-through ratio can then be calculated by dividing β by the expected full pass-through (approximated in last column in Table 1).

Another issue is the dynamic response of import prices to changes in the tariff. To allow for continued price adjustment after the tariff shock, two months of lagged tariff changes are included in the regression; longer lags tend not to be statistically significant. Another important issue is the anticipatory effects of the tariff. If the enactment of the tariff was anticipated, increased importing could have driven up import prices in months preceding its imposition. If this possibility is ignored, simply looking at the immediate and lagged impact of the tariff shock would exaggerate the imputed impact of the tariff if prices declined after the imposition of the tariff because prices were falling from an immediate pre-tariff spike, not because of the tariff's effect on import prices.

In fact, there is clear evidence that the imposition of the tariff was anticipated by importers. Once the Senate passed the tariff bill in late March 1930, a House and Senate conference committee struggled for more than two months in negotiating the final version of the legislation. There was a significant chance that the process would break down, as well as some uncertainty about whether President Herbert Hoover would ultimately sign the measure. However, several negotiating breakthroughs occurred in mid-May and it became apparent that the legislation was very likely to get enacted by the end of the month. Newspaper accounts clearly document that importers tried to accelerate the shipping and the clearance of their goods in the weeks prior to the imposition of the higher duties. In fact, dutiable imports jumped nearly 25 percent in June 1930 from the previous month.

Hence, the estimated equation for each imported good is:

$$(2)\ \Delta \log(p_M)_t = \alpha + \sum_{t=-2}^{1} \beta_t \cdot \Delta\, SH_t + \mu \cdot \Delta \log\,(p_{WPI})_t + \sum \gamma_t \cdot month_t \ + \ \varepsilon_t$$

where SH is a dummy variable that takes the value of one in July 1930. The coefficient β_{t+1} is the effect on June 1930 (in anticipation of the tariff), β_t is the impact effect (July 1930), and β_{t-1} and β_{t-2} are the lagged effects (August and September 1930). The full impact of the tariff can be measured by the sum of these coefficients. Hence, the test of whether the higher tariff decreases the price of imports is whether the sum of the coefficients is negative and statistically significant, including the anticipated effect of the tariff.

This approach of looking at a four month window around the time of the imposition of the tariff is imperfect because factors other than seasonal price movements and the general price level cannot be controlled for, yet they may account for some of the price fluctuations during the period. In other words, some coincidental factors might offset import price movements in the tariff window, leading one to conclude erroneously that the tariff had no effect on prices, or there may be factors unrelated to the tariff that cause prices to move significant, leading one to conclude erroneously that the tariff had a large impact on prices.

3. Empirical Results

Import Prices

Table 2 presents the coefficients on the lead, impact, and lags of the tariff change from equation 2. The period of estimation is from 1924M01 to 1932M06, yielding roughly 100 observations. In parenthesis are Newey-West standard errors that correct for heteroskedasticity and autocorrelation; an asterisk indicates statistical significance at the 5 percent level.

The first two imported commodities are figs and onions, each of which was subject to the largest tariff change in the sample (Table 1). In the case of figs, there is statistically significant increase in the price in June, consistent with extra buying in anticipation of the tariff, and a statistically significant decrease in the price in August, after the imposition of the tariff. The sum of the coefficients is negative, but not statistically significant. In the case of onions, there appears to be no significant changes in import prices during the tariff window.

With so many goods under consideration, it would be laborious to discuss each and every result. To summarize the main findings, the sum of the coefficients is negative in 19 of 25 cases, but the sum is statistically significant in only 6 of 25 cases. Put differently, in 19 of 25 cases there is no statistically significant decrease in import prices after the tariff was imposed.

Another way of summarizing the findings is to put each result into one of three categories: those in which there is (a) no significant price changes in the tariff window, (b) a roughly offsetting increase in price prior to and decrease in price subsequent to the imposition of the tariff, or (c) a significant decline in import prices after the imposition of the tariff. In seven cases, there appears to be no significant changes in import prices: onions, white potatoes, olive oil, hemp, shelled almonds, tobacco leaf, and unbleached cotton clothing. In twelve cases, there is a pronounced increase in prices in anticipation of the tariff and then a subsequent decrease, with little net change in import prices: figs, rice, beef and veal, calf leather, soybean oil, cheese, bar steel, butter, pig iron, wool clothing, and bleached cotton cloth. In six cases, there appears to be a significant decrease in import prices after the imposition of the tariff: dried beans, cheese, shelled walnuts, flaxseed, carpet wool, and combing wool. In addition, there are two cases in which tariffs were reduced in 1930, crude aluminum and peanut oil. In the case of aluminum,

the import price does rise significantly after the tariff reduction, whereas the import price of peanut oil falls significantly.

These results are suggestive but suffer from several weaknesses. Because many of these goods are commodities, the month-to-month volatility in import prices is often very large. In addition, the controls for other factors influencing the month-to-month variation in prices are imperfect, simply movements in general prices (the wholesale price index) and month dummies. Commodity prices can be very volatile for various reasons that are hard to capture in monthly indicators of supply and demand, meaning that other factors beside the tariff may be affecting prices in the tariff-window. In many instances, the average annual price fluctuations exceed the change in the tariff, making it very difficult to identify the impact of the any tariff change on those prices. Prices often move up or down by more than ten percent in a month, whereas the tariff changes are less than that. This makes it very difficult to know if prices changes in the tariff window can really be attributed to changes in import duties.

However, taking the results at face value, a tentative conclusion would be that, in a large majority of cases, import prices do not fall significantly when import duties are imposed.

Domestic Wholesale Prices

The fact that most import prices are not significantly affected by the imposition of the higher tariffs is consistent with domestic consumers bearing most of the burden of the tariff. But in the absence of data on the domestic price of imported goods, this conclusion will be uncertain. The Bureau of Labor Statistics reported the domestic (New York) wholesale prices of a few imported goods that were subject to tariff changes, such as wool and vegetable oils (peanut, olive, and soybean). The New York wholesale price is taken because nearly 80 percent of all

U.S. imports arrived there in 1929 and it is less affected by transportation costs (as the Chicago price would be, for example). The wholesale prices of these goods can be compared to the import prices to see the tariff changes were pass on to consumers.

Table 3 presents the results for the domestic prices. The wholesale price of olive oil appears unaffected by the higher duties, whereas it might be expected to increase as much as 8 percent if the tariff had been fully passed through to domestic prices. The wholesale price of soybean oil jumped 3 percent in July 1930 but then fell back (the tariff increase was about 11 percent). In the case where the tariff was reduced, the wholesale price of peanut oil fell 5 percent in August 1930, nearly a third of the decrease in the tariff.

In the case of three specific types of imported wool from Argentina and Australia, the wholesale prices of wool jumped by about 5-6 percent in July 1930. If the wool was combing wool, then the implied immediate pass-through to consumer prices is about two-thirds; if the wool was used for clothing, the implied pass-through is about one-third.

The Underwood-Simmons Tariff Reduction

The same approach can be used with respect to the Underwood-Simmons tariff reduction in October 1913. The sample size is shorter, from 1909M07 to 1914M06. The tariff dummy variable switches on in October 1913, as the tariff took effect on October 3rd. The lead coefficient on the tariff dummy variable is not expected to be significant because a prospective tariff decrease is unlikely to have the same anticipatory effect on import prices as a prospective tariff decrease. In the case of a tariff decrease, importers need not delay purchases of foreign goods, thereby pushing import prices down, to benefit from the tariff reduction. Instead,

importers can simply stockpile foreign goods in bonded warehouses at U.S. ports and then release them to clear customs starting on October 3, when the lower tariff took effect.

Table 4 presents the results. Since tariffs were reduced in this episode, we would be looking for an increase in import prices as U.S. demand for such goods would increase. To summarize the findings, import prices increase for 11 of 15 goods considered, but there is a statistically significant increase in only 3 of 15 cases. As in the case with Smoot-Hawley, the prices of only a small minority of all goods appear to be significantly affected by the change in import duties.

Unfortunately, the domestic wholesale prices reported by the Bureau of Labor Statistics prior to World War I do not include specific imported commodities as it did after the war so it is impossible to see if the tariff reductions were passed through to the domestic market.

4. The Case of Sugar

Ideally, determining tariff incidence requires price observations on both sides of the tariff wall, the landed import price as compared to the domestic wholesale price. As the previous section indicated, such data are not readily available.

However, domestic and import prices are available for one specific commodity, raw sugar. Willett & Gray's Weekly Statistical Sugar Trade Journal presents the weekly landed price of 96º raw sugar in the port of New York and the market price of 96º raw sugar in New York City. The high frequency of the data permits the tariff window to be very narrow since the specific day the tariff takes effect is known. In addition, the prices reported in the Journal refer to exactly the same product in exactly the same location, making the comparison as good as one can get.

Sugar was one of the largest U.S. imports during this period and the United States was very likely a "large" country with respect to the world sugar market; it consumed more than 20 percent of the world's production of sugar in the late nineteenth and early twentieth century (Statistical Abstract of the United State 1932, 732). The majority of sugar imports came from Cuba. And the tariff on imported sugar changed significantly over time. Table 5 shows the changes in the sugar tariff. In most instances, the new duties in tariff legislation took effect the day after the president signed the bill. However, in the case of sugar, Congress often pushed the date at which the duties would take effect several months into the future.

Figure 1 shows the domestic and import price of sugar in the weeks before and after four large tariff changes (more to come in the next draft). The relative stability of sugar prices in the weeks surrounding the tariff change makes it extremely straightforward to determine the incidence of the tariff on domestic consumers and foreign exporters. In the case of the McKinley tariff, which was approved on October 1, 1890 although the sugar provision took effect on April 1, 1891, the import duty on sugar was removed entirely. The domestic price of sugar immediately fell to the import price of sugar (the landed price, including cost, insurance, and freight). The adjustment was instantaneous: the weekly observation is for April 2, the day after the tariff was removed, and on that day the domestic price was exactly equal to the landed price.

However, the tariff was increased in the tariff legislation of 1894 and 1897; in each instance, domestic consumers bore only part of the burden of the tariff and import prices clearly fell when the tariff was imposed. In the Underwood-Simmons tariff of 1913, the duty was reduced and once again the domestic price fell by the full extent of the tariff reduction.

[I hope to collect the data for the other tariff changes soon.]

This creates a consistent but puzzling pattern, summarized on Table 6: reductions in the sugar tariff are fully passed-through to consumers, but only about a third of the tariff increases are borne by consumers. [more discussion and analysis in the next draft]

4. Conclusion

Robert Baldwin (1969, 303) once wrote: "If the infant-industry argument for tariff protection is worthy of its reputation as the major exception to the free-trade case, it should be possible to present a clear analytical case, based upon well-known and generally accepted empirical relationships unique to infant industries, for the general desirability and effectiveness of protective duties in these industries." In a similar vein, if the optimal tariff argument for taxes on imports is worthy of its reputation as the major exception to the free-trade case, it should be possible to present generally accepted empirical evidence that the imposition or removal of import tariffs leads to pronounced changes in the prices of import goods such that the welfare of the importing country is affected

This paper has sought to bring new evidence to bear on this question: can countries shift the burden of the tariff onto their trading partners? This is a key question in international economics, but there is surprisingly little evidence on it. The Smoot-Hawley tariff of 1930 and the Underwood-Simmons tariff of 1913 were two of the biggest tariff shocks in U.S. history and provide an opportunity to address this question. Although these tariff shocks occurred at a time when the United States was the world's dominant economic power, and was therefore a plausible candidate for having been a "large" country, it has been difficult to uncover strong evidence that the United States was able to alter the prices that it paid for its imports as a result of these large, unilateral tariff changes. In many of the commodities examined here, the Smoot-Hawley tariff

did affect import prices, but they rose in anticipation of the tariff and subsequently fell back, with little change in their final level. This implies but does not prove that the burden of the tariff was largely borne by domestic consumers. To the extent that one can generalize from these findings, it is that large country effects on terms of trade are not pervasive.

The case of sugar provides a rare instance in which prices on both sides of the tariff wall for an identical commodity can be observed. The puzzling finding here is that there is an asymmetry in tariff changes: tariff reductions were entirely passed-through to domestic prices, whereas tariff increases were borne largely by foreign exporters.

Table 1: U.S. Import Duties, Tariff Acts of 1922 and 1930

	units	Import Duty		Ad valorem equivalent (1929 prices)		Percentage change in domestic price	Principal Supplier (1929)
		1922	1930	1922 rate	1930 rate		
Tariff Increases							
Figs	lbs	2 cents	5 cents	25%	63%	30	Turkey (82%)
Onions	lbs	1.5 cents	2.5 cents	83%	139%	30	Spain (74%)
Rice, cleaned	lbs	2 cents	2.5 cents	49%	61%	25	Hong Kong (65%)
Beef and veal	lbs	3 cents	6 cents	25%	50%	20	Canada (35%)
Beans, dried	lbs	1.75 cents	3 cents	31%	53%	17	Japan (43%)
Leather, calf & kip	Sq. feet	Free	15%	0%	15%	15	Canada (47%)
Potatoes	per 100 lbs	50 cents	75 cents	29%	44%	12	Canada (92%)
Soybean oil	Lbs	2.5 cents	3.5 cents	39%	54%	11	China (95%)
Cattle hides	Lbs	Free	10%	0%	10%	10	Argentina (63%)
Calf & kip hides	Lbs	Free	10%	0%	10%	10	-
Cheese	lbs	25%	35%	25%	35%	8	Italy (56%)
Olive oil	lbs	7.5 cents	9.5 cents	44%	56%	8	Italy (91%)

Hemp	per ton	$22.4	$44.8	8%	15%	7	Italy (97%)
Walnuts, shelled	lbs	12 cents	15 cents	42%	53%	7	France (52%)
Almonds, shelled	lbs	14 cents	16.5 cents	41%	48%	5	Spain (71%)
Tobacco Leaf	lbs	$2.10	$2.275	114%	124%	5	Netherlands (95%)
Bar Iron	Lbs	2/10th cent	3/10th cent	21%	27%	5	Sweden (47%)
Flaxseed	Bushel	56 cents	65 cents	29%	33%	4	Argentina (92%)
Butter	lbs	12 cents	14 cents	32%	37%	4	Denmark (40%)
Pig Iron	tons	$0.75	$1.125	5%	7%	2	India (67%)
Other Goods							
Wool, carpet	Lbs			41%	66%	18	Argentina (35%)
Wool, clothing	Lbs			59%	86%	17	Australia (32%)
Wool, combing	Lbs	31 cents	34 cents	61%	76%	9	Australia (30%)
Cotton cloth, unbleached				29%	33%	3	United Kingdom (86%)
Cotton cloth, bleached				32%	38%	5	United Kingdom (57%)
Tariff Decreases							
Aluminum, scrap	Lbs	5 cents	4 cents	28%	21%	-4	Canada (43%)

Peanut oil	Lbs	6.5 cents	4 cents	57%	35%	-14	Hong Kong (84%)

Source: U.S. Department of Commerce, Foreign Trade and Navigation of the United States for the Calendar Year 1930. Washington, D.C.: GPO, 1931.

Table 2: The Smoot-Hawley Tariff: Estimated Impacts of Tariff Changes on Import Prices

	ΔSH_{t+1}	ΔSH_t	ΔSH_{t-1}	ΔSH_{t-2}	Sum of Coefficients
Tariff Increases					
Figs	0.81* (0.28)	-0.03 (0.39)	-0.98* (0.26)	-0.41 (0.25)	-0.61 (0.51)
Onions	0.11 (0.08)	0.04 (0.11)	0.01 (0.06)	0.11 (0.11)	0.28 (0.22)
Rice, cleaned	0.17* (0.04)	0.02 (0.06)	-0.04 (0.12)	-0.12 (0.04)	0.03 (0.08)
Beef and veal, fresh	-0.09 0.08	0.24* (0.08)	-0.43* (0.07)	0.27* (0.11)	-0.01 (0.13)
Beans, dried	-0.05 (0.05)	-0.03 (0.06)	0.22* (0.05)	-0.32* (0.04)	-0.18* (0.09)
Leather, calf & kip	0.08* (0.03)	0.11* (0.05)	-0.22* (0.03)	-0.08* (0.03)	-0.11 (0.09)
Potatoes, white	-0.10 (0.36)	0.33 (0.37)	-0.76* (0.35)	0.28 (0.35)	-0.26 (0.73)
Soybean oil	1.47* (0.32)	-1.34* (0.34)	0.31 (0.31)	-0.25 (0.32)	0.19 (0.67)
Calf & kip hides	0.02 (0.08)	0.10 (0.08)	-0.19* (0.07)	-0.01 (0.07)	-0.08 (0.15)
Cheese	-0.08* (0.02)	0.02 (0.02)	0.10* (0.02)	-0.11* (0.02)	-0.08* (0.03)
Olive oil	-0.07 (0.09)	-0.16 (0.14)	0.04* (0.01)	-0.02 (0.01)	-0.22 (0.23)
Hemp	0.22 (0.26)	-0.12 (0.27)	0.19 (0.26)	-0.41 (0.26)	-0.12 (0.53)
Walnuts, shelled	0.10 (0.06)	-0.21* (0.07)	-0.08 (-0.05)	-0.23* (0.04)	-0.26* (0.10)
Almonds, shelled	-0.05	0.02	-0.05	0.07	-0.01

	(0.02)	(0.03)	(-0.03)	(0.04)	(0.06)
Tobacco leaf	0.06 (0.08)	-0.23* (0.08)	0.38* (0.05)	-0.43* (0.06)	-0.22 (0.15)
Bar steel	0.26* (0.09)	-0.31* (0.10)	0.02 (0.05)	-0.10 (0.07)	-0.13 (0.21)
Flaxseed	0.04 (0.04)	-0.03 (0.06)	-0.12* (0.02)	-0.15* (0.02)	-0.26* (0.09)
Butter	0.02 (0.04)	0.16* (0.05)	-0.54* (0.02)	0.45* (0.05)	0.09 (0.09)
Pig iron	0.36* (0.04)	0.01 (0.02)	-0.32* (0.03)	0.06 (0.05)	0.11 (0.06)
Hemp	0.22* (0.09)	-0.12 (0.10)	0.19* (0.07)	-0.41* (0.16)	-0.12 (0.32)
Wool, carpet	-0.11* (002	0.03 (0.03)	-0.17* (0.02)	-0.07* (0.03)	-0.31* (0.05)
Wool, clothing	0.58* (0.12)	-0.49* (0.10)	0.04 (0.05)	-0.18* (0.07)	-0.04 (0.14)
Wool, combing	0.70* (0.06)	-0.42* (0.06)	-0.10* (0.04)	-0.56* (0.03)	-0.37* (0.09)
Cotton clothing, unbleached	-0.02 (0.02)	0.11* (0.02)	-0.05 (0.04)	-0.02 (0.04)	0.01 (0.05)
Cotton clothing, bleached	-0.01 (0.03)	0.04 (0.06)	0.34* (0.05)	-0.36* (0.07)	-0.01 (0.11)
Tariff Decreases					
Aluminum, crude, scrap	0.07* (0.02)	-0.08* (0.03)	0.11* (0.02)	0.06* (0.02)	0.16* (0.04)
Peanut oil	-0.08 (0.06)	-0.34* (0.05)	0.19* (0.03)	-0.21* (0.07)	-0.44* (0.10)

Period of estimation: 1924M01- 1932M06. Newey-West standard errors have been corrected for heteroskedasticity and autocorrelation.

Table 3: Impact of Smoot-Hawley Tariff on Domestic Wholesale Prices of Imported Commodities

	SH_t	SH_{t-1}	Sum of Coefficients
Imported Goods			
Olive oil	-0.023 (0.017)	-0.006 (0.022)	-0.029 (0.028)
Peanut oil (*tariff reduction*)	-0.002 (0.041)	-0.047* (0.015)	-0.049 (0.045)
Soybean oil	0.031* (0.016)	-0.020 (0.006)	0.011 (0.018)
Foreign Wool			
Argentine: high quarter-blood crossbreds, grease basis	0.049 (0.031)	0.004 (0.014)	0.053 (0.035)
Australia: geelong, 56s, scoured basis	0.048* (0.018)	0.006 (0.004)	0.054* (0.019)
Montevideo: high quarter blood, 50s, grease basis	0.057* (0.028)	0.001 (0.015)	0.058* (0.031)

Note: Period of estimation: 1924M01- 1932M06. Newey-West standard errors have been corrected for heteroskedasticity and autocorrelation.

Table 4: The Underwood-Simmons Tariff: Estimated Impacts on Import Prices

	Δ US$_{t+1}$	Δ US$_t$	Δ US$_{t-1}$	Δ US$_{t-2}$	Sum of Coefficients
Almonds	-0.16 (0.13)	-0.14 (0.10)	-0.14 (0.08)	-0.01 (0.04)	-0.46 (0.33)
Beans	-0.27* (0.07)	-0.03 (0.09)	-0.01 (0.09)	0.02 (0.07)	-0.28 (0.31)
Cement	0.34* (0.05)	0.00 (0.06)	-0.08 (0.09)	-0.09 (0.09)	0.16 (0.22)
Cheese	-0.02 (0.02)	0.05* (0.01)	0.01 (0.02)	0.01 (0.02)	0.05 (0.05)
Coal, bituminous	-0.02 (0.05)	0.06 (0.05)	0.07* (0.03)	0.12* (0.01)	0.23* (0.11)
Currants	0.04 (0.04)	0.18 (0.11)	0.24 (0.18)	0.04 (0.05)	0.51* (0.18)
Figs	0.13 (0.23)	0.07 (0.17)	0.24 (0.17)	-0.15 (0.17)	0.29 (0.68)
Flax	0.03 (0.03)	0.08 (0.08)	-0.11 (0.07)	0.02 (0.08)	0.02 (0.23)
Hemp	0.26* (0.01)	-0.13 (0.01)	0.07 (0.03)	-0.04* (0.01)	0.16* (0.05)
Onions	-0.10 (0.06)	-0.05 (0.04)	-0.05 (0.08)	-0.13* (0.06)	-0.32 (0.19)
Pig iron	-0.13 (0.08)	0.13 (0.10)	0.01 (0.07)	0.05 (0.05)	0.06 (0.23)
Potatoes	0.19* (0.09)	0.06 (0.14)	0.22 (0.18)	-0.18 (0.08)	0.38 (0.40)
Wool, carpet	-0.08 (0.05)	-0.01 (0.04)	-0.01 (0.04)	0.01 (0.02)	-0.09 (0.14)
Wool, carpet	-0.11* (002	0.03 (0.03)	-0.17* (0.02)	-0.07* (0.03)	-0.31* (0.05)
Wool, clothing	0.58* (0.12)	-0.49* (0.10)	0.04 (0.05)	-0.18* (0.07)	-0.04 (0.14)
Wool, combing	0.70* (0.06)	-0.42* (0.06)	-0.10* (0.04)	-0.56* (0.03)	-0.37* (0.09)

Period of estimation: 1924M01- 1932M06. Newey-West standard errors have been corrected for heteroskedasticity and autocorrelation.

Table 5: U.S. Duties on Imported Raw Sugar (96º centrifugal)

Year of Tariff Act	Effective Date (sugar only)	Rate of Duty
1883		2.25 cents per pound
1890	April 1, 1891	Free
1894	August 28, 1894	40 percent
1897	July 24, 1897	1.685 cents per pound
1903*	December 27, 1903	1.348 cents per pound
1909	August 6, 1909	No change
1913	March 1, 1914	1.0048 cents per pound
1921		1.6 cents per pound
1922	September 22, 1922	1.7648 cents per pound
1930	June 18, 1930	2.00 cents per pound

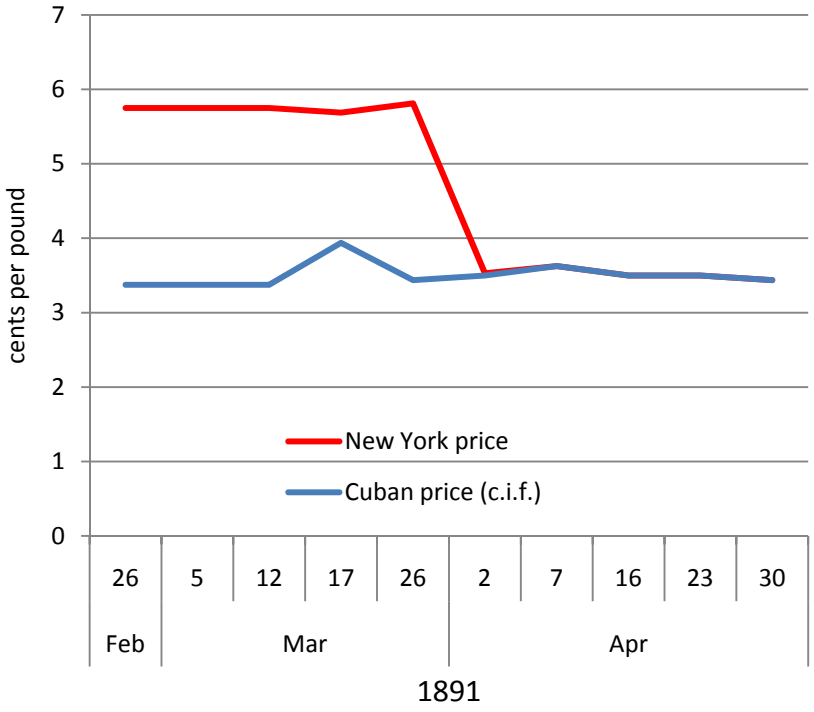
Table 6: Impact of Changes in Sugar Duties

Year of Tariff Act	Tariff Change	Incidence of Tariff Change	
		Domestic Prices	Import Prices
1890	↓	96%	4%
1894	↑	23%	76%
1897	↑	36%	64%
1913	↓	100%	0%

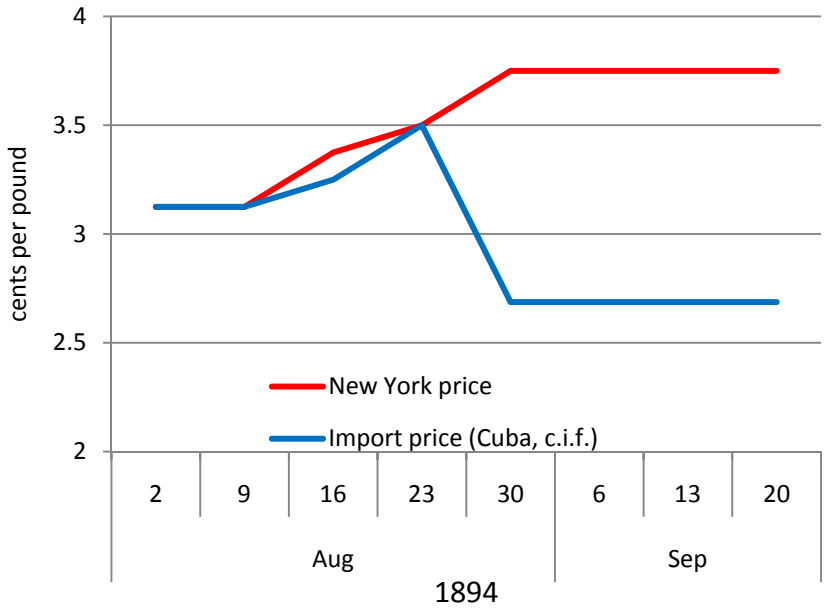
Figure 1: New York Wholesale and Import Price of 96º Raw Sugar

Source: Willett & Gray's Weekly Statistical Sugar Trade Journal, various issues

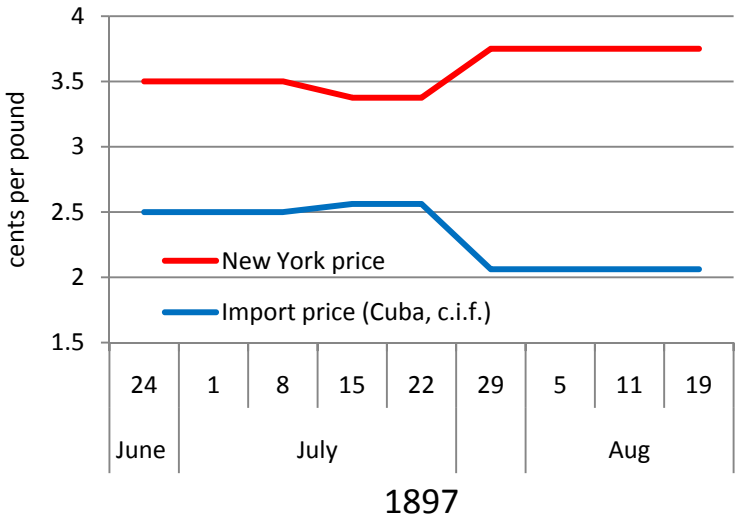
A. McKinley Tariff of 1890



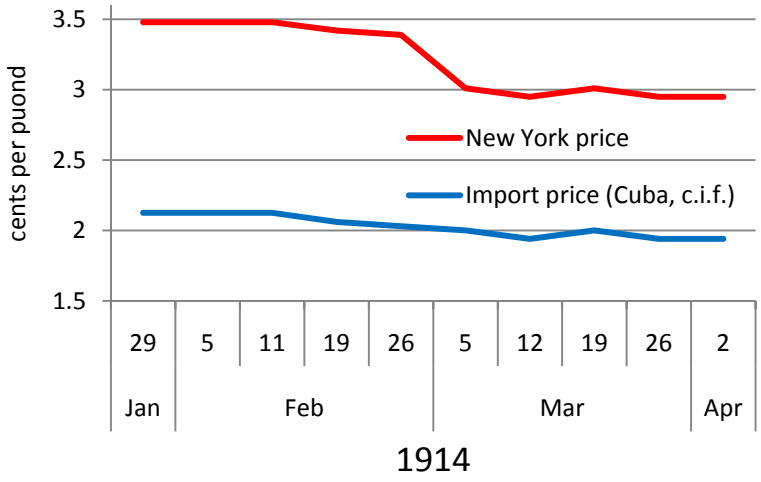
B. Wilson Gorman Tariff of 1894



C. Payne-Aldrich Tariff of 1897



D. The Underwood-Simmons Tariff of 1913



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