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The Price of Protection: Tariff Incidence and Import Collapse under the Infamous Smoot-Hawley Tariff *

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Abstract

Using newly digitized monthly data on the quantities and prices of imports as well as product-level data on tariff rates, we estimate that in the first year after the passage of the Smoot-Hawley Tariff Act, imports facing rate increases fell swiftly and dramatically relative to imports not affected by tariffs: for a one-percentage-point increase in the tariff rate, they declined by an average of 4%. We also estimate that the incidence of Smoot-Hawley was almost entirely borne by U.S. importers. Using an open-economy model, we attribute our high measured short-run trade elasticity of greater than 4 to fixed exchange rates that the U.S. maintained with most trade partners in the first 15 months after enactment. Our model also suggests that Smoot-Hawley accounted for 27% of the decline in total US imports in the first year after enactment. Finally, we construct both partial equilibrium and general equilibrium welfare estimates of Smoot-Hawley. Both methods deliver welfare losses of about 0.2% of GDP, reflecting the high measured elasticity of substitution and low US import-GDP ratio.

JEL classification: F10, F13, F14, F63, F68, N12, N72

Keywords: Trade policy, pass through, Smoot-Hawley Tariff, trade elasticity, international trade, tariff incidence, welfare analysis of tariffs

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1 Introduction

The Tariff Act of 1930 represents the largest and most comprehensive American tariff increase in the last 100 years of American trade policy. In the two years after its passage, the ad valorem equivalent tariff rate in the US increased dramatically, from 44.4% in 1930 to 59% in 1932 (Bond et al., 2013), and trade volume declined by roughly 40% over this same period. The Smoot-Hawley Tariff Act, as it is more commonly known, raised rates on a wide range of manufacturing and agricultural imports, greatly increasing the coverage of American tariffs and adding hundreds of new line items to the tariff code. In turn, it provoked both a massive trade war (Mitchener, O'Rourke, and Wandschneider, 2023) and ushered in a new era of global protectionism (Eichengreen and Irwin, 1995; Irwin, 2011, 2012).

Given Smoot-Hawley's scale and scope, this paper asks a series of straightforward questions regarding its effects. First, how did the tariff act change import prices and quantities in the short run and medium run? Second, what is the average trade elasticity derived from a large, broad-based increase in tariff rates at different time horizons, and do measured elasticities appear sensitive to monetary policy? Third, how much did total U.S imports fall due to Smoot-Hawley Tariff and what was the estimated change in welfare due to its enactment?

To estimate these effects and parameters, we build a database consisting of newly digitized monthly, free-on-board (FOB) import prices between January 1929 and June 1932, spanning 88 categories of imports and accounting for 60% of total U.S. imports (by value) in 1929. We then match these price data to the corresponding monthly data on the quantities and values of these same 88 import categories. This yields a monthly, product-level panel data set consisting of prices, quantities, and values of US imports. We then use US tariff code information to classify these imported articles as to whether they had tariffs prior to Tariff Act of 1930 as well as whether their tariff rates changed in June 1930.

The heterogeneity in products affected by the Tariff Act of 1930 allows us to construct a treatment group (products experiencing positive increases in tariff rates in 1930 as well as the size of the rate changes) and a control group (those that did not see their rates change in 1930). We use these groups to estimate the cross-sectional effects of tariff changes, exploiting product and time variation. Using panel event-study models with time and product fixed effects, we find large and significant reductions in the quantities imported as well as their values for treated imports and relative to imports that did not experience positive increases in tariffs in 1930. The average measured effects of the tariffs reduced quantities and values of treated imports by roughly 5% three months after the implementation of the tariff and of almost 8% a year after their imposition. The reductions in quantities and values due to tariffs are even larger in magnitude when we include sector-time fixed effects, consistent with larger tariff-induced substitution within sectors.

We find no evidence of pre-trends or anticipation effects when examining the treatment and control groups. Instrumental variables estimates and specifications using annual data, controlling for country of (export) origin fixed effects, show similar estimated average effects on prices and quantities. Across different specifications, we find an average trade elasticity within the first year after the enactment of Smoot-Hawley of between 4.43 and 5.25, a quantitative finding we explore in more detail. [1]

[1]The trade elasticity, depending on the model, is typically interpreted as one minus the elasticity of substitution across varieties produced in different locations. For the Smoot-Hawley tariff, variation in tariff rates occurs at the product level rather than by exporter location. In our setting, we measure the elasticity of substitution between different products, comparing treated products to untreated ones. By including sector fixed effects, we compare products that are more similar; however, we cannot compare the exact same product by country of origin. In models with nested CES preferences, where substitution across

Using a similar specification, we next consider tariff incidence, and find little evidence that foreign producers lowered their product prices in response to the 1930 tariff. This result implies that American wholesalers or consumers absorbed any changes in product prices arising from the Smoot-Hawley tariff. In 1930, we find no significant differences in prices between products that saw their tariffs rise and those that did not, implying no significant price anticipation and similar trends across the two groups. After implementation, we find some evidence of absorption by foreign producers in the first trimester. The estimates show a negative and statistically significant coefficient on the interaction between post and treatment of roughly 0.75, suggesting that foreign producers absorbed 75% of the change in tariffs. However, event-study plots using monthly data reveal this result to be temporal, lasting only a couple of months. Thereafter, the coefficient displays values that are largely indistinguishable from zero for the remainder of the sample period. Event studies reveal no evidence of systematic price absorption by foreign producers in 1930, 1931, or 1932, and difference-in-differences regression estimates show an average effect on prices that is not statistically different from zero for the treated sample once Smoot-Hawley was enacted.

Our data allow us to generate import trade elasticities at different time horizons using product-level data. We therefore present a new set of tariff-based trade elasticities based on the most comprehensive change to the US tariff code in the last century. Our estimates are also free from changes in monetary policy since the US and almost all of its trade partners remained on the gold standard until September 1931 (when Great Britain devalued), allowing us to isolate the responsiveness of quantities to trade policy rather than

varieties within a product is higher than substitution across broader product categories, our estimates should therefore be interpreted as a lower bound in absolute value for the elasticity of substitution across varieties of the same product.

trade and monetary policy in the short-run (Auclert, Rognlie, and Straub, 2025; Monacelli, 2025).

Empirically, we find a large and rapid effect of tariffs on quantities imported. In absolute value, our short-run trade elasticity is considerably larger than recent research by Boehm, Levchenko, and Pandalai-Nayar (2023), which uses cross-country data on tariff changes and finds tariff-based trade elasticities of less than 2 in the year following the rate change in tariffs. Using a simple, New Keynesian model, we show that exchange-rate movements driven by changes in monetary policy can partially offset the effects of tariffs in the short run, explaining the lower measured reduced-form trade elasticities found in other empirical settings. That is, in the short run, changes in the exchange rate can affect the prices importers and exporters face, reducing the effect of tariffs on quantities in transition.

Similar to Boehm, Levchenko, and Pandalai-Nayar (2023), our model indicates that the effect of tariffs on quantities imported depends on the direct effect of the tariff on quantities as well as on the indirect effect that tariffs produce on supplier decisions due to changes in prices. This indirect effect, in turn, depends on the effect of tariffs on prices of production and the effect of tariffs on the exchange rate. However, given that the U.S. was on the gold standard and had a fixed exchange rate during our sample period, exchange-rate movements are muted. Using a product-level weighted exchange rate, we show that this is the case in our sample. Moreover, our empirical estimates show that foreign exporters did not respond to Smoot-Hawley by lowering their prices. Combining these two factors implies that our estimates of the effects of the 1390 tariff on the quantity of imports measures the elasticity of substitution.

Using our model, we also examine why measured trade elasticities can be smaller in the short run. If market conditions change producer prices or monetary policy reacts to tariffs (e.g., depreciating the domestic currency), the measured effect on quantities can be lower in the short run even with a relatively large elasticity of substitution. Our results highlight the importance of monetary policy when interpreting the effect of tariffs on the quantity imported, a factor that is crucial for understanding the aggregate implications of tariffs (Auclert, Rognlie, and Straub, 2025; Monacelli, 2025).

Using our model, we also estimate the contribution of Smoot-Hawley to the decline in total US imports in the first year after enactment, which in nominal terms, fell by a massive 37%. We find that the Tariff Act explains roughly one- quarter of the decline in total US imports in the first year after its implementation, slightly higher than the estimates in Irwin (1998b), with this difference in estimates largely attributable to our higher measured trade elasticity. In other words, in a world without the Smoot-Hawley tariff, our model estimates that trade would have fallen by approximately 27% between May 1930 and May 1931. As Irwin (2011) and others have noted, the Smoot-Hawley Tariff mattered, but other factors associated with the Great Depression, including declining aggregate demand, are important in explaining the collapse in imports that occurred between October 1929 and March 1933.

With these estimates in hand, namely, the trade elasticity and expenditure shares, we then evaluate the welfare implications of tariffs. Using a partial equilibrium analysis as in Amiti, Redding, and Weinstein (2019), we find that the tariffs we estimate imply a deadweight loss of roughly 0.2% of GDP in 1929 without considering the benefits of tax revenues, and as low as 0.02% when tariff revenues are rebated back to households or firms in a non-distortionary, lump-sum manner. In comparison, Amiti, Redding, and Weinstein (2019) find an annual estimated deadweight loss of roughly 0.09% of GDP per year for the much narrower set of tariffs imposed by the US in 2018, due to imports' larger share of GDP in 2018. Using the general equilibrium approach of Costinot and Rodríguez-Clare (2014), we estimate a welfare loss of about 0.2% of GDP when tax revenues are not considered. To better understand the 1929 trade share's impact on this welfare estimate, when we use the same values for the tariff rate increase and the elasticity but instead applying today's trade share (about three times larger than 1929), welfare losses are about 3 to 4 times larger relative to GDP. Fajgelbaum et al. (2020) build a general equilibrium model and estimate the annual deadweight loss from the limited 2018 tariffs as 0.04% of US GDP. The welfare loss due to Smoot-Hawley is larger than estimates based on these recent tariff changes, but it is still small due to the high share of domestic expenditure (over 95%) and the large estimated trade elasticity in our sample period.

Our data and empirical setting have several appealing features. First, as noted above, the 1930 Tariff Act affected a wide range of imports. Although the tariff started as a 1928 Presidential campaign promise aimed at addressing the ongoing struggles of farmers in the 1920s, it quickly spiraled into a much more comprehensive rewrite of the U.S. tariff code that also resulted in significant changes to manufacturing tariffs. After a considerable and protracted negotiation in the House and Senate, the tariffs that appeared in the final version of the bill affected many products and sectors, and thus impacted a large number of trade partners' chief exports (Mitchener, O'Rourke, and Wandschneider, 2023). The broad-based changes in tariffs enacted in June 1930 allow us to examine this infamous episode of a large economy considerably ratcheting up its tariffs.

Second, because the U.S. and nearly all of its trade partners were on the gold standard when Smoot-Hawley was passed, we are able to isolate the effects of the tariff on prices and quantities free of exchange-rate effects for more than a year. Third, prior to the proposed recent changes in the U.S. tariff code, the Tariff Act of 1930 represents the last 20th century example of American trade policy when tariffs were significantly increased. After World War II, the U.S. actively engaged in both multilateral (through GATT and WTO) and regional tariff agreements that lowered tariffs. Subsequent tariff hikes were usually limited to just a few products and were often temporary in nature.

Fourth, although the U.S. economy may be experiencing a similar large shift in tariff policy in 2025, as of writing, this most recent episode's effects are not fully observable since the tariff code continues to be revised due to fluid governmental policies and legal rulings. Our episode thus provides a historical complement to studies examining the effects of the much more limited tariff increases during the first Trump administration as well as the ones currently being enacted during his second term as president. Additionally, given the nature of our episode, we provide estimates of a change in tariffs that has a clear starting date and remained invariant at least up to June 1934, when the Reciprocal Trade Agreements Act (RTAA) was enacted.

Literature Review. Our study contributes to the literature in several ways. First, we respond to the recent call for more empirical studies on trade policy (Goldberg and Pavcnik, 2016), and focus on the most infamous case of American trade policy from the 20th century. The recent return of protectionism in the United States has also prompted new research interested in quantifying the effects of trade policy. Our paper is most closely related to those examining pass-through and tariff incidence in the context of the 2018-19 and 2025 tariff episodes (Amiti, Redding, and Weinstein, 2019; Gopinath and Neiman, 2026; Cavallo, Llamas, and Vazquez, 2025; Fajgelbaum et al., 2020; Flaaen, Hortaçsu, and Tintelnot, 2020; Cavallo et al., 2021). As in many of these studies, we find nearly complete pass-through on prices to the domestic economy as well as significant effects on the quantity of imports targeted by new tariffs. (For example, using a similar event-study design Fajgelbaum et al. (2020) find tariff-targeted products in 2018-19 fell by roughly 2.5%; in our setting, the quantity of imports fell by roughly 8% in the year following implementation). As noted above, one advantage of our data is that we collected import prices measured at the market of origin instead of simply relying on unit values, i.e., the implied price of an imported article computed by dividing the total value of the imported article by the total quantity imported. For estimation purposes, these port-of-orign import prices are superior to unit values because the latter can suffer from measurement bias (including quality changes and within-category heterogeneity) as well as simultaneity bias, which can affect their measurement and hence statistical inference (Fontagne, Guimbard, and Orefice, 2022; Feenstra and Romalis, 2014). Import prices collected at the market of origin (exporter to the U.S.) thus allow for cleaner measurement of pass-through to American importers. We then obtain changes in tariffs before and after Smoot-Hawley as well as the quantities and values for each specific import to estimate the effects of tariff changes on prices and quantities for the same group of products.

As in recent studies examining changes tariff policies on pass through, our study focuses on tariff incidence for a large economy, the United States. The Tariff Act of 1930, however, differs from changes in American trade policy in 2018-19 in that the new tariffs during the first Trump administration disproportionately targeted Chinese imports (via Section 301) and otherwise affected a more limited range of imports (e.g., metals, solar panels, washing machines through Sections 201 and 232).[2] The 2025-6 Trump administration tariffs potentially represent a more apt comparison to Smoot-Hawley in terms of their eventual scale and scope. However, an important difference is that the rate increases in

[2]It also featured some non-tariff arrangements, such as purchase agreements of agricultural goods.

1930 were almost entirely assessed at the product level, so many goods that the US did not produce, both inputs of production or consumption goods (such as bananas), were not affected by the Tariff Act of 1930, which explains our relatively large trade elasticity and the small, measured welfare effects of Smoot-Hawley (Arkolakis, Costinot, and Rodríguez-Clare, 2012). Recent rate increases in the US have yet to settled at their permanent levels due to the Trump administration's planned response to the 2026 Supreme Court ruling against the legality of many of the early 2025 "Liberation Day" tariffs (which included "reciprocal tariffs" that varied by country), continued bilateral trade negotiations between the US and its trade partners, and the suggestion by the administration that additional product-level tariffs (beyond those already implemented) may be imposed. Since the final rates are not yet known, it is therefore difficult to estimate parameters necessary for evaluating the effects of the 2025-6 tariffs.

Researchers have also noted that estimating the effects of policy-based tariff hikes for the recent period is particularly challenging because of shipment lags, subsequent exemptions at the product level and company level (e.g., microchips), USMCA inclusion, evasion and uneven enforcement (Gopinath and Neiman, 2026). Our study thus provides an empirical setting where the rate changes are complete, comprehensive, and permanent (i.e, were not altered or removed during the period of analysis). We have a full and known set of rate changes applying to a large change in US tariff policy that remained invariant for four years, allowing us to measure the tariff's effects on prices and quantities in the short run and medium run. In comparison to episodes such as 2018-19, which are also "complete" in the sense that we can now fully observe short-run and medium-run effects, our setting provides evidence on a more comprehensive overhaul of the tariff system.

Moreover, we have a setting where we can explicitly control for the effects of exchange rates on trade prices and quantities, given the U.S. remained on gold until April 5, 1933 and most US trade partners remained on gold up to the third quarter of 1931, more than a year after Smoot-Hawley. Jeanne and Son (2024), show the conditions under which exchange rates can absorb the effects of tariffs, potentially fully under certain assumptions. Furceri et al. (2022) provide empirical support for this mechanism, finding that tariff shocks appreciate the real exchange rate. Important US trade partners, such as Great Britain, Canada, and Japan only went off gold beginning in September 1931, 15 months after the implementation of Smoot-Hawley. Using product-level weighted exchange rates, we find that exchange-rate movements played a limited role during this period. This is mainly because exchange rate parity was largely maintained until 1931 and, afterward, because exchange-rate changes were primarily associated with countries abandoning the gold standard and with country-specific shocks, rather than reflecting a direct response to the Tariff Act of 1930.

Our research also relates to interest in empirically estimating the macroeconomic effects of tariffs (Känzig and den Besten, 2025; den Besten et al., 2026) and specifically estimating trade elasticities using trade policy, a key parameter of interest in international trade (See Anderson and van Wincoop (2004) and Head and Mayer (2014) for reviews). Using aggregate import data, Irwin (1998b) quantifies the effects of of the Smoot-Hawley tariff on imports and finds modest effects. We complement those findings by using product-level data on tariffs and imports to measure trade elasticities. We find complete pass-through and large effects of the Smoot-Hawley Tariff on the quantities of affected imports. This last result implies a high trade elasticity and considerable domestic substitution between goods affected and not affected by the new tariffs.

Compared Boehm, Levchenko, and Pandalai-Nayar (2023) and Teti (2024), our estimates show large trade elasticities, even in the short run. There are several reasons why these differences may arise. First, our empirical approach for estimating trade elasticities differs in that we use a single, large, within-country tariff shock. Second, the Tariff Act of 1930 increased tariff rates on a large number of product groups, an important difference from studies relying on data from the GATT and WTO era – when tariff rates were generally negotiated downward. Third, we exploit product-level variation in tariff rates that remained in place for several years after implementation, which allows us to trace out the evolution of elasticities over the short run and medium run. These characteristics of our data allow us to compute short-run and medium-run elasticities and avoid measurement issues described in Teti (2024). Fourth, as discussed above, our short-run elasticities measured over the first 15 months are largely free of exchange rate effects.

Finally, our estimates might also differ because the political process of the early 1930s favored raising rates more on imports that had many close domestic substitutes.[3] That said, this earlier era is still of general interest today since the 21st century global economy is once again witnessing countries that are *raising* tariff rates for political reasons. In summary, our research complements existing studies focusing on post-World War II trade policy changes by producing a set of product-group estimates as well as an average trade elasticity estimate over various horizons for the 1930s.

Our research also contributes to a recent stream of papers evaluating the effects of trade policy in interwar period using modern empirical methods and disaggregated or large data sets (Jacks, Meissner, and Novy, 2008; Bond et al., 2013; Jacks, Meissner, and Novy, 2020; Vellore et al., 2024; Mitchener, O'Rourke, and Wandschneider, 2023; Chakrabarty, Crucini, and Harrison, 2025; Greenland and Lopreseti, 2022). The Tariff Act of 1930 has

[3]Additionally, the lack of adjustment in prices at the market of origin could indicate higher foreign elasticity of supply.

received considerable attention from economic historians (Irwin, 1998a, 2012, 1998b, 2011; Crucini, 1996; Crucini and Kahn, 2007). Crucini (1994) was one of the first articles to make use of micro level data on Smoot-Hawley tariff rates. Our paper builds on the methodology of his research and more recent scholarship Bond et al. (2013); Greenland and Lopreseti (2022); Chakrabarty, Crucini, and Harrison (2025) that exploits the cross-sectional variation in tariff rate changes in 1930 by also drawing on new high-frequency quantity and price data on imports from the period around the tariff act. Our high-frequency panel data allow us to apply modern micro empirical methods to analyze outcomes that vary both across industries and over time.

Our study thus not only throws new light on this important historical episode by providing quantitative estimates of the tariff's effects on quantities and prices, but also provides novel estimates of key trade parameters whose values have often been assumed in the existing literature on the interwar period. For example, in generating gravity-based estimates for trade costs for the interwar period, Jacks, Meissner, and Novy (2011) have to assume a value of -8 for the elasticity of substitution based on their reading of estimates from other time periods. Exploiting the cross-sectional variation in rate changes and monthly data, we improve upon this by providing period-specific or interwar estimates of the conceptually-related, but broader concept of a trade elasticity, and that complement another recent interwar estimate based on British trade data De Bromhead et al. (2019).[4] Moreover, existing research on the Smoot-Hawley Tariff often assumes a value for pass through or estimates it using simple cross-sectional regressions so the tariff's

[4] This study estimates elasticities of substitution between different "varieties" (country of origin) of the same imported good as well as the elasticity of substitution between different imported goods, exploiting differential tariff rates that arose on the same imported goods based on country or colony of origin due to the system of imperial preferences. Their estimated elasticity of substitution between imported goods (with a value close to -1) is conceptually closer to the elasticity of substitution that we estimate, with their figure implying a more inelastic demand than our result.

macroeconomic impact can be evaluated (Bond et al., 2013). Our data and event-study analysis allow us to generate monthly estimates of the effects of Smoot-Hawley on import prices while controlling for potential confounders, such as differences in the types of tariffs across imports (specific vs. ad valorem) and differences in import substitution across sectors of the US economy.

Finally, Irwin (2011) and Crucini and Kahn (2007), among others, find relatively modest effects of the Smoot-Hawley Tariff on GDP, mainly due to the low share of imports relative to GDP. In a related article, Irwin (2010) also uses sector-level data to estimate the deadweight loss (DWL) from the existence of US tariffs between 1859 to 1961. Our analysis complements this existing scholarship by explicitly measuring the elasticity of substitution for the goods exposed to tariffs at the time and then using this estimate in our welfare calculations. Our DWL estimates are slightly larger than Irwin (2010) for the relevant period of overlap, the early 1930s, mainly due to our larger estimated elasticity of substitution. However, consistent with this literature, we also find very small welfare losses arising from the Tariff Act of 1930 given imports' low share of US GDP and the fact that the tariff failed to generate more revenue relative to GDP.

The rest of the paper is organized as follows. Section 2 describes the historical context and our data. Section 3 presents our empirical strategy and estimates the effects of Smoot-Hawley on quantities, values, and prices. Section 4 uses a New Keynesian model to explore how monetary policy changes operating through exchange rates affect the size of trade elasticities in the short run, and uses this lens to discuss our findings relative to the literature. It then uses this model to quantify the effects of Smoot-Hawley on total US imports. Section 5 presents both a static and a general equilibrium estimates of the Smoot-Hawley tariff's effects on welfare. Section 6 concludes.

2 Data and Historical Setting

This section first discusses how the enactment of the Tariff Act of 1930 led to a comprehensive rewriting of the tariff code. It then describes the data we use in our analysis and presents some summary statistics on how Smoot-Hawley changed the existing tariff rates.

2.1 The Tariff Act of 1930

The origins of the Tariff Act of 1930 date back at least to campaign-trail promises made by Republican presidential candidate Herbert Hoover to Midwestern farmers – an important constituency. In spite of the Emergency Tariff Act of 1921 and the Fordney-McCumber Tariff of 1922, agricultural farm prices were falling relative to non-agricultural goods throughout the decade (Eichengreen, 1989). In addition, farmers were saddled with debt and foreclosures from wartime expansion of cultivable land that was no longer paying off due to the return of European producers after the end of World War I. Two months before Hoover's inauguration in March 1929, the Republican-controlled House Ways and Means Committee began meeting on the issue of American tariffs with the hope of acting on the newly-elected President's tariff agenda.

However, as drafts of the proposed legislation passed between the the House and Senate over the subsequent year and a half, it was clear legislators had moved beyond the "limited tariff" Hoover had called for in his inaugural address to a much more comprehensive tariff, one that would that would not only seek relief for agricultural, but one that would also significantly alter manufacturing tariffs. A classic analysis of pork barrel politics (Schattschneider, 1935) describes how the proposed legislation's reach broadened considerably through a process "reciprocal noninterference," where no one import-competing group benefited more than any other, but a broad coalition of import-competing sectors benefited sufficiently so as to support its passage. Subsequent research argues that vote-trading and log rolling in the Senate also played a pivotal role in widening the coverage of the tariff (Irwin and Kroszner, 1996). The final version, sponsored by Senator Reed Smoot (UT) and Representative Willis Hawley (OR) was signed into law on June 17, 1930.

Around the time of the implementation of the Tariff Act of 1930, imports were small relative to US GDP. Table 1 shows that in 1929 imports accounted for 4.2% of GDP. After the stock market crash of October 1929, GDP and imports both collapsed quickly: by 1931, nominal GDP was 26% lower than in 1929 and the value of imports was 51% lower. Both prices and quantities declined during this period, which helps explain the fall in both nominal GDP and the value of imports. Irwin (2011) argues that between 30-40% of the decline in imports can be attributed directly to Smoot-Hawley, due to the increases in duties, or indirectly, since deflation increased the average tariff paid on goods subject to specific tariffs. As a result of this decline, imports as a share of GDP fell from 4.2% of GDP in 1929 to 2.7% in 1931. Tariff revenue declined from 0.56% of GDP to 0.49%, despite the rising average tariff rates.

Table 1: Imports and GDP between 1929 and 1931

Year	1929	1930	1931
GDP (USD, billions)	103.6	91.2	76.5
Imports (USD, billions)	4.34	3.11	2.09
Tariff Revenue (USD, billions)	0.58	0.462	0.37
Imports over GDP	4.19%	3.41%	2.73%
Tariff Revenue over GDP	0.564%	0.506%	0.485%

Notes: GDP, imports, and tariffs revenues are in nominal USD. GDP is from the U.S. Bureau of Economic Analysis. Imports and tariff revenue are from the the U.S. Department of Commerce, *Foreign Commerce and Navigation Acts of the United States* (1929, 1930, 1931) Department of Commerce (1930a).

The American tariff code was already large and complex before Smoot-Hawley was enacted, consisting of roughly 4,500 articles. Among them, almost half were subject to ad valorem tariffs, around one fourth to specific tariffs, and nearly 10 percent to compound tariffs (a combination of both a specific and ad valorem tariff).[5] The remaining categories corresponded to goods with no tariffs. After Smoot-Hawley, the number of categories increased by around 10%, to roughly 5,000. The composition of categories remained relatively constant, with a slight decrease in exempt categories and categories with specific tariffs, and an increase in categories with ad valorem tariffs and compound tariffs. The product group with the largest number of tariff categories was "cotton manufactures," with roughly 1,000 tariff lines, many of which varied by numerical thresholds that captured specific product characteristics. Certain groups of metals, metal manufactures and industrial chemicals also had a large number of tariff categories.

Ideally, one could use product-level tariff data to construct a weighted average rate tariff rate, pre and post any change in a country's tariff code. However, comparing changes in tariff rates over time on an article-by-article basis is quite challenging since new subcategories of tariffs can be created when the tariff code changes. Nevertheless, we can still exploit disaggregated data to gain a more accurate assessment of how the Smoot-Hawley tariff altered the average tariff rate on dutiable goods. To do so, we construct average tariff rates based on the 88 sub-categories of imports. These 88 categories encompass all U.S. imports at the time of enactment and are published in the 1930 edition of U.S. Department of Commerce, *Foreign Commerce and Navigation of the United States*. They roughly correspond to trade at the 2-digit-level using today's Harmonized System Codes. Specifically, we calculate the total amount paid in tariffs divided by the imports subjects to a rate, the

[5] This breakdown accounts for the number of products (i.e., at the level of the tariff line) and is not weighted by the quantity imported. Irwin (1998a) reports that 65% of dutiable imports had specific or compound tariffs in 1925 weighted by value of imports.

ad valorem equivalent rate, for each of the 88 categories before and after the enactment of Smoot-Hawley. Using the average of these 88 rates, the ad valorem equivalent rate was around 44.5% before enactment of the Tariff Act of 1930. After that tariff came into effect, the ad valorem equivalent rate rose to 50.4%. This change in the tariff rate considers only articles that were dutiable, but many imported articles entered duty free. If we consider the large fraction of goods that entered the US duty free, the average rate across all 88 categories increased from 15.9% to 17.5%. Of course, that average rate also includes substitution between categories, reducing the total revenue collected and hence the implied tariff rate using an ad valorem equivalent. In order to have a sense of how much substitution matters, we estimate the ad valorem equivalent rate for each of the 88 categories. Using this approach, the average rate increased from 12.1% before enactment (weighted by total imports in the first half of 1930) to 18.1%, six months after the Tariff Act of 1930 went into effect.

Of course, these averages mask variation in rate changes across product categories at the 2-digit level. Some categories had rates as high as 85%. Others, such as non-manufactured silk or petroleum, had no tariffs before or after June 1930. In general, goods that were harder to produce in the United States, such as bananas and turmeric, or important intermediate inputs, such as copper or iron ore, did not see their rates change under Smoot-Hawley. By contrast, imported articles that the United States produced more intensively were more likely to have higher tariffs initially, and also saw their rates rise due to the Tariff Act of 1930. For example, rice and wool clothing already had high rates before June 1930, but were then subjected to large rate increases under Smoot-Hawley. As discussed earlier, these rate changes resulted from Congressional negotiation over the scope of Tariff Act. From a measurement perspective, the political economy of these rate changes implies that many highly tariffed goods likely had near substitutes, which could have implications for how much of the incidence is borne by foreign suppliers, a point we return to later.

2.2 Data

We now describe the construction of a micro-level panel dataset, which we will use in our empirical analysis. To understand the effects of the Smoot-Hawley tariff on quantities and prices of imports, we digitized several different U.S. government publications. For import prices at the product level, we digitized the U.S. Department of Commerce's *Monthly Summary of Foreign Commerce* (Department of Commerce, 1929b, 1930b, 1931b, 1932b). Through June 1932, this publication included a table entitled, "Monthly Average Prices of Principal Articles Exported and Imported," which displays many of the most important U.S. tradables by value added. Table A.1 in Appendix A shows that just prior to the enactment of Smoot-Hawley (1930H1) the products specified as "principal imports" by the US government represented 60% of the total value imported. The table's note further specifies that import prices are "based on wholesale price of articles in the markets of the countries from which imported for unit of quantity stated." These reported prices are thus the price of the import to the U.S. recorded in the country of origin (or exporting country) and represent wholesale prices received at the port before any U.S. tariffs are applied. Throughout our discussion, we refer to these wholesale prices at the country of origin as "import prices."

As noted, the data on import prices shown for principal imports is a subset of all imports, consisting of 82 products such as "beef and veal, fresh," "spun silk," and "unrefined copper." In some months and for some goods, there are no import prices listed in the table from the government report, perhaps because there were no imports in that month or there was a publication timing issue or some other issue that was not reported in the publication. For some of these cases, we were able to find the missing price from the publication in the same month, but dated one year later, and which also reported prices for the month of interest. All import prices are quoted in US dollars.[6] We drop any product that still had missing values since these can affect the interpretation of the results in difference-in-differences estimates, our main estimation strategy utilized in the empirical section.[7] After this cleaning, we obtain a balanced sample of import prices, quantities, and values.[8] Using this source for price data, we obtain a consistent set of 73 products with a full series of monthly import prices beginning in January 1929 and continuing through June 1932, the last month the table displaying "principal import and export" data appears in the publication.[9] Appendix Table A.2 shows that the 73 products included in our sample span all the 1-digit classification codes or groups that the U.S. Commerce Department utilized for imports in the late 1920s and early 1930s.

We then obtained the tariffs that applied to each of the 73 products (if any) before and after Smoot-Hawley was enacted using *Foreign Commerce and Navigation of the United States* (Department of Commerce, 1930a). (The Tariff Act of 1930 is the only change in American tariffs that occurred during our sample period.) Following other scholars (Bond et al., 2013), we use Table 9 from this government publication for the line-item tar-

[6]Most US trade partners were on the gold standard up through August 1931, so exchange rate changes likely played a very small role in explaining changes in those prices given rates were pegged and stable.

[7]In most cases, goods with missing prices also have missing quantities. In one case (Coal: Bituminous), there is only one missing price, for July 1931, but no missing quantity for that month, and that good had price and quantity data for the rest of the period. So, we impute the price of that good for July 1931 by averaging the prices for June and August (i.e., 0.5*(4.68+4.58)).

[8]While procedures such as Poisson Pseudo-Maximum Likelihood (PPML) would allow us to deal with zero quantities, we would have to input values for prices in order to keep a unique sample of quantities and import prices. That said, as a robustness check we ran PPML regressions for quantities of imports to check this alternative, and it delivers similar results for the cleaned and unrestricted sample.

[9]The publication changes format thereafter and reports less information.

iff rates.[10] The table provides the complete list of items imported into the U.S., specifically each article's name, a five-digit classification number, the unit of the quantity imported, the rate of the tariff if applicable (ad-valorem, specific, or both), the quantity imported, the value imported, the total amount paid in tariffs, and the equivalent ad valorem tariff in the case of products with specific tariffs or a combination of an ad valorem and specific tariff.[11] Generally, these figures are reported annually. However, given the large changes in the tariff code that took place midway through 1930, the 1930 publication conveniently reports two tables of interest: one covering data on imports from January 1930 to June 17th 1930 (before the implementation of Smoot-Hawley) and one from June 18th 1930 to December 1930 (after enactment and implementation). The *Monthly Summary of Foreign Commerce* presents monthly data on quantity and values imported for the same goods.

Using the data shown in Table 9 from Department of Commerce (1930a), we obtain the an ad valorem rate or an ad valorem equivalent rate for each article imported. Many of the articles for which we have monthly import prices correspond directly to the tariff line level or the 5-digit classification number provided in Table 9.[12] In some instances, there were multiple sub-products listed with differing tariff rates. In these cases, we aggregate up to the next nearest classification. Appendix Tables A.3 and A.4 show the exact correspondence between the two sources that we used both for the first half and second half of 1930. We validate this correspondence in Appendix C. With this information, we build

[10]The full title of Table 9 is "Imported Merchandise Entered for Consumption, Including Entries for Consumption and Withdrawals from Warehouse for Consumption, With Rates and Amounts of Duty Collected."

[11]For a given article, the ad valorem equivalent shown in the table is calculated as total tariff revenue divided by total value.

[12]The Tariff Act of 1930 conveniently began to list products using this 5-digit classification number and classified the existing (pre-1930) products and tariffs similarly in its 1930 volume. Our sample period significantly predates the introduction of harmonized tariff schedules, but most of our categories would be roughly equivalent to 3-4 digit level of classification under the modern, harmonized system.

a monthly series of quantity, values, and prices at the border for 73 products between January 1929 to June 1932.

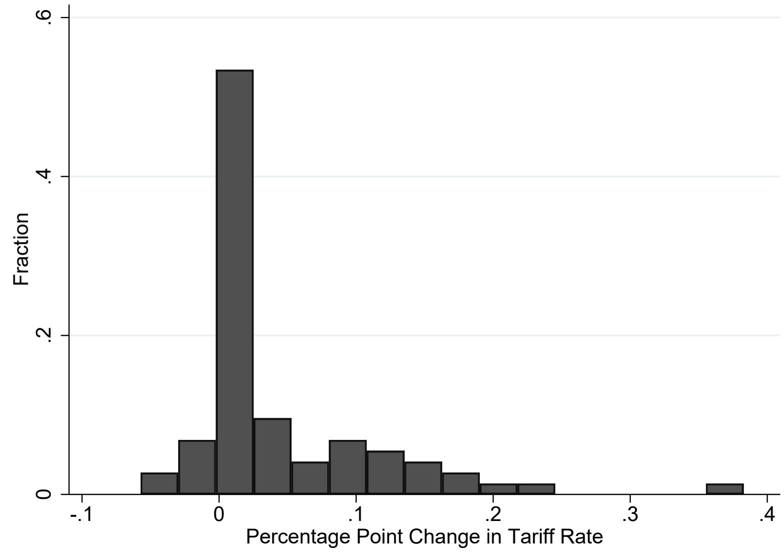
In our sample of principal imports, 53% of the articles had tariffs prior to the Tariff Act of 1930. For our sample of principal imports, ad-valorem equivalent rates from January 1st to June 17th, 1930 ranged from of 0.8% for wheat to a 125% in the case of tobacco leaves. After the enactment of the Smoot-Hawley tariff, 58.9% of articles in our sample had tariffs. On average, comparing duties in the first and second half of 1930 (January 1st to June 17th versus June 18th to December 31st, 1930), tariffs in our sample increased by 6.7 percentage points, from 19.2% to 25.9%.[13] Of course, this average masks some important distributional changes. Many goods, especially goods that are difficult if not impossible to produce in the US, such as bananas or tea, or important intermediate inputs, such as iron ore or copper, were not affected by tariffs before or after Smoot-Hawley. In our sample of imports, the 75th percentile of the tariff increased by 5.6 percentage points and the 90th percentile by 13.6 percentage points. Figure 1 shows the distribution of changes in tariff at the product level. Some imports show a negative change in the rate, which could reflect reductions in rates, goods with specific tariffs where the import price increased, or products in our sample that had sub-categories and where there were changes in the amount of imports toward sub-categories which were less affected by the tariff of 1930.[14]

We then plot the average price of imports between January 1929 and June 1932 based on our sample of 73 principal U.S. imports. Figure 2 shows a clear downward trend, unsurprising since our sample period encompasses the onset and deepening of the Great

[13]Because these calculations include goods with specific tariffs, such averages mask the fact that changing import prices change the ad valorem equivalents and should be taken as suggestive evidence. We address this issue more systematically throughout our analysis.

[14]In many cases, those subcategories are not possible to identify before Smoot-Hawley. Many goods received new tariffs by subcategory (for example, by size). In those cases, those subcategories where generally not reported before the change.

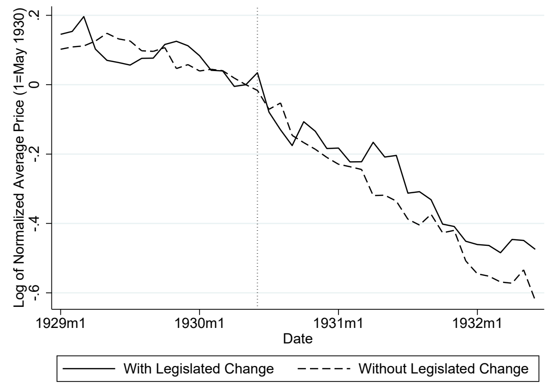
Figure 1: The Distribution of Changes in Tariff Rates due to the Smoot-Hawley Tariff



Notes: The histogram shows the change in the ad valorem equivalent rate for a given import, where the rate is compared for the period from January 1, 1930 to June 17th, 1930 to the period June 18, 1930 to December 31st 1931. Data sources are described in the text.

Depression – a period of severe deflation. Between January 1929 and May 1930, the month prior to passage of Smoot-Hawley, average import prices at the market of origin had declined by 12.3%. Between May 1930 and June 1932, the decline was even more precipitous, with average import prices falling by approximately 55%. Between March 1929 and June 1932, import prices at the market of origin decreased 67.2%. The US wholesale price index fell by 35% between March 1929 and December 1932 and the cost of living index (a US precursor to the CPI) fell by 23% over that same period, suggesting that import prices fell by more than overall prices in the economy. Given this downward trend in import, consumer, and wholesale prices, our empirical analysis of import prices focuses on the *relative* effects of the tariff act, comparing those imports that experienced positive tariff increases in 1930 versus those that did not. All our empirical specifications thus include time fixed effects, such that we exploit the cross-sectional variation in the intensity of tariffs.

Figure 2: Prices with and without Legislated Tariff Changes



Notes: The figure displays the average relative price change for goods with legislated tariff changes (solid line) and the goods without legislated tariff changes (dashed). Import prices are based on the wholesale price reported in the country of origin. Each good's price is first normalized to May 1930. We then compute the average of the log of that normalized price for each group of goods.

We now turn to providing a more systematic analysis of the effects of the Smoot-Hawley tariff on quantities, values, and prices, and estimate models to test for differences in the movements for the two groups of products in our sample before and after its implementation.

3 Estimation and Results

In this section, we present our difference-in-differences (DiD) models and panel event studies to analyze the effects of 1930 tariff code changes on import quantities, values, and prices. Our analysis is at the monthly frequency and spans January 1929 to June 1932 to ensure we have data on quantities and prices for the same set of goods. Because economists and economic historians view U.S. departure from the gold standard as a regime shift that altered the evolution of U.S. prices (Eichengreen, 1992; Ellison, Lee, and O'Rourke, 2024; Temin and Wigmore, 1990), our sample period ends well before the devaluation of the dollar in April 1933 as to avoid any anticipatory effects.

3.1 Measuring changes in tariff rates

To begin, we compute the change in the tariff rate for each product in our sample based on the rate before and after the legislative change that occurred on June 17th, 1930. Specifically, the change in the tariff rate $\Delta Tariff_i$ for article i is defined as

$$\Delta Tariff_i = \log(1 + rate_{i,1930H2}) - \log(1 + rate_{i,1930H1}), \tag{1}$$

where $rate_{i,t}$ is the amount paid in tariffs for imported article i divided by the total value of imported article i in period t. The period $1930H1$ considers imports from January 1st, 1930 to June 17th, 1930. The period $1930H2$ considers imports from June 18th, 1930 to December 31st, 1930. We calculate $rate_{i,t}$ as the ratio of the total tariffs paid by a product i during period t divided by the total value of those imports. For products with ad valorem tariffs, this yields the exact tariff rate since an ad-valorem tariff is a trade tax assessed as a percentage of the total value of the import. Thus, $\Delta Tariff_i$ is equivalent to the legislated rate change due to the enactment of Smoot-Hawley. However, for specific and combined tariffs, $\Delta Tariff_i$ represents an ad-valorem-equivalent change in the tariff rate. (Recall that specific tariffs are trade taxes assessed on the quantity imported, i.e., duties assessed in cents or dollars per physical quantity, such as pounds, ounces, tons, etc.). Compound tariffs consist of an imported article facing both an ad valorem tariff and a specific tariff. Given the heterogeneity in tariff types that exist in the U.S. tariff code, for the sake of comparison, we convert all specific and compound tariffs to their ad valorem equivalents. (This rate is also displayed in Table 9 of (Department of Commerce, 1930a), the source that we digitized for tariff rates).

For specific and compound tariffs, the use of an ad valorem equivalent can generate a time-varying and non-legislated change in the tariff rate if, for example, the import price of product i changes (Eichengreen, 1989; Irwin, 1998a; Chakrabarty, Crucini, and Harrison, 2025; Greenland and Lopreseti, 2022). In instances where the price of imports falls, the ad-valorem equivalent rate for a specific or compound tariff will increase. When using ad valorem equivalent tariffs, it is thus necessary to choose a period over which to average, and comparing the periods immediately before and after the passage of Smoot-Hawley on June 17th, 1930 seemed like a logical baseline given our focus is on comparing pre- and post-1930 enactment effects. In a robustness check shown in Figure B.1 in Appendix B, we find similar results if we instead consider changes in tariffs between January 1931 and December 1931, confirming that our estimated effects are not driven by different types of tariffs. In sub-section 3.3.1, we take a more direct approach to this issue and present event-study plots disaggregated by tariff type; we find no systematic differences between products with ad valorem tariffs and specific or compound (ad valorem plus specific) on the quantity of imports.

3.2 Empirical Specification

Our empirical approach takes advantage of the monthly variation in quantities, values, and prices while still accounting for several important features of changes in trade policy. First, which products received new tariffs in 1930 may be nonrandom — a fact that could influence the magnitudes of measured effects. For example, if 1930 tariff rate changes focused on elastic goods, the effect on quantities and import prices at the origin should be large since foreign producers would react to changes in demand. Second, policymakers could have potentially targeted imported items whose prices were already trending downward for rate increases. Third, measured effects could be influenced by seasonality or because certain goods were more sensitive to declining incomes, once the business cycle turned down.

To account for these potential confounders as well as the possibility of pre-trends in our data, we use panel event studies and difference-in-difference estimates with two-way fixed effects. As in Fajgelbaum et al. (2020), examining our data for pre-trends helps to rule out potential anticipation effects and validates the use of tariffs as a source of identification, either to estimate elasticities of substitution with quantities imported or to estimate the effects of the tariffs on import prices. Our setting corresponds to the two-way fixed effects case De Chaisemartin and d'Haultfoeuille (2020) characterized as yielding unbiased estimates: all treated groups start receiving the treatment on the same date (June 18, 1930).[15] Specifically, we run regressions which take the following form:

$$\log\left(x_{it}\right) = \alpha_t + \gamma_i + \sum_{\tau=1929m1}^{1932m6} \beta^{\tau} I(1\ if\ t=\tau)\Delta Tariff_i + \varepsilon_{i,t}, \tag{2}$$

where x_{it} is either quantities, values or prices of the good i at time t. $I(1\ if\ t=\tau)$ is a variable that takes a value of 1 if the month is t and zero otherwise. $\Delta Tariff_i$ represents the change in tariffs due to the Smoot-Hawley Tariff Act. γ_i is a product fixed-effect and α_t is a time fixed-effect. To control for within-sector substitution effects, we also run a version of this specification using sector-time fixed effects, where the nine sectors are defined by the 1-digit import categories used by the government in the 1930s and described in the data section.[16] Standard errors are clustered at the product level. All coefficients are expressed

[15]We run robustness exercises using a binary variable for goods that perceived or not positive tariff changes. We find results consistent with our main findings.

[16]Specifically, these nine import groups are: (1) animals and animal products, inedible; (2) animals and animal products, edible; (3) vegetable food products and beverage; (4) vegetal products inedible; (5) textiles; (6) wood and paper; (7) nonmetallic minerals; (8) metals and manufactures; and (9) chemicals and

relative to March 1930, the month we set as the baseline in case anticipatory effects influence the coefficients in the few months before the Tariff Act of 1930 is signed into law.

Our empirical model controls for many factors that could potentially bias the estimated effects of tariffs. To avoid aggregate trends or shocks that might affect all imports in the same month, we include a time fixed effect. Our estimates thus explore the cross-sectional variation in the reaction of imported goods to tariffs. For most of our sample period, U.S. exchange rates are fixed vis-a-vis most of its trade partners (almost all countries were on the interwar gold standard at the beginning of our sample period), meaning that US monetary policy will not play an important role in terms of affecting relative prices in exporting countries; however, other aggregate shocks could. Additionally, as mentioned earlier, tariffs could have targeted goods that had experienced larger declines in prices or quantities before the tariff's enactment. We thus measure pre-trends to ensure that our estimates do not capture changes due to potential selection bias. Finally, the new tariff rates were clearly announced and were neither reversed nor changed further during our sample period, meaning that our estimates are not influenced by future changes in tariffs in the US.

3.3 Effects on Quantities and Values Imported

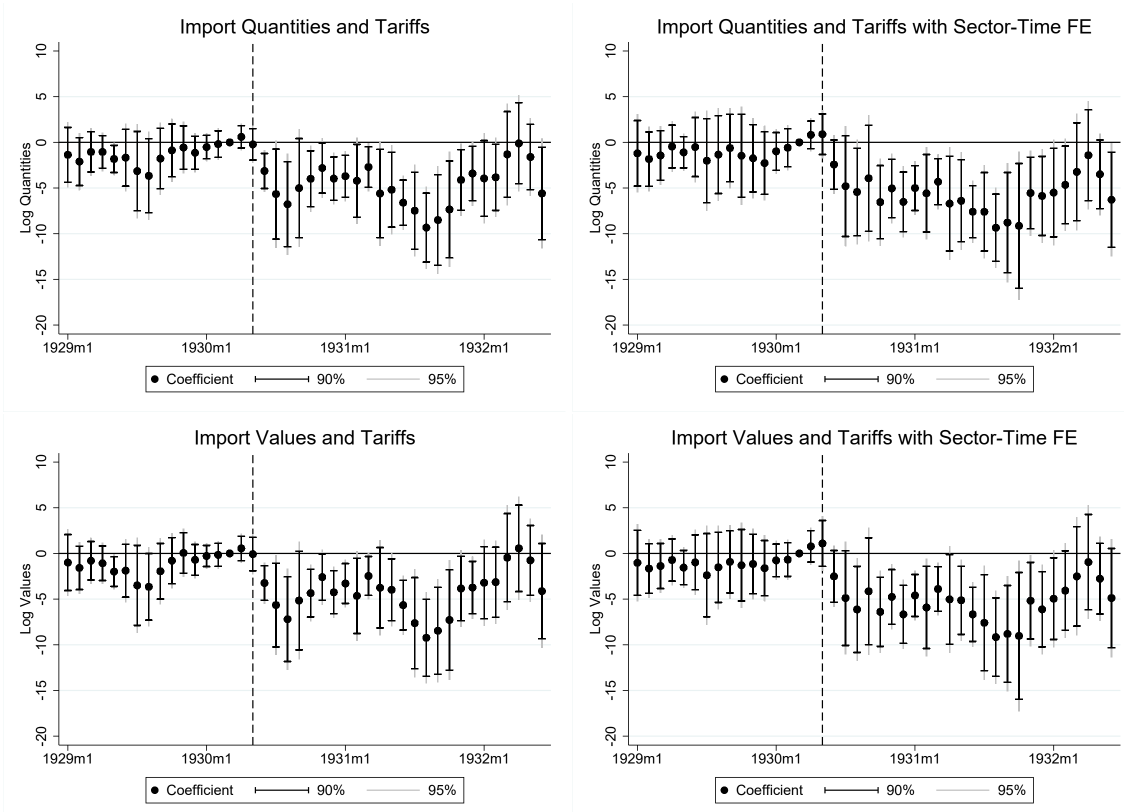
Next, we estimate the effects of the Tariff Act of 1930 on imported quantities and values using our monthly data. We estimate models based on equation 2, where the dependent variable is either the quantity or the value of imports. Some specifications include 1-digit-sectoral fixed effects interacted with a time fixed effect. Our sample period spans January 1929 to June 1932. In our specification, we set the baseline period (month) as March 1930 to account for potential anticipation effects of the tariff's enactment.

related products.

Figure 3 displays event study plots of the estimated effects of Smoot-Hawley tariff rate changes on either (log) quantities in the top two panels or (log) values in the lower two panels. The vertical dashed line again indicates the benchmark month of March 1930. The plotted coefficients for $\Delta Tariff_i$ reveal that both the value and quantity of imports facing new tariffs under Smoot-Hawley fell swiftly and substantially. In June 1930, the month that tariffs were implemented, the effects of the Smoot-Hawley Tariff on quantities and values are statistically significant at the 95-percent level and slightly negative. The estimated coefficients are large and negative in subsequent months, reaching their 1930 nadir in August. The figure shows that, as measured for August 1930, for every one-percentage point increase in the tariff rate , both quantities and values fell by over 6% relative to imports whose tariff rates did not change. In specifications including sector-time fixed effects, the imports remain negative and statistically significant through the end of 1930. The relative decline in the quantity and value of imports fell even more sharply in 1931, with the coefficient peaking at over -8%.

While the coefficients show some cyclicality prior to June 1930, we observe no evidence of persistent upward or downward pre-trends, suggesting that the effects are not influenced by strong anticipatory effects of the enactment of the tariff act, a factor that can impact import dynamics (Alessandria, Kaboski, and Midrigan, 2010). The cyclicality shown in the coefficient is perhaps due seasonal changes in the demand for imports, such as agricultural goods. To adjust for any seasonal factors in the data, we run a regression for each product in our sample with monthly fixed effects. We then obtain the residual of that series and re-run the differences-in-differences regression using this as our *seasonally-adjusted* dependent variable. It should be noted that because seasonality coincides with the timing of the tariff, this exercise could potentially lead to an underestimate the actual

Figure 3: The Effect of the Smoot-Hawley Tariff on Import Quantities and Values

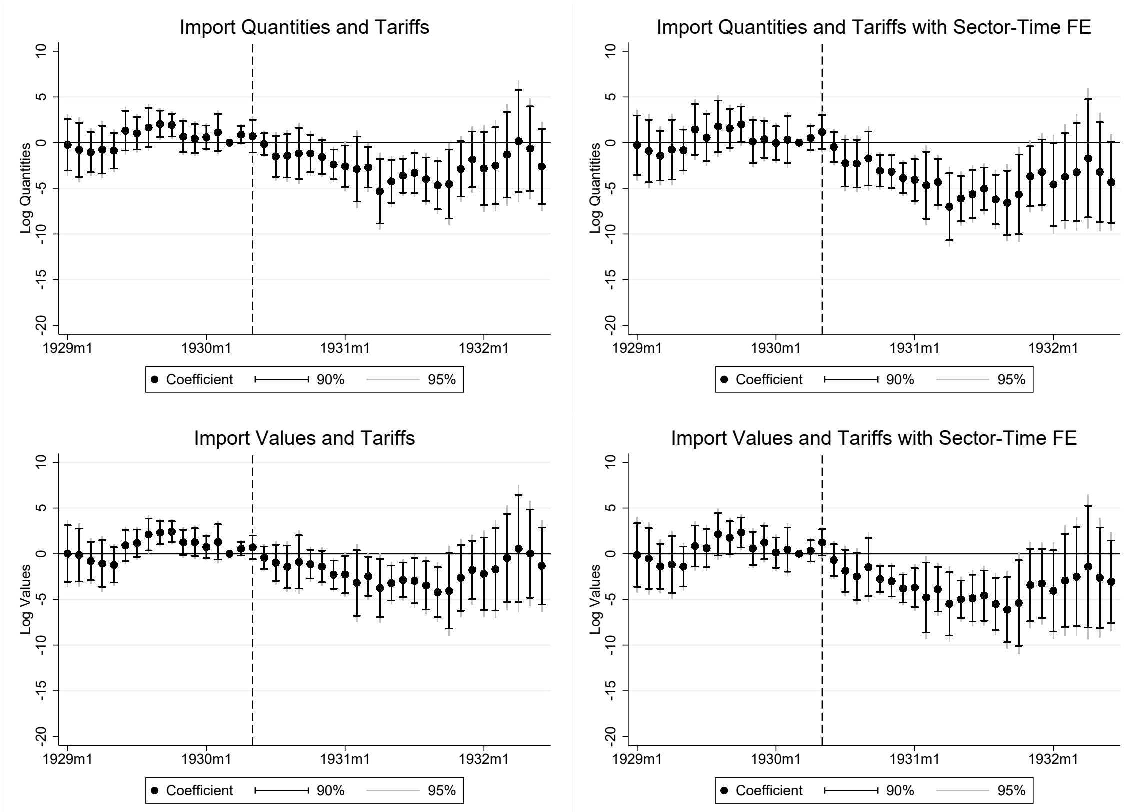


Notes: The figure displays event-study plots based on equation (2), where the dependent variable is either the log quantity of imports (upper two panels) or the log value of imports (lower two panels). The right panel also includes sector-time fixed effects. The baseline period is March 1930 for both graphs as shown by the dashed vertical line. Black dots are estimated coefficients for the change in tariffs as defined in equation (1) interacted with the time fixed effect for each period. The darker lines represent 95-percent confidence intervals and the light gray lines 90-percent confidence intervals. Standard errors are clustered at the product level.

effect.

Figure 4 shows the results from this specification, and displays patterns that are similar to those shown in Figure 3. First, there is a sharp decline in affected imports, measured either by value or quantity, for those imports facing higher tariffs under Smoot-Hawley. This decline then intensifies over time. In comparison to the panels shown in 3, the esti-

Figure 4: The Effect of the Smoot-Hawley Tariff on Import Quantities and Values Adjusting for Seasonality



Notes: The figure shows estimates of equation (2), where the dependent variable is either the log quantity of imports (upper panels) or the log value of imports (lower panels). The right panels include sector-time fixed-effects. All variables are seasonally adjusted, by taking the residual of regression with month fixed effect at the product level. The baseline period is March 1930 for both graphs. Black dots are coefficient for the change in tariffs as defined in equation (1), interacted with the time fixed effect each period. The darker lines represent 95- percent confidence intervals and the light gray lines 90- percent confidence intervals. Standard errors are clustered at the product level.

mated coefficients are somewhat smaller in magnitude, but still economically meaningful. In our main specification in both quantities and values, the coefficient is close to -5% for almost all of 1931, and then starts to increase around September 1931, when the UK and other main US trade partners abandoned the gold standard. As before, the effects tend to be more pronounced when sector-time fixed effects are included. For quantities, the coefficient bottoms out at -5.9% in April 1931.

The large estimated coefficient on quantities could be explained by the characteristics of the Tariff Act of 1930 if its aim was to protect domestic industry. For example, it could have targeted goods with higher elasticities of substitution, with domestic producers responding to the tariffs by ramping up their production. In fact, as discussed in Section 2.1, key inputs of production like copper or petroleum as well as goods not produced in the US, such as bananas, were generally not tariffed. In addition, the timing of the tariff act could have been non-random, since by the time of its passage, some sectors of the American economy were already contracting, making its passage and the products that received new tariff rates potentially endogenous to the economic cycle. However, as argued in research on other tariff episodes (Fajgelbaum et al., 2020), the absence of pre-trends indicates that no product characteristic predicts the change in the duty under Smoot-Hawley, and reduces concerns about these types of confounding factors. To account for these concerns more explicitly in our estimation, Section 3.5 considers additional specifications and finds results very similar to those presented here.

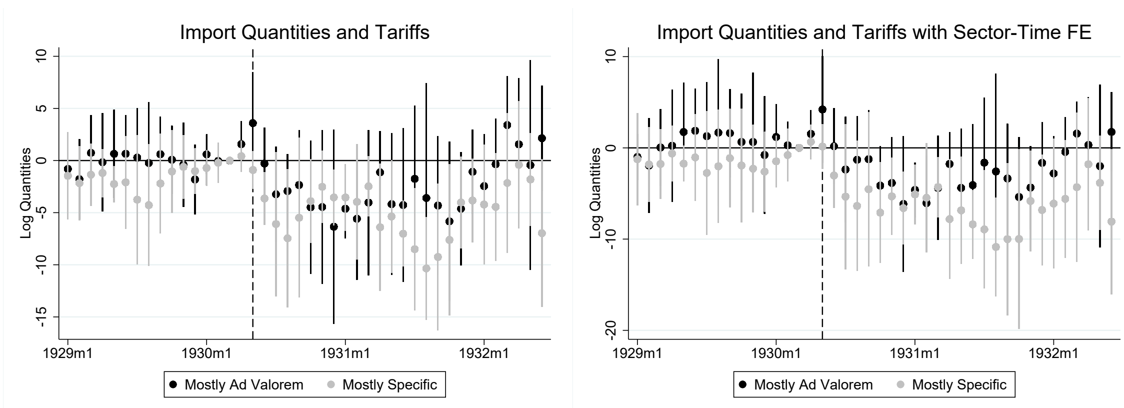
3.3.1 Heterogeneity by Type of Tariff

We next explore heterogeneous effects by types of tariffs found in the tariff schedule. Some imports in the 1930s faced ad valorem tariffs, computed as a constant proportion of the value while other imports faced specific tariffs which, for a given quantity imported, have a constant dollar value (e.g., 12 cents per pound). Since specific tariffs are nominally rigid, their ad valorem equivalent rates change as the price of the tariff article increases or decreases over time. As noted earlier, our sample period coincides with a general period of deflation, meaning that the ad valorem equivalent of specific tariffs generally increased. To account for this tariff heterogeneity, we run the following regression:

$$\log (Q_{it}) = \alpha_t + \gamma_i + \sum_{\tau=1929m1}^{1932m6} \beta_{AV}^{\tau} I(1 \text{ if } t = \tau) \Delta Tariffs_i \times Sh_{AV,i}$$
$$+ \sum_{\tau=1929m1}^{1932m6} \beta_{Q}^{\tau} I(1 \text{ if } t = \tau) \Delta Tariffs_i \times (1 - Sh_{AV,i}) + \varepsilon_{i,t}, \quad (3)$$

where Sh_AV_i is the share of the tariff that is ad valorem. This variable lies between zero and one, as some imports in our sample were assessed a combination of ad valorem and specific tariffs. Q_{it} is the quantity imported of product i at time t.[17] Figure 5 shows that there are no statistically significant differences based on the type of tariff, even in 1931, when the effects of specific tariffs were operating more strongly due to ongoing deflation.

Figure 5: The Effect of the Smoot-Hawley Tariff on Import Quantities by Type of Tariff



Notes: The figure shows estimates of equation (3), where the dependent variable is the log quantity of imports. The right panels also include sector-time fixed effects. For both figures, the baseline period is March 1930. Dots are coefficients for the change in tariffs as defined in equation (1) interacted with the time fixed effect each period. Black dots are for the interaction with the share of ad valorem tariffs and gray are for the share of specific tariffs. Lines represent 95-percent confidence intervals. Standard errors are clustered at the product level.

Further, Figure B.3 in Appendix B shows that this result remains unchanged when we control for seasonality in the data. Across different specifications, we do not observe sys-

[17]Figures B.2 and B.4 in Appendix B show similar event-study plots broken down by tariff type, but where the dependent variable is defined as import values.

tematic differences in the results based on the type of tariffs that changed under Smoot-Hawley.

3.4 Did Import Prices Change in Response to the 1930 Tariff?

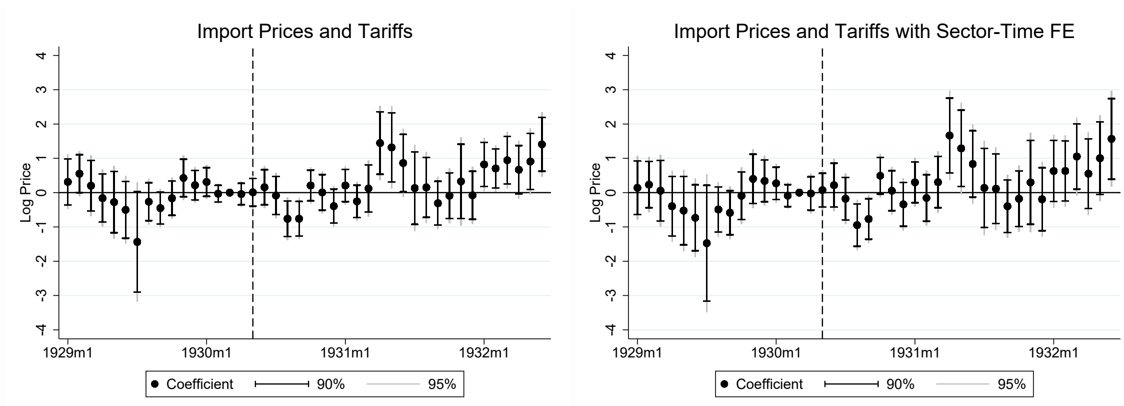
We now turn to estimating the effects of tariffs on prices at the market of origin to shed light on the incidence of the Smoot-Hawley Tariff. Using quantities of imports and total values of imports, we can also obtain unit values (i.e., average prices) and compare them to our main monthly import price series, which is wholesale product prices collected at the port of origin. We compare these price series to check the accuracy of our data imputation between the price and quantity data. In Appendix C, we show different exercises that confirm a strong time series correlation between the implied prices (i.e., unit values) and the average price at the port. This relationship confirms that our imputed categories are accurate, so we can use the price data to obtain results for the same products that we estimated for quantities. Additionally, it confirms that our tariff imputation is accurate.

If we observe a null effect on the coefficient $\Delta Tariff_i$in Equation (2), that would imply full pass-through of the tariff into domestic prices, either to U.S. producers or consumers. On the other hand, if we find a negative and statistically significant effect on $\Delta Tariff_i$, that would indicate that the tariff rate changes of 1930 are partially absorbed by the producers in the country of origin, implying that some of the incidence of the tariff is being borne by foreign producers. In the extreme case, a coefficient of -1, would imply that producers in the market of origin are absorbing the full amount of the tariff by lowering their export prices by an amount equivalent to the tariff.[18] In this case, the price faced by US importers would not rise.

[18]As mentioned earlier, during our sample period, most US trade partners were on the gold standard and had fixed exchange rates relative to the US dollar. While our prices are measured in US dollars, given this constant parity, we interpret the result as the price faced by the foreign producer.

Figure 6 displays the event study plots based on the estimating equation 2. As in earlier figures, the dashed vertical line indicates March 1930. The left panel includes month and product fixed effects while the right panel also includes sector-time fixed effects. Although there are some statistically significant movements in $\Delta Tariff_i$ in 1929, there is no evidence of a clear trend. Starting in November 1929, we find no pre-trend in the coefficient of interest, $\Delta Tariff_i$, and we observe a generally stable trajectory between the treated and control groups of imports before the enactment of Smoot-Hawley.

Figure 6: The Effect of 1930 Tariffs on Import Prices



Notes: The figure shows estimates for equation (2), where the dependent variable is the log import prices. Import prices are based on wholesale price of articles in their country of origin. The right panel include sector-time fixed effects. The baseline period is March 1930 for both graphs. Black dots are coefficient for the change in tariffs as defined in equation (1) interacted with the time fixed-effect each period, the darker lines represent 90-percent confidence intervals and the light gray lines 95-percent confidence intervals. Standard errors are clustered at the product level.

Interestingly, in June and July 1931, we observe no difference in the prices of imported articles that were subject to higher tariffs under Smoot-Hawley tariffs versus those that were not; however, in August and September 1930, we observe a statistically significant and large, negative coefficient of approximately -0.75 relative to the baseline month of March. This coefficient's size implies that, in these two months, roughly 75% of the average tariff rate increase was being offset by foreign producers lowering their product prices. Their tolerance for doing so nevertheless appears to have been short-lived. By October 1930, the coefficient reverts to zero, implying full pass-through of the tariff to American firms or consumers. No doubt, falling global commodity and manufacturing prices may have made it challenging for foreign producers to cut prices and absorb the cost of the Smoot-Hawley tariff.

As a robustness exercise, we also estimate the same equation but instead define the change in each product's tariff through the end of 1931, thus allowing products with specific and compound tariffs to respond to any changes in prices for a longer period of time. Figure B.1 in Appendix B shows the same short-run negative effect on exporters' pre-tariff prices in August and September 1930. As before, the negative effect does not persist. By October 1930, it appears that foreign producers were, again, unwilling to absorb the tariff hikes. Thereafter, there was complete pass-through to American importers.

3.5 Average Effects of Smoot-Hawley on Quantities, Values, and Prices

To measure the average effects of changes in tariffs on quantities and values, we estimate the following regression using monthly data:

$$\log(x_{it}) = \alpha_t + \gamma_i + \beta I(1\ if\ t \geq 1930m6)\Delta Tariff_i + \varepsilon_{i,t}, \tag{4}$$

where variables are defined as in equation (2), except that now the change in tariff is interacted with a dummy that is zero before June 1930 (the month when Smoot-Hawley went into effect) and equal to one thereafter. As in the previous exercise, in some regression specifications, we include a sector fixed effect interacted with the time fixed effect, meaning we are exploiting within-sector variation. Table 2 shows the effects of tariffs on quantities, values, unit values and import prices, (i.e., the prices of the exports to the U.S. at the country of origin and used in our figures above). By contrast, as is standard in the literature, unit values are the prices calculated by dividing the total value of import i in month t by the quantity of import i in month t using the US customs data.

Table 2: Effects of Tariffs on Quantities, Values, Unit Values and Prices

	Quantity		Value		Unit Value		Import Prices	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta Tariff_i$	-3.428***	-4.715***	-3.195***	-4.381***	0.230	0.330	0.383	0.490
	(0.910)	(0.867)	(0.915)	(0.947)	(0.409)	(0.406)	(0.375)	(0.397)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Time FE	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,066	3,024	3,066	3,024	3,066	3,024	3,066	3,024
R-squared	0.931	0.943	0.852	0.879	0.991	0.992	0.992	0.993

Notes: Table shows estimates of equation (4) between January 1929 to June 1932. For quantities (Columns (1) and (2)), values (Columns (3) and (4)), unit values (Columns (5) and (6)) and import prices (columns (7) and (8)). Import prices are wholesale price of articles in the imported article's country of origin.. Sector FE is a 1-digit sector fixed effect. Standard errors clustered at the product level in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

The table confirms the previous findings for all variables. In particular, we find that a one-percentage point increase in the tariff rate in 1930 reduced the quantity of imports by an average of -3.4 percent relative to imports which were not tariffed under Smoot-Hawley. This effect considers some of the fluctuations seen in the time-series exercise, but confirms there was a relatively large substitution between goods at least until the first half of 1932, two years after the passage of the 1930 tariff act. The price elasticity of demand is considerably larger when the regression includes sector-time fixed effects (column 2). Smoot-Hawley's effects on imports were large, but appear to be consistent with other more recent examples of trade protection (Amiti, Redding, and Weinstein, 2019). Columns 3 and 4 show the results for values. In terms of absolute values, the estimates for the value of imports are slightly smaller than quantities. This comparison implies a positively-signed effect on unit values, which is confirmed in columns 5-8 using unit values and wholesale prices at (exporter) country of origin. However, using either of the two price series with and without sector and time fixed effects, the estimated effects of the tariff changes on import prices are not statistically significant. Even though the price effects are noisily measured, it is clear they are not negative. Therefore, as discussed earlier, we can reject the possibility of a significant absorption of the tariff by foreign producers: the tariff was passed through to domestic consumers and firms.

Tables A.5 and A.6 in Appendix A confirm that the estimated coefficients for the effects of the Smoot-Hawley tariffs on quantities, values, and prices are not sensitive to the frequency of the data or its source. These two appendix tables use data from an alternative US government publication, the *Foreign Commerce and Navigation of the United States* Department of Commerce (1929a, 1930a, 1931a, 1932a), the same source that provides the tariff code. This publication provides trade data at a semi-annual data for 1930 and annual thereafter. For example, the measured effects on quantities are similar for the second half of 1930 (1930H2) and through 1931, but slightly larger in magnitude (absolute value), -4.3 through 1930H2 and -4.1 in 1931. That said, the estimates are not perfectly comparable with those reported with the monthly data: (Table 2) uses a longer pre-period for estimation than Tables A.5 and A.6. Moreover, the *Foreign Commerce and Navigation of the United States* explicitly categorizes trade data in June 1930 as being measured before or after tariff, whereas for the monthly estimates, we classify June 1930 as fully treated. Considering the different specifications, we estimate an effect of tariffs on quantity imported of between -3.43 and -4.25 percent, during the first 12 to 18 months. We use these estimated elasticities of substitution later in the paper when computing the welfare effects of the Smoot-Hawley Tariff.

To address some endogeneity concerns mentioned earlier, we also estimated instrumental variables models. We follow the approach of Goldberg and Pavcnik (2005) and Amiti and Konings (2007) and use pre-existing tariff rates as an instrumental variable. In our setting, *existing* tariff rates at the product level are likely unrelated to issues that American industries or sectors faced between October 1929 and May 1930; the existing rates likely reflected early tariff legislation (the last of which was in 1922) and other factors orthogonal to the reasons for the rise of US protectionism in 1930. We use these pre-existing tariff rates as an instrumental variable to ensure that tariffs affect the demand of the product directly, and that their rate changes in 1930 are not the result of economic conditions in these markets during the first year of the Depression. For example, in our sample of imported articles, tobacco leaves have the largest tariff rate. This baseline high rate is likely the result of other considerations, such as product-specific inelastic demand or specific lobbying power of the sector, which could offset selection toward high-elasticity-of-substitution goods or goods that had significant changes in demand due to the Depression, impacting the behavior of policymakers in setting those tariffs. Figure B.6 in Appendix B shows the first stage regression and Table A.7 in Appendix A shows that the estimated effects using instrumental variables are similar to those using OLS. These IV estimates, combined with our examination of pre-trends, reduce concerns that specific contemporaneous demand shocks explain the estimated effects shown in the event-studies and panel estimates.

Finally, we also collected data on the same key US imports by country of origin, which allows us to control for country-specific shocks. The origin-level data are from the yearly editions of the *Foreign Commerce and Navigation of the United States* (Department of Commerce, 1929a, 1930a, 1931a, 1932a), and are available at an annual frequency. These data allow us to run a difference-in-differences specification using annual data between 1929 and 1932, where we also include origin (exporter)-time fixed effects. Appendix Table A.8 displays the results. The table shows estimated coefficients that are consistent with the previous findings in terms of both magnitude and significance. We also find similar effects when we include both exporter-time and sector-time fixed effects. These results confirm that our baseline findings are not driven by country-specific shocks that are affecting the country of origin, reinforcing our baseline results.

Finally, we consider if there are exporters that might be disproportionately influencing our results for reasons unrelated to the Tariff Act of 1930. For example, Britain devalued the pound in 1931, which could have affected their exports to the US. To account for this possibility, we use annual data that provide information on the origin of imports, and run regressions in which we exclude one exporting country at a time. Figure B.5 in Appendix B presents coefficients for the Smoot-Halwey's effects on the quantity of imports. We find that both the estimated coefficient estimates and their standard errors are remarkably stable, with no meaningful changes even when major trading partners are sequentially dropped from the sample.

In summary, our results show that the Smoot-Hawley Tariff led to: (1) large reductions in the quantity of imports for articles whose tariffs increased in 1930 relative to unaffected articles and (2) price movements that are consistent with full pass-through to U.S. consumers and producers.

4 Modeling the Trade Elasticity and the Effects of Smoot-Hawley on Total Imports

In this section, we explore how monetary policy changes, operating through exchange rates, affect measured short-run trade elasticities. We use a simple New Kenesian model to discuss our findings and to relate them to the literature. Using this same model, we then quantify the effects of the Smoot-Hawley Tariff on total US imports.

4.1 Quantifying Exchange Rate and Tariff Effects

In this sub-section, we use our empirical evidence to further unpack estimates of short-run and medium-run trade elasticities. Given short-run dynamics of prices and monetary policy, these elasticities can depend on a number of factors. In Appendix E, we develop a New Keynesian model with trade across countries to account for the variables affected by tariffs and to study how quantities react in the short and long run. Similar to Boehm, Levchenko, and Pandalai-Nayar (2023), we obtain equations that allow us to characterize the effects of tariff changes on imports and to clarify which structural parameters our empirical setting identifies. Our framework makes some simplifying assumptions. In our model, each country produces a different variety under CES preferences and tariffs are assessed on a variety produced at the country level. This assumption gives us the flexibility to account for the effects of movements in exchange rates, but it can be adapted to a setting where tariffs vary by both country of origin and product.[19] In our setting, price setting from firms and domestic monetary policy will play a role, which will give us a general picture of the different components that can affect the measured elasticity.

Using the household intratemporal condition between domestically produced and for-

[19]For example, in our model, we could assume some foreign regions are in a monetary union and relax labor market frictions between economies.

eign varieties, we obtain the following condition:

$$\frac{c_{ijt}}{c_{iit}} = \left(\frac{p_{it}}{p_{jt} e_{ijt} (1 + \tau_{ijt})} \right)^{\sigma}, \tag{5}$$

where c_{ijt} is the quantity consumed in economy i of the variety produced in economy j at time t, i.e. imports of good j by i. c_{iit} represents domestic consumption of the domestically produced variety at time t. The term p_{jt} is the producer price of the good produced in country j, and e_{ijt} is the exchange rate between country i and j expressed in currency i. The tariff imposed by country i on goods produced in country j is denoted τ_{ijt}.

The regression estimating the effect of tariffs on import quantities (in our case, equation 4) can be represented in the model as equivalent to taking logs of equation (5) and then differentiating over the change in the tariff rate. Specifically, we can express that as:

$$\frac{d \ln c_{ijt}}{d \ln(1 + \tau_{ijt})} = \frac{d \left(\ln c_{iit} - \sigma \ln p_{it} \right)}{d \ln(1 + \tau_{ijt})} - \sigma \frac{d \ln p_{jt}}{d \ln(1 + \tau_{ijt})} - \sigma \frac{d \ln e_{ijt}}{d \ln(1 + \tau_{ijt})} - \sigma \frac{d \ln(1 + \tau_{ijt})}{d \ln(1 + \tau_{ijt})}, \tag{6}$$

and relative to the effect on a control group k:

$$\frac{d \ln c_{ikt}}{d \ln(1 + \tau_{ijt})} = \frac{d \left(\ln c_{iit} - \sigma \ln p_{it} \right)}{d \ln(1 + \tau_{ijt})} - \sigma \frac{d \ln p_{kt}}{d \ln(1 + \tau_{ijt})} - \sigma \frac{d \ln e_{ikt}}{d \ln(1 + \tau_{ijt})} - \sigma \frac{d \ln(1 + \tau_{ikt})}{d \ln(1 + \tau_{ijt})}. \tag{7}$$

As shown by these equations, the effect on domestic consumption and domestic prices, $\frac{d(\ln c_{iit} - \sigma \ln p_{it})}{d \ln(1+\tau_{ijt})}$, enters symmetrically in both expressions. With time fixed effects, this common component is absorbed and therefore cancels out in the main regression. We also have that $\frac{d \ln(1+\tau_{ijt})}{d \ln(1+\tau_{ijt})} = 1$ and $\frac{d \ln(1+\tau_{ikt})}{d \ln(1+\tau_{ijt})} = 0$. The estimated effect is thus given by the difference between the two equations:

$$
\begin{aligned}
&\frac{d\ln c_{ijt}}{d\ln(1+\tau_{ijt})} - \frac{d\ln c_{ikt}}{d\ln(1+\tau_{ijt})} = \\
&-\sigma\left(\frac{d\ln p_{jt}}{d\ln(1+\tau_{ijt})} - \frac{d\ln p_{kt}}{d\ln(1+\tau_{ijt})}\right) - \quad \sigma\left(\frac{d\ln e_{ijt}}{d\ln(1+\tau_{ijt})} - \frac{d\ln e_{ikt}}{d\ln(1+\tau_{ijt})}\right) - \sigma.
\end{aligned}
\tag{8}
$$

As shown by this expression, the cross-sectional effect of tariffs on imports, relative to imports not affected by tariffs in the short run, is equal to minus the elasticity of substitution plus terms capturing relative price adjustments and relative exchange rate movements.

In our empirical setting, we are able to estimate some of these components directly while controlling for the others. First, in Section 3.4, we estimate the effect of tariffs on the prices for imported goods affected and not affected by tariffs, which allows us to identify $\left(\frac{d\ln p_{jt}}{d\ln(1+\tau_{ijt})} - \frac{d\ln p_{kt}}{d\ln(1+\tau_{ijt})}\right)$. We find estimates close to zero, suggesting that this component is likely small in our setting. Second, as discussed in 3, the Tariff Act of 1930 was implemented when almost all US trading partners were on the gold standard. As a result, exchange rates were largely fixed at the time the Tariff Act of 1930 was implemented.

That said, a small number of US trade partners had floating exchange rates (Spain) or were on the silver standard (China and Hong Kong), implying that bilateral rates vis-a-vis the USD could change during our sample period. Additionally, in September 1931, Great Britain, a large trade partner of the US, abandoned the gold standard and devalued. Although Britain's departure from gold was driven by events in Europe (including contagion from the Credit Anstalt banking crisis) and not the Tariff Act of 1930, we nevertheless consider the possibility that the devaluation still might have influenced US imports that experienced significant increases in their tariff rates. If this were the case, it would change the expression $\left(\frac{d\ln e_{ijt}}{d\ln(1+\tau_{ijt})} - \frac{d\ln e_{ikt}}{d\ln(1+\tau_{ijt})}\right)$ to something other than zero. In order to test for this possibility, we evaluate the correlation between a product-level exchange rate, weighted by the importance of the countries from which American imports originate and the change in tariffs.

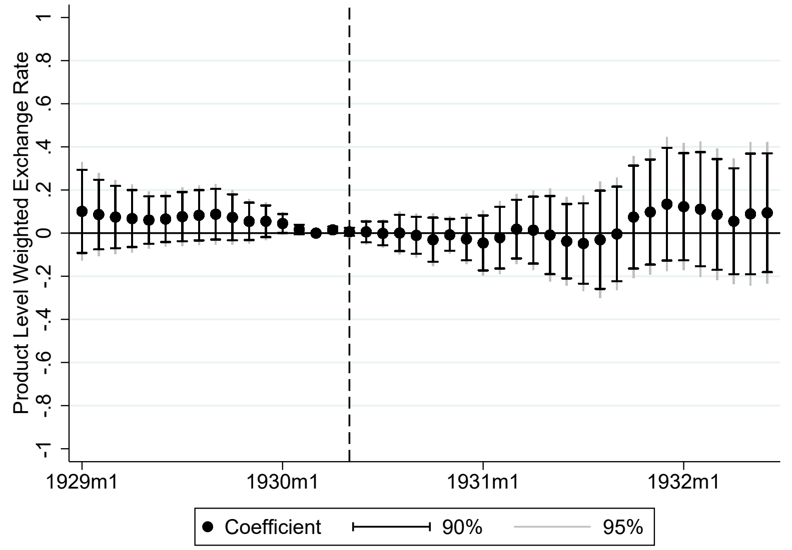
As a first step, we construct the trade-weighted exchange rate for each imported article in our sample, where the weights are fixed by the share of the imported article from each country of origin before the enactment of the Smoot-Hawley tariff. In particular, the weighted exchange rate *wer* is calculated as:

$$wer_{it} = \sum^{R} \omega_{ir,1929} \times er_{r,t},$$

where ω_{di} is the share of imports of good i coming from country $r \in R$ in 1929 and $er_{r,t}$ is the nominal exchange rate of country r at time t (foreign currency/USD). To make it comparable, we normalize each exchange rate to be equal to 1 in January 1929. WER_{it} represents a product-based, time-varying exchange rate analogous to the city-level, weighted exchange rate used in Candia and Pedemonte (2025). Next, we re-estimate equation 2, where the dependent variable is wer_{it}.

Figure 7 shows that exchange-rate effects pre-Smoot Hawley period are generally muted, and roughly equal to zero over our entire sample period. It displays a mild appreciation of the US dollar starting in October 1929, perhaps arising from trade partners such as China and Spain, which saw their currencies depreciate relative to the dollar beginning in October 1929. According to equation 8, an appreciation, more generally, should have reduced the measured effect of the 1930 tariff changes on imports, but the effect shown in Figure 7 is not statistically different from the coefficient in the baseline period. Similarly,

Figure 7: Tariffs and the Nominal Exchange Rate



Notes: The figure shows estimates for equation (2), where the dependent variable is wer_{it}, as defined in the text. The regression includes sector-time fixed effects. The baseline period is March 1930. Black dots are the estimated coefficients for the change in tariffs as defined in equation (1), interacted with the time fixed-effect each period. The black lines represent 90-percent confidence intervals and the light gray lines 95-percent confidence intervals. Standard errors are clustered at the product level.

the figure shows that when the UK and other countries' departed from the gold standard after October 1931, it did not have a significant effect on imports in terms of the exchange rate.

Given the data suggest small effects of the Smoot-Hawley tariff on both import prices and exchange rates, our empirical estimates of the effect of tariffs on quantities can be interpreted as identifying an elasticity of substitution varying between -3.4 and -4.3, estimates that are consistent with trade elasticities obtained in other settings, such as Caliendo and Parro (2015).[20]

[20]The trade elasticity is generally defined as $1-\sigma$; hence our estimated trade elasticities lie between 4.4 and 5.3.

Compared to Boehm, Levchenko, and Pandalai-Nayar (2023), we estimate a relatively larger trade elasticity (in absolute value terms) for the short run. Our model provides a potential explanation for this difference: the exchange-rate channel. Recall that our short-run trade elasticity is measured when the US and its trade partners adhered to fixed exchange rates. As emphasized by Candia and Pedemonte (2025) for the 1930s and by Jeanne and Son (2024), more generally, exchange-rate adjustments can partially offset the effects of tariffs in the short run, leading to lower measured reduced-form trade elasticities. In our setting, exchange-rate movements are muted due to the interwar gold standard. Figure E.8 in Appendix E shows how the measured elasticity of substitution between goods would look in the model, with and without fixed exchange rates. We can see that in the model with fixed exchange rates, the difference between the effect of treated (or newly "tariffed") imports relative to the control group of imports is large and that the elasticity of substitution is close to -4. Figure E.9 in Appendix E illustrates the role that tariffs play in this measured difference, as expressed in Equation 8 and using $\sigma = 4$. The figure shows that a combination of sticky prices and exchange-rate movements can generate a smaller measured trade elasticity in settings with a flexible exchange rate, even with an almost complete pass through of tariffs into domestic prices. In our historical setting, we estimate large effects of trade on the quantity of imports. In the short-run, when prices and exchange rate are fixed, our estimate measures the elasticity of substitution.

Consistent with this mechanism, we observe a similar role for exchange rates in the data. Figure 4 shows that the effect on quantities reaches its lowest value around April 1931. It remains near -5 until September 1931, after which the coefficient begins to decline in absolute value terms. September 1931 coincides with the Great Britain's exit from the gold standard, followed by the departures of several other countries with close political and economic ties to Great Britain. Canada, the main US trading partner at the time, adopted an exchange rate regime linked to both the US dollar and the UK pound, resulting in an effective depreciation of the Canadian Dollar relative to the dollar. Japan devalued in December 1931. These important American trade partners' devaluations could explain the estimated dynamics shown in the figure.

In Appendix E, we also discuss how the effect of tariffs on quantities can vary depending on the characteristics of the economy, including the size of trade relative to GDP and the degree of pass through. At the limit, in a small open economy setting, the effect of tariffs on quantities is exactly equal to the elasticity of substitution since foreign prices are not affected by tariffs and the exchange rate is fixed.[21]

4.2 Quantifying the Effects on Total US Imports

We now use our same NK model to quantify the importance of the 1930 Tariff Act in explaining the change in total US imports. Figure E.10 in Appendix E shows that the response of total imports to a tariff depends on the elasticity of substitution, σ, with larger values associated with larger declines. Using our estimate, we multiply the observed change in tariffs by the model-implied response of imports to quantify their contribution to the overall decline.

Nominal imports fell by almost 37% between May 1930 and May 1931. As described in Section 2.1, accounting for substitution, the implied increase in tariffs, is about 6 percentage points in the first few months following the Tariff Act. Using this value in our model to avoid measurement issues related to aggregate price changes and specific tar-

[21] In a small open economy setting with complete markets, foreign interest rates are not affected by tariffs. So, the exchange rates between the domestic economy and the two large economies are determined in the same way as the domestic interest rate. Therefore, the relative exchange rate between the domestic economy and the two large, foreign economies is fixed, independent of the domestic monetary policy setting. Because relative prices and the exchange rate do not change, the effect of tariffs on quantities is always equal to the elasticity of substitution.

iffs, we estimate that roughly 27 percent of the decline in total imports in the year following its enactment is the result of the Tariff Act of 1930. [22] In other words, without Smoot-Hawley, the model suggests that nominal total imports would have declined by 10 percentage points less, 27% rather than 37% in the first year after its implementation. Focusing on the first six months after its implementation, Smoot-Hawley's contribution to the decline in trade is even larger, rising to about 40% of the total decline in US imports.

As Irwin (1998b) argues, other factors associated with the Great Depression, such as falling aggregate demand account, for the remaining decline. Our estimates are broadly consistent with those in Irwin (1998b), although our elasticity of substitution is larger. However, in contrast to his estimated effects, our modeling does not incorporate the aggregate decline in the price level, which would imply a larger effective increase in tariff rates for articles subjected to specific or compound tariffs.

5 Welfare Analysis

In this section, we use off-the-shelf models to generate static and structural estimates of the welfare effects of the Smoot-Hawley Tariff.

Our empirical results on prices and quantities allow us to estimate the elasticity of substitution between imported articles, a key parameter for understanding the aggregate effects of tariffs. Moreover, our empirical setting allows us to estimate this elasticity free of monetary-policy effects that otherwise might change the estimated elasticity in the short run. Combining this elasticity with information on US GDP, imports, and tariff changes allows us to generate two estimates of the welfare effects of the Tariff Act of 1930.

Since the estimated effect of the tariff on foreign producers' prices is close to zero and

[22] Of course, imports continued to decline until April 1933, when FDR then took the United States off the gold standard.

there is no measurable effect of the 1930 tariff rate changes on the exchange rate, we can compute a partial-equilibrium estimate of the welfare loss due to the Smoot-Hawley Tariff as in Amiti, Redding, and Weinstein (2019). That is, we calculate the standard deadweight loss due to the Tariff Act of 1930 using the observed values of tariffs before enactment, the change in tariff rates, and the elasticity of tariffs with respect to quantities. Following the procedure in Amiti, Redding, and Weinstein (2019), we first estimate an elasticity of the change of tariffs with respect to quantities of between -3.43 (Table 2) and -4.25 (Table A.5). Additionally, in Section 2.1, we document a change in the average rate of tariffs due to Smoot-Hawley of roughly 6 percentage points. Finally, we use the value of 4.19% shown in Table 1 as the value for the share of GDP attributable to imports.

As in Amiti, Redding, and Weinstein (2019), we estimate the static deadweight loss as the area of a triangle, where the height is the difference between the supply price with and without tariffs, and the base is the change in imports due to the tariff. Because our empirical estimates show no change in pre-tariff import prices, the height is equal to the change in the tariff rate due to Smoot-Hawley multiplied by the price. Therefore, the deadweight loss is equal the initial price of imports multiplied by to one-half of the change in the average tariff rate and the proportional decline in imports.[23] Using the values discussed above, we obtain a deadweight loss between 0.026% and 0.032% of 1929 GDP, depending on the range of elasticity estimates discussed above. The associated increase in tariff revenue is between 0.19% and 0.20% of GDP, so if tariff revenues are not transferred to households or firms as a non-distortionary lump sum rebate, the total welfare loss would therefore rise to between 0.22% and 0.23% of 1929 GDP.

We also use our empirical estimates and features of the American economy corre-

[23]Details of the estimation procedure and assumptions are described in Section E.3 in Appendix E.

sponding to our sample period to estimate the welfare implications of tariffs using structural approaches, such as Arkolakis, Costinot, and Rodríguez-Clare (2012) or the steady state of our NK model. Their research shows that, in a wide class of models, gains from trade depend only on the domestic expenditure share and the trade elasticity. Our estimated trade elasticity allows us to apply this framework to the Smoot-Hawley episode. Table 1 in Section 2.1 provides the relevant inputs for this calculation. As in the static model, we use 4.19% as the ratio of imports to US GDP in 1929. Subtracting this figure from GDP yields the domestic expenditure's share for 1929. The first step is to calculate the implied gains from trade relative to autarky using this expenditure share and an estimate for the trade elasticity.[24] Based on Costinot and Rodríguez-Clare (2014), the gains from trade relative to autarky are generally found to be quite small. In our case, the 1929 value ranges between 0.81% for a trade elasticity of 4.43 and 0.96% for a value of 5.25, which is the benchmark for autarky in our calculations. The second step measures the gains from trade due to the change in tariff through the end of 1930, or after Smoot-Hawley has been in effect for approximately 6 months. Applying the model-implied change in imports due to the tariff increase, the share of imports relative to GDP declines to 3.2%.[25] Deriving the new value of the domestic expenditure share from the new import share and using the same elasticities, we estimate the gains from trade relative to autarky as ranging between 0.62% and 0.76%. The third and final step simply subtracts the 1929 gains from the estimated gains from trade after the tariff has been in place, yielding the change in welfare. Following this procedure, we find that Smoot-Hawley reduced welfare by 0.20% of GDP, using either estimated value of the trade elasticity. If we further account

[24] Gains from trade relative to autarky can be approximated by $1 - \lambda^{1/\varepsilon}$, where λ is the domestic expenditure share and $\varepsilon = 1 - \sigma$ is the trade elasticity. We proxy λ using one minus the import share in GDP. Details of the estimation and assumptions in Section E.4 of Appendix E

[25] As in the static model, the average tariff rates increase by 6 percentage points, from 12.1% to 18.1%

for the increase in tariff revenues, then the welfare loss is smaller, and lies between 0.11% and 0.13% of GDP.

Both the static and GE welfare estimates show that US welfare changed modestly as a result of Smoot-Hawley. These findings reflect the combination of a relatively large measured elasticity of substitution for the early 1930s and the fact that the US was a relatively closed economy at the time, i.e., trade was a small share of GDP. Tariff revenue was additionally affected by the massive decline in aggregate demand in the early 1930s, limiting the size of any potential lump-sum transfer assumed in these models' calculations. However, given that the gains from trade in the American economy were relatively small to begin with, Smoot-Hawley nevertheless appears to have wiped out a significant proportion of them, reducing these by 0.2%, between a fourth and a fifth of the original gains from trade. To unpack the contributions of the various elements that make up this estimate, we can conduct some simple counterfactuals. Ceteris paribus, substituting in today's trade share for the 1929 value would result in a welfare loss that is 3 to 4 times larger relative to GDP than the actual estimated welfare loss. If, instead, we reduce the trade elasticity to half of its estimated value, it would almost double the welfare loss.[26]

6 Conclusion

Smoot-Hawley continues to be invoked by policymakers today as the last example of a dramatic increase in U.S. tariffs. Although it is arguably the most researched and discussed trade policy in American history, surprisingly, some of its key effects are still not well understood.

Newly-digitized monthly data on quantities, values, and import prices (at the port

[26]However, for a given tariff increase, a lower trade elasticity would also imply a smaller decline in imports. Accounting for this endogenous adjustment, the welfare losses would increase by only about 10 percent in our counterfactual exercise.

of entry) allows us to shed light on several questions of importance. First, using event studies and diff-in-diff models, we estimate the effects on quantities, values, and prices. We find a relatively quick and large average decline in the quantity of imports that were subjected to tariff increases under Smoot-Hawley. In terms of prices, controlling for time, sectoral, and tariff-type fixed effects, we find that by the third month after its introduction, there was nearly complete pass-through to U.S. consumers and firms. Second, our analysis shows that Smoot-Hawley rate increases had a large effect on affected imports. At their nadir in the first year after Smoot-Hawley was enacted, for each one percentage point increase in tariffs, imports fell by about 8% relative to imports that did not face tariff changes in 1930. Overall, the Tariff Act of 1930 appears to account for roughly one-quarter of the reduction in total US imports through 1931.

Our study also sheds light on key parameters of interest in the trade literature. Given that Smoot-Hawley was the only tariff change enacted during our sample period and we have monthly data that spans several years after its enactment, we exploit the substantial changes in tariffs at the product level to estimate short-run and medium-run trade elasticities. Moreover, given the U.S. had fixed exchange rates with almost of its trade partners for the two years after enactment, we are able to measure elasticities that are largely purged of the effects of shocks to monetary policy. In our setting, we find a short-run trade elasticity of between 4.4 and 5.3, which is higher than the most recent estimates using trade policy have reported. Using a simple, New Keynesian model, we show that exchange-rate movements driven by changes in monetary policy can partially offset the effects of tariffs in the short run, explaining the lower measured reduced-form trade elasticities found in other empirical settings.

Finally, using these estimates, we evaluate the welfare implications of the Tariff Act of 1930. The low share of imports relative to GDP in 1929 and our large estimated trade elasticity lead to modest welfare costs from the increase in tariffs in 1930. The large trade elasticity can be explained by the fact that even though tariff rates increased substantially due to Smoot-Hawley, they mainly targeted goods that could be substituted with U.S. production. Welfare estimates based on 21st century American tariff rate hikes are of similar magnitude, but (2018 tariff hikes) apply to a narrower range of imports than the Smoot-Hawley Tariff, and therefore may generate larger welfare losses due to lower substitutability and a larger expenditure share on foreign goods compared with the shares observed in 1930. Nevertheless, because trade, in general, had little impact on 1929 US welfare, the "lost trade" arising from Smoot-Hawley reduced the "gains from trade" by roughly a quarter.

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Appendix

A Additional Tables

Table A.1: Summary Statistics of US Imported Articles, Sample and US Totals

Group		All US Imports by Category						Our Sample	
		Free	Dutiable	Duty	Value of Imports	Tariff	Tariff Dutiable	Value of Imports	Share of Total
Total Value of Imported Merchandise Entered for Consumption	1930H1	$1,102,107,285	$603,891,126	$269,357,255	$1,705,998,411	15.79%	44.60%	$1,023,169,216	59.97%
	1930H2	$979,015,749	$429,063,131	$192,528,261	$1,408,078,880	13.67%	44.87%	$782,473,632	55.57%
	Change (%)	-11.17%	-28.95%	-28.52%	-17.46%	-13.40%	0.60%	-23.52%	-7.34%
00.-Animals and Animal Products, Edible	1930H1	$12,693,826	$46,483,268	$11,096,913	$59,177,094	18.75%	23.87%	$23,450,055	39.63%
	1930H2	$10,172,891	$29,970,648	$8,209,781	$40,143,539	20.45%	27.39%	$16,132,891	40.19%
	Change (%)	-19.86%	-35.52%	-26.02%	-32.16%	9.06%	14.74%	-31.20%	1.42%
0.-Animals and Animal Products, Inedible	1930H1	$123,267,533	$25,833,782	$7,573,539	$149,101,315	5.08%	29.32%	$78,184,447	52.44%
	1930H2	$59,040,992	$42,822,022	$11,219,665	$101,863,014	11.01%	26.20%	$52,433,606	51.47%
	Change (%)	-52.10%	65.76%	48.14%	-31.68%	116.84%	-10.63%	-32.94%	-1.84%
1.-Vegetable Food Products and Beverages	1930H1	$206,434,619	$146,688,403	$91,182,314	$353,123,022	25.82%	62.16%	$295,076,635	83.56%
	1930H2	$183,292,046	$78,819,446	$62,913,320	$262,111,492	24.00%	79.82%	$212,547,850	81.09%
	Change (%)	-11.21%	-46.27%	-31.00%	-25.77%	-7.05%	28.41%	-27.97%	-2.96%
2.-Vegetable Products Inedible, Except Fibers and Wood	1930H1	$143,102,274	$71,677,318	$35,174,276	$214,779,592	16.38%	49.07%	$128,595,356	59.87%
	1930H2	$131,121,958	$44,569,126	$19,335,171	$175,691,084	11.01%	43.38%	$71,907,039	40.93%
	Change (%)	-8.37%	-37.82%	-45.03%	-18.20%	-32.80%	-11.60%	-44.08%	-31.64%
3.-Textile	1930H1	$182,684,508	$169,666,261	$71,073,296	$352,350,769	20.17%	41.89%	$233,983,604	66.41%
	1930H2	$166,706,266	$96,681,866	$43,872,243	$263,388,132	16.66%	45.38%	$188,446,131	71.55%
	Change (%)	-8.75%	-43.02%	-38.27%	-25.25%	-17.42%	8.33%	-19.46%	7.74%
4.-Wood and Paper	1930H1	$140,516,965	$15,890,705	$4,974,289	$156,407,670	3.18%	31.30%	$122,015,545	78.01%
	1930H2	$144,028,630	$19,797,608	$5,429,475	$163,826,238	3.31%	27.42%	$132,655,488	80.97%
	Change (%)	2.50%	24.59%	9.15%	4.74%	4.21%	-12.39%	8.72%	3.80%
5.-Nonmetallic Minerals	1930H1	$80,222,332	$29,551,722	$11,449,138	$109,774,054	10.43%	38.74%	$30,877,802	28.13%
	1930H2	$94,337,221	$41,517,937	$11,980,826	$135,855,158	8.82%	28.86%	$35,129,069	25.86%
	Change (%)	17.59%	40.49%	4.64%	23.76%	-15.45%	-25.52%	13.77%	-8.07%
6.-Metals and Manufacturers, Except Machinery and Vehicles	1930H1	$115,331,064	$40,117,498	$15,031,793	$155,448,562	9.67%	37.47%	$95,485,925	61.43%
	1930H2	$79,618,393	$29,914,908	$11,487,719	$109,533,301	10.49%	38.40%	$67,276,893	61.42%
	Change (%)	-30.97%	-25.43%	-23.58%	-29.54%	8.46%	2.49%	-29.54%	-0.01%
7.-Machinery and Vehicles	1930H1	$7,177,357	$11,723,936	$3,860,156	$18,901,293	20.42%	32.93%	$0.00	0.00%
	1930H2	$1,660,379	$9,681,580	$2,953,828	$11,341,959	26.04%	30.51%	$0.00	0.00%
	Change (%)	-76.87%	-17.42%	-23.48%	-39.99%	27.52%	-7.34%		
8.-Chemicals and Related Products	1930H1	$45,434,698	$17,417,565	$6,032,466	$62,852,263	9.60%	34.63%	$15,499,857	24.66%
	1930H2	$35,326,383	$13,868,894	$5,563,591	$49,195,277	11.31%	40.12%	$5,944,665	12.08%
	Change (%)	-22.25%	-20.37%	-7.77%	-21.73%	17.83%	15.83%	-61.65%	-51.00%
9. Miscellaneous	1930H1	$45,242,109	$28,840,668	$11,909,076	$74,082,777	16.08%	41.29%	$0.00	0.00%
	1930H2	$73,710,590	$21,419,096	$9,562,643	$95,129,686	10.05%	44.65%	$0.00	0.00%
	Change (%)	62.92%	-25.73%	-19.70%	28.41%	-37.47%	8.12%		

Notes: The table shows US imported articles by group and for our sample. Free represents the value of total US imports in a given product group that did not pay tariffs. Dutiable shows the value of total US imports subject to tariffs. Duty is the total nominal dollar amount paid in tariffs for each product group. Value of imports is the sum of free plus dutiable imports for each group. Tariff is the ad-valorem equivalent tariff rate for the group and tariff dutiable is the ad- valorem equivalent when only considering imports within that group, which are subjected to tariffs. Under Our Sample, value of imports is the total value for articles in our sample, while share of total is our sample relative to US totals.

Table A.2: Product List

Product Name	τ_{1930H1}	τ_{1930H2}	$\Delta\tau$	% AV	% S	Product Name	τ_{1930H1}	τ_{1930H2}	$\Delta\tau$	% AV	% S
1. Animals and Animal Products , Edible						5. Textiles					
Beef and veal, fresh	0.30	0.50	0.20	0.00	1.00	Unman. Cotton	0.00	0.02	0.02	1.00	0.00
Sausage casings	0.00	0.00	0.00	-	-	Cotton cloths-Not bleached	0.29	0.33	0.04	1.00	0.00
Butter	0.37	0.43	0.07	0.00	1.00	Cotton cloths-Bleached	0.32	0.38	0.06	1.00	0.00
Cheese	0.28	0.36	0.07	0.79	0.21	Cotton cloths-Colored	0.32	0.31	-0.01	1.00	0.00
Herring	0.17	0.13	-0.04	0.00	1.00	Jute and jute butts, unman	0.00	0.00	0.00	-	-
Mackerel	0.14	0.16	0.02	0.00	1.00	Burlaps	0.10	0.12	0.02	0.00	1.00
2. Animals and Animal Products, Inedible						Manila fiber	0.00	0.00	0.00	-	-
Cattle hides	0.00	0.10	0.10	1.00	0.00	Sisal fiber	0.00	0.00	0.00	-	-
Calf and Kip Skins	0.00	0.10	0.10	1.00	0.00	Matting and mats for floors	0.46	0.66	0.20	0.00	1.00
Sheep and lamb skins	0.00	0.00	0.00	-	-	Carpet wool, unman	0.09	0.07	-0.02	1.00	0.00
Goat and kid skins	0.00	0.00	0.00	-	-	Clothing wool, unman	0.59	0.86	0.28	1.00	0.00
Gloves	0.50	0.55	0.05	1.00	0.00	Combing wool, unman	0.61	0.76	0.15	0.00	1.00
Beaver, fur	0.00	0.00	0.00	-	-	Wool yarns	0.49	0.57	0.09	0.74	0.26
Fox, fur	0.00	0.00	0.00	-	-	Raw silk	0.00	0.00	0.00	-	-
Marten, fur	0.00	0.00	0.00	-	-	Spun silk	0.45	0.46	0.02	1.00	0.00
Squirrel, , fur	0.00	0.00	0.00	-	-	6. Wood and Paper					
Bristles, sorted, etc.	0.05	0.03	-0.03	0.00	1.00	Wood: Boards, etc., softwood	0.00	0.03	0.03	0.00	1.00
3. Vegetable Food Products and Beverages						Pulp wood	0.00	0.00	0.00	-	-
Corn	0.19	0.40	0.21	0.00	1.00	Wood pulp-Mech ground	0.00	0.00	0.00	-	-
Rice, Cleaned	0.51	0.73	0.22	0.00	1.00	Wood pulp-Sulphite, unbl.	0.00	0.00	0.00	-	-
Wheat	0.00	0.00	0.00	0.00	1.00	Wood pulp-Sulphite, bl.	0.00	0.00	0.00	-	-
Beans, dried	0.36	0.66	0.30	0.00	1.00	Wood pulp-Sulphate, unbl.	0.00	0.00	0.00	-	-
Potatoes, white	0.25	0.58	0.34	0.00	1.00	Paper: Standard newsprint	0.00	0.00	0.00	-	-
Onions	0.78	1.62	0.83	0.00	1.00	7. Nonmetallic Minerals					
Bananas	0.00	0.00	0.00	-	-	Coal: Bituminous	0.09	0.08	-0.01	1.00	0.00
Olives	0.51	0.55	0.05	0.00	1.00	Petroleum: Crude	0.00	0.00	0.00	-	-
Currants	0.30	0.35	0.05	0.00	1.00	8. Metals and Manufacturers, Except Machinery and Vehicles					
Dates	0.26	0.26	-0.01	0.00	1.00	Iron ore	0.00	0.00	0.00	-	-
Almonds, shelled	0.48	0.65	0.17	0.00	1.00	Pig iron	0.08	0.09	0.02	0.00	1.00
Walnuts, shelled	0.50	0.70	0.20	0.00	1.00	Bar steel	0.26	0.29	0.02	0.13	0.87
Olive oil, edible	0.55	0.68	0.13	0.00	1.00	Aluminum: Crude, scrap, etc.	0.28	0.21	-0.07	0.00	1.00
Cocoa or cacao beans	0.00	0.00	0.00	-	-	Copper: Unrefined	0.00	0.00	0.00	-	-
Coffee	0.00	0.00	0.00	-	-	Copper: Refined	0.00	0.00	0.00	-	-
Tea	0.00	0.00	0.00	-	-	Tin: Bars, blocks, etc.	0.00	0.00	0.00	-	-
Sugar	0.67	1.00	0.33	1.00	0.00	9. Chemicals and Related Products					
4. Vegetable Products Inedible, Except Fibers and Wood						Fertilizers: Nitrate of soda	0.00	0.00	0.00	-	-
Rubber, crude	0.00	0.00	0.00	-	-						
Shellac	0.00	0.00	0.00	-	-						
Flaxseed or linseed	0.26	0.36	0.10	0.00	1.00						
Coconut Oil	0.00	0.00	0.00	0.00	1.00						
Palm Oil	0.00	0.00	0.00	-	-						
Peanut Oil	0.42	0.48	0.06	0.00	1.00						
Clover seed	0.30	0.41	0.11	0.00	1.00						
Tobacco, leaf wrapper	1.25	1.55	0.29	0.00	1.00						

Notes: τ_t is the ad valorem equivalent tariff rate in period t. $\Delta\tau$ is the change in the tariff rate between 1930H2 and 1930H1. % AV is the share of ad valorem tariffs and % S is the share of specific tariffs. See the text for data source.

Table A.3: Pre-Smoot Hawley Correspondence Between Price and Tariff Data, first six months of 1930, (1/4)

Price Data Category	Tariff Data Category	Tariff Data Sub Category	Unit
Beef and veal, fresh	Beef And Veal, Fresh	Beef, Fresh	pound
		Veal, Fresh	pound
Sausage casings	Sausage Casings	Sheep, lamb, and goat casings	pound
		Weasands and ox gullets	pound
		Sausagecasings, n. s. p. f	pound
Butter	Butter	Butter	pound
Cheese	Cheese	Cheese (except swiss) 5c lb	pound
		Cheese (except swiss) 25pc	pound
		Swiss Cheese	pound
Cod	Cod, Cured Or Preserved	Cod (dried)	pound
Herring	Herring, Cured Or Preserved	Pickled or salted, in bulk or containers weighing, with contents, over 15 pounds	pound
	Herring, Cured Or Preserved	Dried	pound
Mackerel, cured or preserved	Mackerel	Pickled or salted, in bulk or containers weighing, with contents, over 15 pounds	pound
Cattle hides	Cattle Hides	Dry or dry salted (over 12 pounds)	pound
		Wet salted (over 25pounds)	pound
Kip Skins	Calf And Kip Skins	Dry and salted (6-12 pounds)	pound
		Wet salted (12-25 pounds)	pound
Calf Skins	Calf And Kip Skins	Dry and salted (less than 6 pounds)	pound
		Wet salted (less than 12 pounds)	pound
Sheep and lamb skins	Sheep And Lamb Skins	Wooled	pound
		Slats, dry , no wool	pound
		Pickled skins , not split , no woo	pound
		Pickled fleshers, split,flesh side	pound
		Pickled skivers ,split ,grain side	pound
Goat and kid skins	Goat And Kid Skins	Dry and dry salted	pound
		Green or pickled	pound
Calf and kip, upper	Leather: Calf And Kip, Upper	Upper Leather, Calf and Kip	sq. ft.
Gloves	Leather Gloves		pair
Beaver	Beaver	Furs ,undressed Beaver	number
Fox, except silver or black	Fox, Except Silver Or Black	Furs ,undressed Fox other (than silver or black)	number
Marten	Marten	Furs ,undressed Marten	number
Squirrel	Squirrel	Furs ,undressed Squirrel	number
Bristles, sorted, etc.	Bristles Sorted ,Bunched ,Or Prepared	Bristles, Sorted, etc.	pound
Corn	Corn	Corn	bushel
Rice, Cleaned or milled	Rice, Cleaned	Cleaned or milled rice	pound
Wheat	Wheat	For grinding in bond and export	bushel
		Other	bushel

Pre-Smoot Hawley Correspondence Between Price and Tariff Data, first six months of 1930, cont. (2/4)

Price Data Category	**Tariff Data Category**	**Tariff Data Sub Category**	**Unit**
Beans, dried	Beans, Dried	Beans ,dried	pound
Potatoes, white or Irish	Potatoes, White	Potatoes ,white or Irish	pound
Onions	Onions	Onions	pound
Bananas	Bananas	Bananas	bunch
Olives	Olives	Green	gallon
		Ripe	gallon
Currants , Zante or other	Currants	Currants , Zante or other	pound
Dates	Dates	Fresh or dried	pound
		Prepared or preserved	
Figs	Figs	Fresh , dried , or in brine	pound
		Prepared or preserved	pound
Raisins	Raisins		pound
Almonds, shelled	Almonds, Shelled	Shelled	pound
Almonds, not shelled	Almonds, Not Shelled	Not shelled	pound
Walnuts, shelled	Walnuts, Shelled	Shelled	pound
Walnuts, not shelled	Walnuts, Not Shelled	Not shelled.	pound
Olive oil, edible	Olive Oil, Edible	In packages weighing less than 40 pounds	pound
		Other	pound
Cocoa or cacao beans	Cocoa Or Cacao Beans	Cocoa or cacao beans	pound
Coffee	Coffee	Raw or green	pound
		Toasted	pound
Tea	Tea		pound
Sugar	Sugar	Sugarcane, natural	ton
		Beet sugar-Testing by the polariscope not above 75	pound
		Beet sugar-Testing by the polariscope not above 100	pound
		Cane Sugar Free	pound
		Cane Sugar Dutiable	pound
Rubber, crude	Rubber, Crude	Rubber , crude	pound
Shellac	Shellac		pound
Flaxseed	Flaxseed Or Linseed	Flaxseed	bushel
Coconut Oil	Coconut Oil	Coconut oil	pound
Palm Oil	Palm Oil	Palm oil	pound
Peanut Oil	Peanut Oil	Peanut Oil	pound
Soybean oil	Soybean Oil	Soybean oil	pound

Pre-Smoot Hawley Correspondence Between Price and Tariff Data, first six months of 1930, cont. (3/4)

Price Data Category	**Tariff Data Category**	**Tariff Data Sub Category**	**Unit**
Clover seed	Clover Seed	Red	pound
		Alsike	pound
		Crimson	pound
		White	pound
		Clover seed, n. s. p. f	pound
Tobacco, leaf wrapper	Tobacco, Leaf Wrapper	Leaf for cigar wrappers -Unstemmed	pound
Unmanufactured Cotton	Unmanufactured Cotton	Long staple (118inches or over)	pound
		Short staple (under 136inches.	pound
Cotton cloths-Not bleached	Cotton Clothsâ€"Not Bleached	Not bleached, printed , dyed, colored, or woven figured	pound
Cotton cloths-Bleached	Cotton Cloths-Bleached	Bleached	pound
Cotton cloths-Colored	Cotton Cloths-Colored	Printed , dyed, colored, or woven figured	pound
Jute and jute butts, not dressed or manufactured-	Jute And Jute Butts	Jute	ton
		Jute Butts	ton
Burlaps	Burlaps	Burlaps and other woven fabrics wholly of jute, n.s.p.f	pound
Hemp, unmanufactured	Hemp, Unmanufactured	Hemp,unmanufactured	Ton
Manila fiber	Manila Fiber	Manila and abaca	Ton
Sisal fiber	Sisal Fiber	Sisal and henequen	Ton
Floor Coverings	Matting And Mats For Floors	Floor coverings, mats of coco fiber or ratan	sq. yd.
		Common China, Japan, and India straw mating and floor	sq. yd.
		Mating of coco fiber or ratan	sq. yd.
Unmanufactured-Carpet wool	Unmanufactured-Carpet Wool	Carpet wools not improved... , and hair of the camel-actual weight (All)	Pound
Unmanufacturedâ€"Clothing wool	Unmanufacturedâ€"Clothing Wool	Clothing wool In the grease	Pound
		Clothing wool On the skin	Pound
		Clothing wool Washed	Pound
		Clothing wool Scoured	Pound
Unmanufactured-Combing wool	Unmanufactured-Combing Wool	Combing wool. In the grease	Pound
		Combing wool. On the skin	Pound
		Combing wool. Washed	Pound
		Combing wool. Scoured	Pound
Unmanufactured-Hair, Angora, cashmere, etc.	Unmanufacturedâ€"Hair, Angora, Cashmere, Etc.	Hair of the Angora goat mohair, in the grease	Pound
		Hair of the Cashmere goat ,Alpaca ,and other like animals, in the grease	Pound
		Hair of the Cashmere goat ,Alpaca ,and other like animals, washed	Pound
		Hair of the Cashmere goat ,Alpaca ,and other like animals, scoured	Pound
Wool yarns	Wool Yarns	Yarns ,of wool, mohair, Valued over $1 per pound	Pound
		Wool and other hair Valued over 30c,not over $1 per pound 1per pound	Pound
		Wool and other hair Valued over $1 per pound 1per pound	Pound
Raw silk	Raw Silk	Raw silk , in skeins, reeled from the coco	Pound
Spun silk	Spun Silk	Spun silk or shappe silk yarn, or yarn of s	Pound

Pre-Smoot Hawley Correspondence Between Price and Tariff Data, first six months of 1930, cont. (4/4)

Price Data Category	**Tariff Data Category**	**Tariff Data Sub Category**	**Unit**
Wood: Boards, etc., softwood	Wood: Boards, Etc., Softwood	Boards , planks , and deals	M Ft
Pulp wood	Pulp Woods	Pulpwood rough spruce	Cord
		Pulpwood rough poplar	Cord
		Pulpwood rough other	Cord
		Pulpwood peeled spruce	Cord
		Pulpwood peeled poplar	Cord
		Pulpwood peeled other	Cord
		Pulpwood rossed spruce	Cord
Wood pulp-Mechanically ground	Wood Pulp-Mechanically Ground	Mechanically ground wood pulp unbleached	Ton
		Mechanically ground wood pulp bleached	Ton
Wood pulp-Sulphite, unbleached	Wood Pulp-Sulphite, Unbleached	Chemical wood pulp, Sulphite ,unbleached including (easy bleaching ,newsgrade	Ton
Wood pulp-Sulphite, bleached	Wood Pulp-Sulphite, Bleached	Chemical wood pulp, Sulphite ,bleached	Ton
Wood pulp-Sulphate, unbleached	Wood Pulp-Sulphate, Unbleached	Chemical wood pulp, Sulphate ,unbleached kraft (pulp).	Ton
Printing Paper	Paper: Standard Newsprint	Newsprint paper,80 percent mechanical ground and 20 percent bleached sulphate	Pound
Coal: Bituminous	Coal: Bituminous	Bituminous coal ,shale ,and lignite	Ton
		Bituminous coal and shale , imported from countries imposing duty	Ton
Petroleum: Crude	Petroleum: Crude	Crude petroleum	Bbl
Iron ore	Iron Ore	Iron ore , including manganiferous iron ore , n. e. s ..	Ton
Pig iron	Pig Iron	Pig iron	Ton
Bar steel	Bar Steel	Steel Bar Valued (various values and content)	Pound
Aluminum		Aluminum , crude scrap and alloy	Pound
Copper: Unrefined	Copper: Unrefined	Copper , unrefined black , blister , and converter, inpigs, or con	Pound
Copper: Refined	Copper: Refined	refined, in ingots, plates, or bars	Pound
Tin: Bars, blocks, etc.	Tin: Bars, Blocks, Etc.	Tin bars , blocks , pigs, grain, granulated, or scrap, and alloy	Pound
Fertilizers: Nitrate of soda	Fertilizers: Nitrate Of Soda	Sodium nitrate nitrate (of soda)	Ton

Table A.4: Pre-Smoot Hawley Correspondence Between Price and Tariff Data, last six months of 1930 (1/4)

Price Data Category	**Tariff Data Category**	**Tariff Data Sub Category**	**Unit**
Beef and veal, fresh	Beef and veal, fresh	Beef, Fresh	pound
		Veal, Fresh	pound
Sausage casings	Sausage casings	Sheep, lamb, and goat casings	pound
		Weasands and ox gullets	pound
		Sausagecasings, n. s. p. f	pound
Butter	Butter	Butter	pound
Cheese	Cheese	Emmenthaler or Swiss with eye formation	pound
		Romano or Pecorino	pound
		Reggiano or Parmesan	pound
		Provoloni or Provolette	pound
		Roquefort	pound
		Other	pound
Cod	Cod, cured or preserved	Cod (dried)	pound
Herring	Herring, cured or preserved	Pickled or salted	pound
Mackerel	Mackerel, cured or preserved	Pickled or salted	pound
Cattle hides	Cattle hides	Dry or dry salted (over 12 pounds)	pound
		Wet salted (over 25pounds)	pound
Kip Skins	Calf and kip skins	Dry and salted (6-12 pounds)	pound
		Wet salted (12-25 pounds)	pound
Calf Skins	Calf and kip skins	Dry and salted (less than 6 pounds)	pound
		Wet salted (lessthan 12 pounds)	pound
Sheep and lamb skins	Sheep and lamb skins	Wooled (wool on dry and green salted)	pound
		Slats, dry , no wool	pound
		Pickled skins , not split , no woo	pound
		Pickled fleshers, split,flesh side	pound
		Pickled skivers ,split ,grain side	pound
Goat and kid skins	Goat and kid skins	Dry and dry salted	pound
		Green or pickled	pound
Calf and kip, upper	Leather: calf and kip, upper	Upper Leather, Calf and Kip	sq. ft.
Gloves	Leather gloves		pair
Beaver	Beaver	Furs ,undressed Beaver	number
Fox, except silver or black	Fox, except silver or black	Furs ,undressed Fox other (than silver or black)	number
Marten	Marten	Furs ,undressed Marten	number
Squirrel	Squirrel	Furs ,undressed Squirrel	number
Bristles, sorted, etc.	Bristles, sorted, etc.	Sorted ,bunched ,or prepared	pound
Corn	Corn	Corn	Bushel
Rice, cleaned	Rice, cleaned	Cleaned or milled rice	Pound
Wheat	Wheat	For grinding in bond and export	Bushel
		Other	Bushel

Pre-Smoot Hawley Correspondence Between Price and Tariff Data, last six months of 1930, cont. (2/4)

Price Data Category	**Tariff Data Category**	**Tariff Data Sub Category**	**Unit**
Beans, dried	Beans, dried	Beans ,dried .	Pound
Potatoes, white	Potatoes, white	Certified seed	Pound
		Other	Pound
Onions	Onions	Onions	Pound
Bananas	Bananas	Bananas	Bunch
Olives	Olives	Green	Gallon
		Ripe	Gallon
Currants	Currants	Currants , Zante or other	pound
Dates	Dates	Fresh or dried with pit	pound
		Fresh or dried with pits removed	pound
		In packages of not more than 10pounds	pound
		Prepared or preserved	pound
Figs	Figs	Fresh , dried , or in brine	Pound
		Fig paste	Pound
		Prepared or preserved	Pound
Raisins	Raisins		Pound
Almonds, shelled	Almonds, shelled	Shelled	Pound
Almonds, not shelled	Almonds, not shelled	Not shelled	Pound
Walnuts, shelled	Walnuts, shelled	Shelled	Pound
Walnuts, not shelled	Walnuts, not shelled	Not shelled.	Pound
Olive oil, edible	Olive oil, edible	In packages weighing less than 40pounds	Pound
		Other	Pound
Cocoa or cacao beans	Cocoa or cacao beans	Cocoa or cacao beans	Pound
Coffee	Coffee	Raw or green	Pound
		Roasted	Pound
Tea	Tea	Tea, n.s.p.f	Pound
Sugar	Sugar	Sugarcane, natural	Pound
		Beet sugar-Testing by the polariscope not above 75	Pound
		Beet sugar-Testing by the polariscope not above 100	Pound
		Cane Sugar Free	Pound
		Cane Sugar Dutiable	Pound
Rubber, crude	Rubber, crude	Rubber , crude	Pound
Shellac	Shellac		Pound
Flaxseed or linseed	Flaxseed or linseed	Flaxseed	Bushel
Coconut	Coconut	Coconut oil.	Pound
Palm	Palm oil	Palm oil	Pound
Peanut	Peanut oil	Peanut oil	Pound
Soya bean	Soybean oil	Soybean oil	Pound
		Soybean oil	Pound

Pre-Smoot Hawley Correspondence Between Price and Tariff Data, last six months of 1930, cont. (3/4)

Price Data Category	Tariff Data Category	Tariff Data Sub Category	Unit
Clover seed	Clover seed	Red	Pound
		sweet	Pound
		Crimson	Pound
		White	Pound
		Clover seed, n. s. p. f	Pound
Tobacco, leaf wrapper	Tobacco, leaf wrapper	Leaf for cigar wrappers -Unstemmed	Pound
Unmanufactured Cotton	Unmanufactured cotton	All sub categories	Pound
Cotton cloths-Not bleached	Cotton cloths-not bleached	Not bleached, printed , dyed, colored, or woven figured	sq. yd.
Cotton cloths-Bleached	Cotton cloths-bleached	Bleached	sq. yd.
Cotton cloths-Colored	Cotton cloths-colored	Printed , dyed, colored, or woven figured	sq. yd.
Jute and jute butts, not dressed or man	Jute and jute butts	Jute	Ton
		Jute Butts	Ton
Burlaps	Burlaps	Burlaps and other woven fabrics wholly of jute, n.s.p.f	Pound
Hemp, unmanufactured	Hemp, unmanufactured	Hemp,unmanufactured	Ton
Manila fiber	Manila fiber	Manila and abaca	Ton
Sisal fiber	Sisal fiber	Henequin and sisal	Ton
Matting and mats for floors	Matting and mats for floors	Floor coverings, mats of coco fiber or ratan	sq. yd.
		Common China, Japan, and India straw mating and floor	sq. yd.
		Mating of coco fiber or ratan	sq. yd.
Unmanufactured-Carpet wool	Unmanufactured-carpet wool	Carpet wool, clean content	Pound
Unmanufactured-Clothing wool	Unmanufactured-clothing wool	Clothing wool, clean weight	Pound
Unmanufactured-Combing wool	Unmanufactured-combing wool	In the grease, on the skin or washed	Pound
		Sorted,or matchings	Pound
Unman-Hair, Angora, cashmere, etc.	Unman-hair, angora, cashmere, etc.	Hair of the Angora goat mohair, in the grease	Pound
		Hair of the Cashmere goat ,Alpaca ,and other like animals, in the grease	Pound
		Hair of the Cashmere goat ,Alpaca ,and other like animals, washed	Pound
		Hair of the Cashmere goat ,Alpaca ,and other like animals, scoured	Pound
Wool yarns	Wool yarns	Yarns ,of wool, mohair	Pound
		Rabbit	Pound
		Wool and other hair	Pound
Raw silk	Raw silk	Raw silk , in skeins, reeled from the coco	Pound
Spun silk	Spun silk	Spun silk and yarn ,or yarn of silk and rayon or other synthetic textile and roving, all	Pound

Pre-Smoot Hawley Correspondence Between Price and Tariff Data, last six months of 1930, cont. (4/4)

Price Data Category	**Tariff Data Category**	**Tariff Data Sub Category**	**Unit**
Wood: Boards, etc., softwood	Wood: boards, etc., softwood	Softwood Fir	Mft.
		Softwood Hemlock	Mft.
		Softwood Spruce	Mft.
		Softwood Pine	Mft.
		Boards ,planks ,and deals inthe rough orplaned and dresse Fir	Mft.
		Boards ,planks ,and deals inthe rough orplaned and dresse Hemlock	Mft.
		Boards ,planks ,and deals inthe rough orplaned and dresse Spruce	Mft.
		Boards ,planks ,and deals inthe rough orplaned and dresse Pine	Mft.
		Boards ,planks ,and deals inthe rough orplaned and dresse Larch	Mft.
		Other softwood	Mft.
Pulp woods	Pulp woods	Pulpwood rough spruce	Cord
		Pulpwood rough other	Cord
		Pulpwood peeled spruce	Cord
		Pulpwood peeled poplar	Cord
		Pulpwood peeled other	Cord
		Pulpwood rossed spruce	Cord
		Pulpwood rossed other	Cord
Wood pulp-Mechanically ground	Wood pulp-mechanically ground	Mechanically ground wood pulp unbleached	Ton
		Mechanically ground wood pulp bleached	Ton
Wood pulp-Sulphite, unbleached	Wood pulp-sulphite, unbleached	Chemical wood pulp, Sulphite ,unbleached	Ton
Wood pulp-Sulphite, bleached	Wood pulp-sulphite, bleached	Chemical wood pulp, Sulphite ,bleached	Ton
Wood pulp-Sulphate, unbleached	Wood pulp-sulphate, unbleached	Chemical wood pulp, Sulphate ,unbleached kraft (pulp).	Ton
		Chemical wood pulp, Sulphate,unbleached and bleached	Ton
Paper: Standard newsprint	Paper: standard newsprint	Printing paper Standard newsprint paper	Pound
Coal: Bituminous	Coal: bituminous	Bituminous coal ,shale ,and lignite	Ton
		Bituminous coal and shale , imported from countries imposing duty	Ton
		Total	
Petroleum: Crude	Petroleum: crude	Crude petroleum	Bbl
Iron ore	Iron ore	Iron ore , including manganiferous iron ore , n. e. s ..	Ton
Pig iron	Pig iron	Not containing dutiable alloy	Ton
		Containing dutiable alloy (grossweight)	Ton
		Vanadium content in excess of Ho per cent	Pound
Bar steel	Bar steel	Concrete reinforcement bars (various values)	Pound
		Hollow bars ,and hollow drill steel (various values)	Pound
		Steel bars , n. e.s. (various values)	Pound
Aluminum: Crude, scrap, etc.	Aluminum: crude, scrap, etc.	Metal , scrap and alloys, crude	Pound
Copper: Unrefined	Copper: unrefined	Unrefined black, blister, and converter, in pigs , or converter	Pound
Copper: Refined	Copper: refined	Refined, iningots, plates, or bars	Pound
Tin: Bars, blocks, etc.	Tin: bars, blocks, etc.	Tin bars , blocks , pigs, grain, granulated, or scrap, and alloy	Pound
Fertilizers: Nitrate of soda	Fertilizers: nitrate of soda	Sodium nitrate (nitrate of soda) -	Ton

Table A.5: Effects of the Smoot-Hawley Tariff on Quantities, Prices, and Values through the end of 1930 (1930H2)

	Quantity		Value		Unit Value		Import Prices	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta Tariff_i$	-4.247**	-5.306***	-4.525**	-5.567***	-0.279	-0.261	-0.311	-0.295
	(1.880)	(1.924)	(1.878)	(1.931)	(0.242)	(0.260)	(0.188)	(0.214)
Constant	-0.187*	-0.133	-0.316***	-0.264**	-0.129***	-0.130***	-0.148***	-0.150***
	(0.102)	(0.107)	(0.105)	(0.106)	(0.024)	(0.023)	(0.023)	(0.022)
Sector FE	No	Yes	No	Yes	No	Yes	No	Yes
Source	Duty	Duty	Duty	Duty	Duty	Duty	Price	Price
Observations	73	72	73	72	73	72	73	72
R-squared	0.117	0.309	0.129	0.346	0.012	0.235	0.019	0.195

Notes: Unit value are import prices computed using the value of the article at the port (pre-tariff)/physical quantity imported. Import prices are wholesale price of articles in the imported article's country of origin (as shown in Table D.10, but using a similar time span to make it comparable to columns (5) and (6)). Standard errors are clustered at the product level and shown in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table A.6: Effects of the Smoot-Hawley Tariff on Quantities, Prices, and Values through 1931

	Quantity		Value		Unit Value		Import Prices	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta Tariffs_i$	–4.141***	-5.322***	-3.994***	-5.248***	0.147	0.074	0.403	0.456
	(1.030)	(1.117)	(1.031)	(1.171)	(0.303)	(0.383)	(0.451)	(0.501)
Constant	0.510***	0.561***	0.193**	0.244***	-0.316***	-0.318***	-0.351***	-0.358***
	(0.077)	(0.079)	(0.076)	(0.076)	(0.033)	(0.032)	(0.031)	(0.029)
Sector FE	No	Yes	No	Yes	No	Yes	No	Yes
Source	Duty	Duty	Duty	Duty	Duty	Duty	Price	Price
Observations	73	72	73	72	73	72	73	72
R-squared	0.188	0.311	0.181	0.377	0.002	0.204	0.016	0.203

Notes: Unit value are import prices computed using the value of the article at the port (pre-tariff)/physical quantity imported. Import prices are wholesale price of articles in the imported article's country of origin (as shown in Table D.10). Standard errors are clustered at the product level and shown in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table A.7: Instrumental Variables Estimates of the Effects of the Smoot-Hawley Tariff on Quantities

	(1)	(2)	(3)	(4)
$\Delta Tariff_i$	-3.428***	-4.715***	-3.567***	-4.573***
	(0.910)	(0.867)	(1.078)	(1.167)
Time FE	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes
Sector-Time FE	No	Yes	No	Yes
Regression	OLS	OLS	IV	IV
F-Test			17.05	15.06
Observations	3,066	3,024	3,066	3,024
R-squared	0.931	0.943	0.024	0.042

Notes: The first two columns show OLS estimates based on equation (4) using data between January 1929 to June 1932. Columns 3 and 4 show the IV estimates, where the instrumental variable is defined as the level of the ad valorem equivalent tariff in the first half of 1930, i.e., prior to the enactment of Smoot-Hawley. The sector fixed effect is at the 1-digit level as described in the text. Standard errors clustered at the product level in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

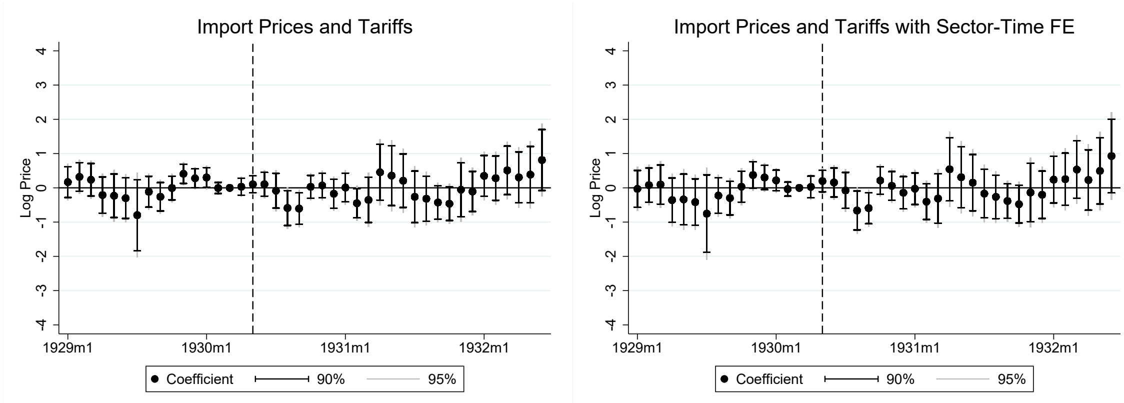
Table A.8: The Effects of Smoot-Hawley Controlling for Origin (Exporter)-Time Fixed Effects

	Quantities	Quantities	Values	Values	Unit Price	Unit Price
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Tariff_i \times I(1\ if\ y \geq 1931)$	-3.618***	-5.306***	-3.295***	-5.036***	0.323	0.270
	(1.051)	(1.107)	(1.040)	(1.101)	(0.225)	(0.227)
Product FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Origin-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Time FE	No	Yes	No	Yes	No	Yes
Observations	3,020	3,020	3,020	3,020	3,020	3,020
R-squared	0.560	0.562	0.402	0.406	0.948	0.949

Notes: This table shows a regression where the independent variable is the change in tariffs due to Smoot-Hawley interacted with a dummy variable that is equal to 1 for years all after the Tariff Act of 1930 was implemented and zero otherwise. The dependent variables is shown in the column headers: in columns (1) and (2), it is quantities; in columns (3) and (4) it is values; and in columns (5) and (6), it is unit prices. Data are at the product-origin(exporter) level with sources described in the text. All columns include an origin-time fixed effect and a product fixed effect. The sector-time fixed effect is at the 1-digit level as described in the text and is the second regression shown for each outcome. Standard errors, clustered at the product-origin level, are shown in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

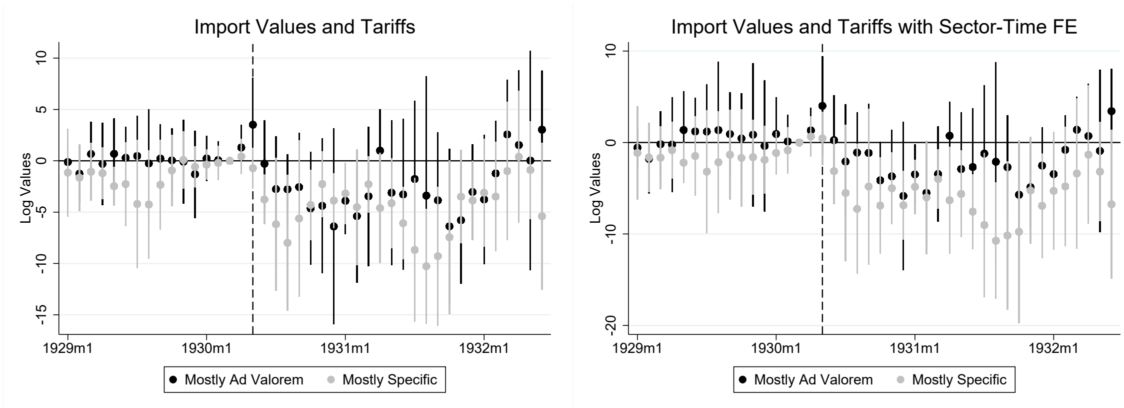
B Additional Figures

Figure B.1: Smoot-Hawley Effects on Import Prices using Change in Tariffs through 1931



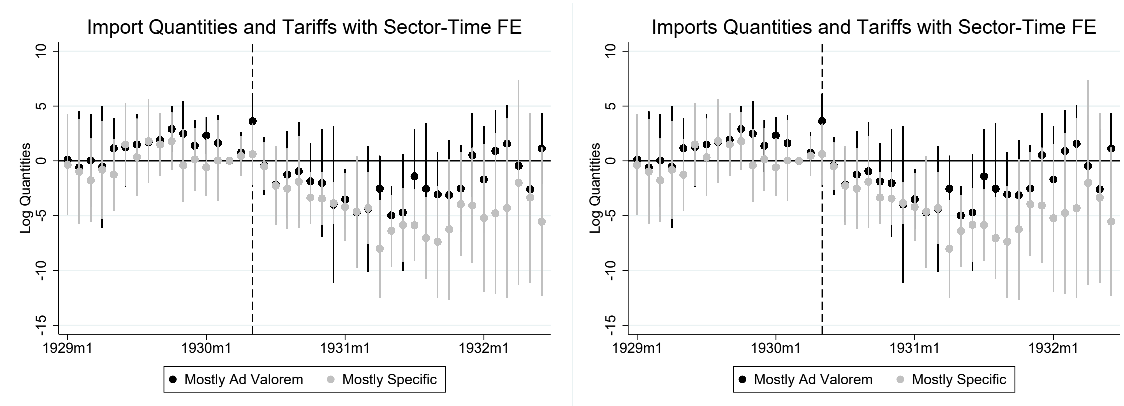
Notes: The figure shows estimates of equation (2), where the dependent variable is the log price. The change in tariffs is measure as the change between 1930H1 and 1931. The right panel also includes sector-time fixed effects. The baseline period is March 1930 for both figures. Black dots display the coefficients for the change in tariffs as defined in equation (1) interacted with the time fixed-effect each period. The darker lines represent 90-percent confidence intervals and the light gray lines 95-percent confidence intervals. Standard errors are clustered at the product level.

Figure B.2: Smoot-Hawley Effects by Type of Tariff



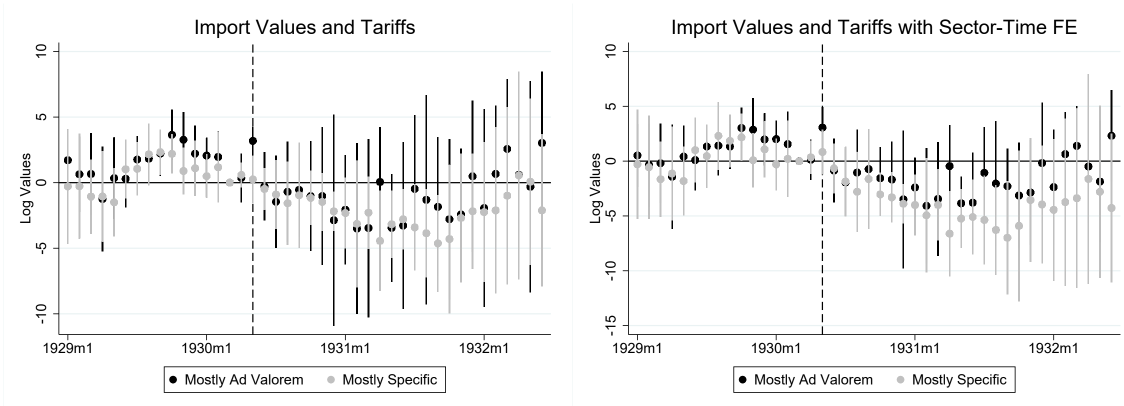
Notes: The figure shows estimates for equation (3), where the dependent variable is the log of the value of imports. The right panel also includes sector-time fixed effects. The baseline period is March 1930 for both graphs. Dots are coefficients for the change in tariffs as defined in equation (1) interacted with the time fixed-effect each period. Black dots are for the interaction with the share of ad valorem tariffs and gray are for the share of specific tariffs. Lines represent 95 percent confidence intervals. Standard errors are clustered at the product level.

Figure B.3: Smoot-Hawley Effects on Import Quantities by Type of Tariff, Controlling for Seasonality



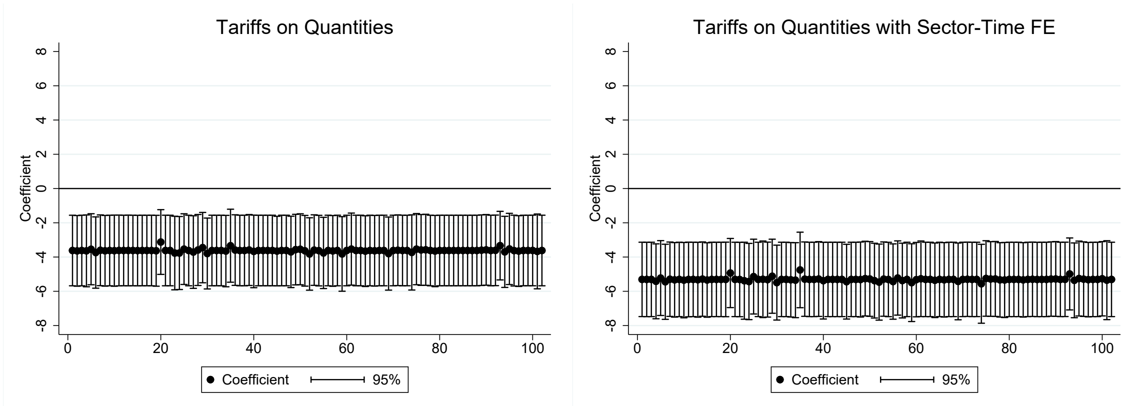
Notes: The figure shows estimates of (3), where the dependent variable is the log quantity. The right panels also include sector-time fixed effects. All variables are seasonally adjusted, by taking the residual of the regression with month fixed effects at the product level. For both figures, the baseline period is March 1930. Dots are coefficients for the change in tariffs as defined in equation (1) interacted with the time fixed effect each period. Black dots are for the interaction with the share of ad valorem tariffs and gray are for the share of specific tariffs. Lines represent 95-percent confidence intervals. Standard errors are clustered at the product level.

Figure B.4: Smoot-Hawley Effects on Import Values by Type of Tariff, Controlling for Seasonality



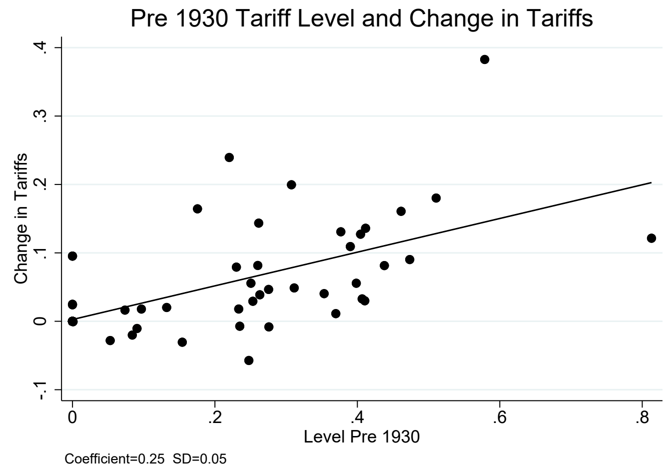
Notes: The figure shows results for regression (3), where the dependent variable is the log values. The left panels do not include controls, and the right panels include sector-time fixed-effects. All variables are seasonally adjusted, by taking the residual of regression with month fixed effect at the product level. The baseline period is March 1930 for both graphs. Dots are coefficients for the change in tariffs as defined in equation (1) interacted with the time fixed-effect each period. Black dots are for the interaction with the share of ad valorem tariffs and gray are for the share of specific tariffs. Lines represent 95 percent confidence intervals. Standard errors are clustered at the product level.

Figure B.5: The Effects oF Smoot-Hawley on Imports, Sequentially Dropping Trade Partners



Notes: The Figures show results similar to the ones presented in Table A.8 for the quantity of imports, but sequentially drops one exporter to the US at a time. Each dot, then, is the point estimate of the regression that excludes a single country from the sample, with a numerical code indicating the country omitted on the y-axis. Bars represent 95-percent confidence intervals. The left panel shows regressions with origin-time and product fixed effects while the right panel includes those fixed effects as well as sector-time fixed effects.

Figure B.6: First Stage of the IV Regression



Notes: The scatter plot displays the first stage of our IV estimates. The x-axis plots the log of 1 plus the tariff rate for an imported article that existed prior Smoot-Hawley for imports in our sample. The y-axis displays exchange imported article's corresponding change in the tariff rate after the Tariff Act of 1930. The solid line shows the linear fit. Below the x-axis, a note shows the results of a regression where the dependent variable is the change in tariff and the independent variable is the pre-Smoot-Hawley tariff. SD is the standard error of the main coefficient. We use robust standard errors in that regression.

C Data Validation

To validate our imputation, we compare import prices based on wholesale prices taken from the article's port of origin and unit values, i.e., the prices calculated using the value of the imported article to the US divided by the quantity imported for that article. From the annual table of tariffs, we obtain quantities and values for the first semester of 1930, the second semester of 1930, and 1931. With that information, we can compute average unit values at the article level by dividing each import's total value by its total quantity. We then take an equivalent around average from our price data and compare both units. Figure C.7 shows the relationship between the two measures of unit prices. We can see that there is a strong correlation between both measures. Table C.9 displays a regression where the dependent variable is the duty price and the independent variable is the monthly average, gives a coefficient of between 0.998 and 1.007, in all cases with constant is small, and we find high R-squareds. This result indicates that our merge between prices and categories of imports is likely accurate.

Figure C.7: Comparing Import Prices: Unit Values and Wholesale Prices by Country of Origin

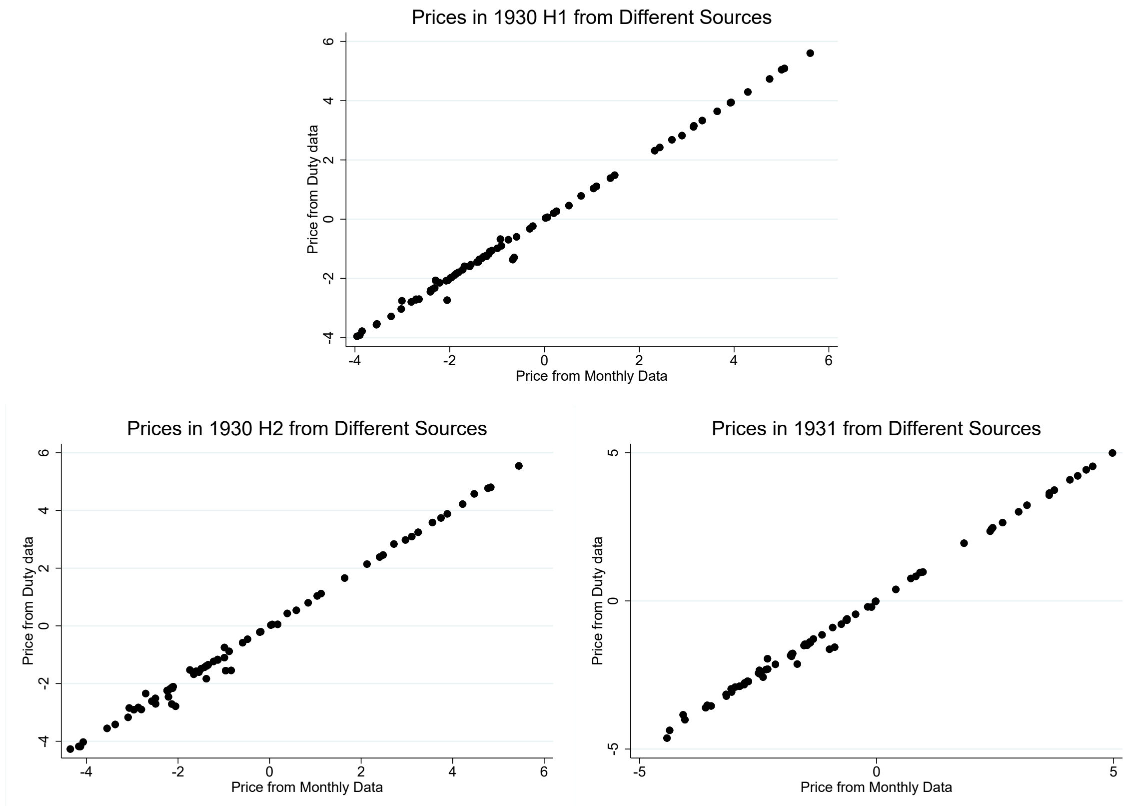


Table C.9: Comparing Duties with Import Prices

	Duty Unit Value		
	(1)	(2)	(3)
Average Price	0.998***	1.007***	1.003***
	(0.004)	(0.005)	(0.005)
Constant	-0.014	-0.019*	-0.037*
	(0.016)	(0.036)	(0.020)
Period	1930H1	1930H2	1931
Observations	73	73	73
R-squared	0.996	0.995	0.993

D Average Effect of Tariffs on Prices

To examine the average effect of tariff rate changes over the entire treatment period, we estimate the following regression using our baseline definition of $\Delta Tariff_i$:

$$\log\left(Price_{it}\right) = \alpha_t + \gamma_i + \beta I(1\ if\ t \geq 1930m6)\Delta Tariff_i + \varepsilon_{i,t}. \tag{D.1}$$

To avoid the influence of the 1929 price variations shown in Figure 6, which tended to be negative, Table D.10 shows estimates with the sample period starting in December 1929.

Table D.10: 1930 Tariff's Effect on Import Prices

	(1)	(2)
$I(1\ if\ t \geq 1930m6)\Delta Tariffs_i$	0.257	0.273
	(0.316)	(0.373)
Product FE	Yes	Yes
Time FE	Yes	Yes
Sector-Time FE	No	Yes
Observations	2,190	2,160
R-squared	0.993	0.993

Notes: "Price" corresponds to foreign producers' wholesale prices as measured at the port of entry and are pre-tariff prices as discussed in the text. Standard errors are clustered at the product level and shown in parentheses.

E Model and Simulation

In this section, we develop a model to shed light on our empirical findings and to aid in the interpretation of the short-run dynamic effects of the tariff on prices and quantities in our setting in comparison to others. The model imposes assumptions that are standard in open-economy, New Keynesian frameworks. We then simulate the effects of a change in the tariff rate under different monetary policy rules.

E.1 Model

We model three economies that are symmetric and trade with each other. In each economy, households consume both domestic and foreign-produced goods. Firms in each country produce goods using only labor, and set their prices in the domestic currency. Households purchase imports where the nominal exchange rate is used to convert prices to domestic currency values. There is no heterogeneity in households or firms within a country. In our model, one country imposes a tariff on a good produced in one of the two other economies. In our setting, we assume that tariffs are imposed on a particular product produced in a single origin, which imply that bilateral exchange rates will matter.[27] Our model allows us to capture some characteristics of our data, namely, that not all exporters to the US origins produced all products, so differences in bilateral exchange rate changes could play a role in how a change in the tariff rate affects the quantities imported.

Specifically, in country i, the representative household maximizes utility subject to a constraint as follows:

$$\max_{C_{i,t}, L_{i,t}, B_{i,t}} U(C_{i,t}, L_{it})$$

s.t.

$$P_{i,t}C_{i,t} + B_{i,t} = W_{i,t}L_{i,t} + (1 + i_{i,t-1})B_{i,t-1},$$

where $C_{i,t}$ is the household's consumption bundle at time t, and $L_{i,t}$ the labor supply. $P_{i,t}$ is the price index and $W_{i,t}$ is the wage. We assume that workers only supply their labor for the production of domestic goods. $i_{i,t}$ the nominal interest rate and $B_{i,t}$ the risk-

[27] Alternatively, we could model foreign economies that produce many products and impose product-specific tariffs, in which case we could just assume a monetary union for the foreign economy. In this set up, the exchange rate dynamics will be the same for both products.

free, nominal bond issued by country i. For simplicity, each consumer only demands the domestic bond. An external agent trades the three countries' bonds in a competitive financial market, resulting in the standard uncovered interest parity condition.

We model the household's consumption with standard, CES preferences such that:

$$C_{i,t} = \left(\phi_H^{\frac{1}{\sigma}} c_{ii,t}^{\frac{\sigma-1}{\sigma}} + \phi_F^{\frac{1}{\sigma}} c_{ji,t}^{\frac{\sigma-1}{\sigma}} + \phi_F^{\frac{1}{\sigma}} c_{ki,t}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}},$$

where $c_{ji,t}$ is the good produced in country j, consumed by the household in country i at time t. We assume $\phi_H + 2\phi_F = 1$, which are preference shifters, and σ is the elasticity of substitution between goods produced in different countries. Given these preferences, the price index is:

$$P_{i,t} = \left(\phi_H p_{ii,t}^{1-\sigma} + \phi_F p_{ji,t}^{1-\sigma} + \phi_F p_{ki,t}^{1-\sigma} \right)^{\frac{1}{1-\sigma}},$$

where $p_{ji,t}$ is the price of the product produced in country j faced by consumer in country i.

There are three economies, denoted H, A and B. Economy H imposes a tariff on economy A $\tau_{HA,t}$, which can vary at time t. Prices faced by households in economy H are thus:

$$p_{ij,t} = p_{i,t} e_{ji,t} (1 + \tau_{ij,t}),$$

where $e_{ji,t}$ is the nominal exchange rate between economy j and i (defined with i in the denominator) and $p_{i,t}$ is the price set by the producer of the good produced in economy i.[28] We can then write the intertemporal condition for the domestic consumer as

$$\frac{c_{ijt}}{c_{iit}} = \left(\frac{p_{it}}{p_{jt} e_{ijt} (1 + \tau_{ijt})} \right)^{\sigma},$$

[28]We assume firms set prices in domestic currency. Trade at the time was invoiced in multiple currencies. Eichengreen and Flandreau (2009) show that, during the interwar period, both the pound sterling and the U.S. dollar played important international roles, with the dollar's importance increasing over time. Candia and Pedemonte (2025) provide empirical evidence suggesting that import dynamics during this period are consistent with producer currency pricing. In our empirical setting, we find no significant effects of tariffs on relative import prices or relative exchange rates. As a result, the estimated effect of tariffs on quantities is driven by the elasticity of substitution, and our conclusions are robust to alternative pricing assumptions.

which is the same as Equation 5 shown in Section 4.

To solve the rest of the model, we assume that the consumer chooses between consumption and labor such that:

$$U(C_{i,t}, L_{it}) = \frac{C_{i,t}^{1-\gamma}}{1-\gamma} - \frac{L_{i,t}^{1+\alpha}}{1+\alpha},$$

where γ is the inverse of the intertemporal elasticity of substitution and α is the inverse of the labor supply elasticity.

From the consumers' intertemporal problem, we obtain the following Euler equation:

$$\left(\frac{C_{i,t}}{C_{i,t+1}}\right)^{-\gamma} = \frac{P_{i,t}}{E_t P_{i,t+1}}(1+i_t)$$

.

The firm produces with labor linearly and faces sticky prices. The firm's output prices are the same regardless of country of origin and are set in domestic currency, i.e., there is no spatial price discrimination, but prices in other countries are subject to the nominal exchange rate and to any applicable tariffs. Using the log-linearized expression for the firm's problem, with $\check{x}_{i,t} = \frac{dx_{it}}{\bar{x}}$ and $\check{pi}_{i,t} = \check{p}_{i,t} - \check{p}_{i,t-1}$, yields the following Phillips curve for each economy:

$$\check{\pi}_{i,t} = \beta E_t \check{\pi}_{i,t+1} + \kappa \check{mc}_{i,t},$$

where $\check{mc}_{i,t}$ is the marginal cost and $\kappa = \frac{(1-\theta)(1-\theta\beta)}{1-\theta}$ is the slope of the Phillips curve. $1-\theta$ representing the frequency of price adjustment. β is the intertemporal discount factor.

Given the presence of domestic-currency bonds trading without frictions in a financial market, we also have an uncovered, interest-rate parity condition, meaning that interest rates in the economies are:

$$\check{i}_{i,t} - \check{i}_{j,t} = \check{e}_{ij,t+1} - \check{e}_{ij,t}$$

Additionally, the risk-sharing conditions holds between the economies with

$$\gamma(\check{C}_{i,t} - \check{C}_{j,t}) = \check{P}_{j,t} + \check{e}_{ij,t} - \check{P}_{i,t}$$

.

We allow for monetary authorities to follow or impose different monetary policy rules or nominal anchors. For example, we allow them to fix their exchange rates, in which case $\check{e}_{ij,t} = 0$ for all partners j. Alternatively, we allow them to choose a different nominal anchor, such as $0 = \check{P}_{i,t} + \check{Y}_{i,t}$ or a Taylor rule $\check{i}_{i,t} = \phi_\pi \check{\pi}_{i,t}$.

E.2 Simulation

Using this set up, we now simulate a permanent shock to the tariff rate $(1 + \tau_{i,t})$. We use $\alpha = 2/3$, and $\gamma = 2$. We simulate monthly changes, with $\beta = 0.996$ and $\theta = 0.917$. We use as a baseline $\phi_H = 0.75$, which represents a relatively large share of imports and exports. We also use a version applicable to a small open economy in order to simulate effects where prices in the foreign economy do not move. These values only serve as a benchmark to show the extent of the influence of different prices in the estimated trade elasticity. Finally, we use a value of $\sigma = 4$ based on our empirical analysis. Using these values, we can decompose the impact of the tariff-rate change on the prices, quantities, and the exchange rate of the domestic economy. We then compare these effects under alternative monetary policy rules, fixed exchange rates or floating exchange rates, which are assumed to exist at the time the new tariff is imposed.

Figure E.8 shows the exchange-rate effects and Figure E.9 shows the decomposition, with fixed exchange rates plotted using a solid line and floating exchange rates with a dashed line.

Figure E.8: Simulation of the Effects of Tariffs on the Trade Elasticity by Type of Monetary Policy Regime

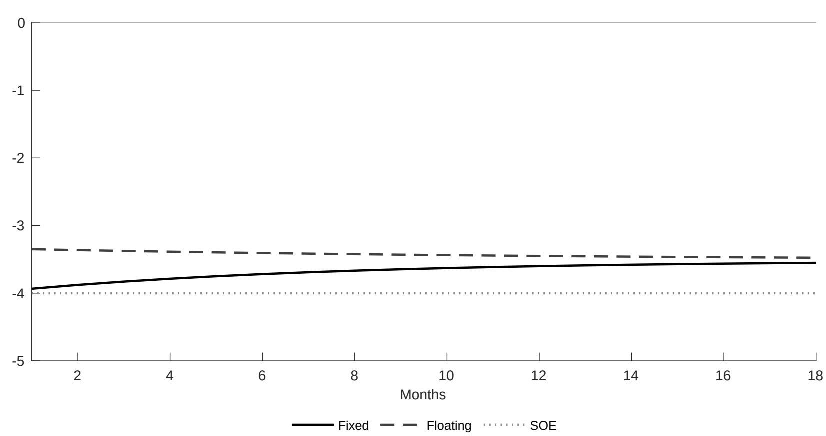
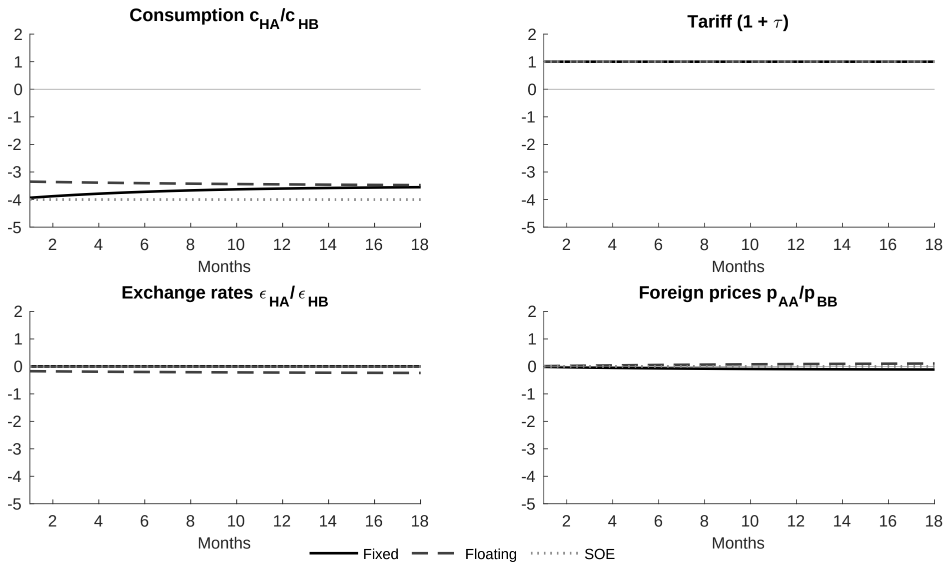


Figure E.9: Tariffs effect on Import Prices

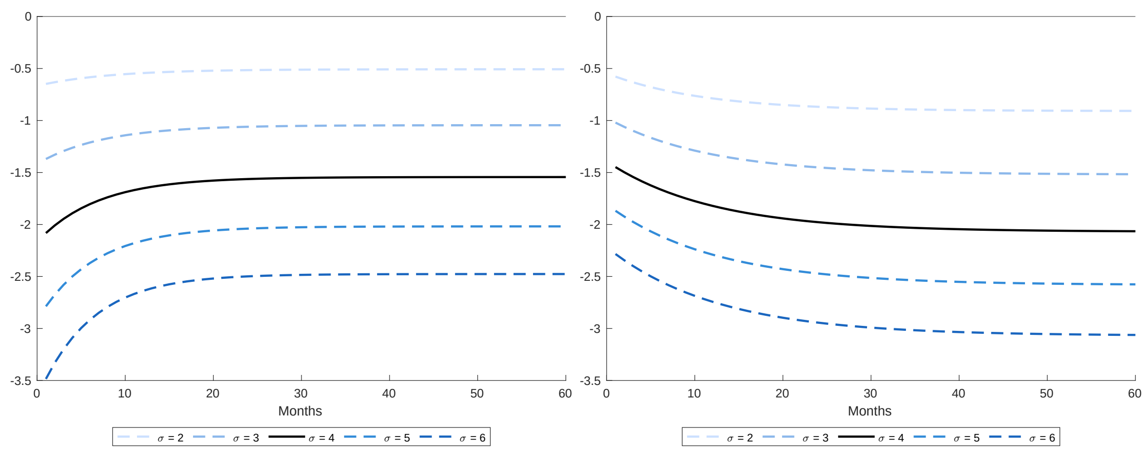


The figure shows that there is a sizable difference in the measured trade elasticity in the short run, consistent with what we document in our empirical setting, where the US and its trade partners had fixed exchange rates when Smoot-Hawley was enacted. The simulation shows that the value of trade elasticities differ because of relative changes in prices and the exchange rate. In the case of the economy with a floating exchange rate, the exchange-rate adjustment reduces the effect of tariffs on import quantities, and compensates for the slow adjustment in prices. In the fixed exchange-rate scenario, prices are rigid, so the effect on quantities is large and close to the value of the elasticity of substitution, or one minus the trade elasticity.

Figure E.9 also shows that the adjustment in foreign prices is key to understanding the dynamics of short-run trade elasticities. In that sense, the smaller the domestic economy or the smaller the trade share, the lower are the changes in prices of the other economy. Foreign producers' demand is not significantly affected by changes in demand in the economy that impose the tariff. Because of that lower demand, they don't adjust their prices to changes in the tariff rate. The implication is that the economy that imposes the tariff will end up paying most of the tariff. In the extreme case of a small open economy (shown by the dotted line), changes in foreign prices are zero, and because of the UIP condition, the exchange-rate gap between different export origins will also be zero. Because foreign economies are not affected by the tariff in the small open economy, their interest rates do not change, so changes in the exchange rate of the small open economy are the same across exporters (or by country of origin). Therefore, the measured trade elasticity will be equal to the elasticity of substitution between goods, independent of the prevailing monetary policy regime.

Finally, Figure E.10 shows the effect of tariff changes on total imports by simulating the change in imports after a tariff on both exporting countries. The figure shows that the larger the elasticity of substitution, the larger the decline in imports. These are the estimates used in Section 4.2 in the main text.

Figure E.10: Tariffs' Effect on Total Import



Under a fixed exchange rate regime and with an elasticity of substitution of -4, a one percentage point increase in average tariff rates leads to a 1.65 percentage point decrease in imports after 12 months. As we discuss in Section 2.1, average tariffs increased by 6 percentage points due to Smoot-Hawley in the first six months.[29] Using this rate increase, the model would imply that total imports decreased by 10 percent due to the tariff rise.

Between May 1930 and May 1931, nominal imports decreased by 37 percent. According to our estimates, the Smoot-Hawley tariff accounts for 27 percent of that decline.[30]

[29]As noted in the main text, many articles in the US tariff could were subject to specific or combined tariffs. During our sample period, prices declined dramatically, implying that the average equivalent ad valorem tariff increased further after Smoot-Hawley's enactment, which included rate increases on these imports Irwin (1998b). We focus on the first six months to better capture the initial increase in tariffs.

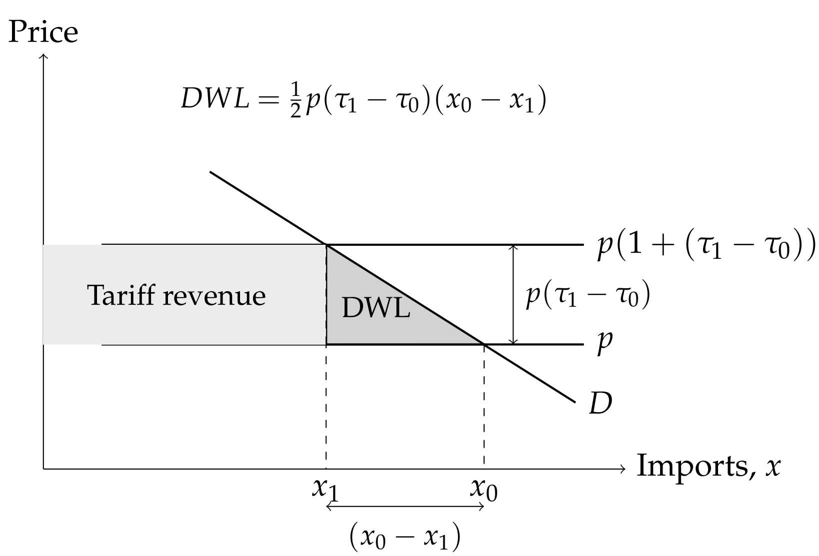
[30]During the first six months after Smoot-Hawley, imports decreased by 27 percent, and the model implies a decrease of 1.80 percent for a one percent increase in tariffs. This suggests that, during the first six months, Smoot-Hawley explains about 40 percent of the decline in imports.

Using a trade model, Irwin (1998b) finds that Smoot-Hawley tariff rate changes account for 22 percent of the decline in imports; he discusses how other factors associated with the Great Depression explain most of the decline in imports. Our estimates are larger due to a higher estimated elasticity of substitution; however, we do not account for the effects that subsequent declines in prices had on specific and combined tariffs, which helps to explain the difference between these estimates and those found in Irwin (1998b).

E.3 Partial Equilibrium Deadweight Loss Estimation

In this subsection we describe our calculation for the partial equilibrium deadweight loss estimate of the Smoot-Hawley Tariff, following the standard methodology shown in Amiti, Redding, and Weinstein (2019). Figure E.11 shows a constant, downward-sloping import demand curve, labeled D. Because we find complete pass through to American importers as a result of Smoot-Hawley, the diagram also depicts a country that is a global price taker and thus has a perfectly elastic import supply curve, shown by the two lines labeled $p(1 + (\tau_1 - \tau_0))$ and p.

Figure E.11: Deadweight Loss due to an Increase in the Tariff Rate



Given these assumptions, the deadweight loss is equal to the triangle defined by:

$$DWL = \frac{1}{2}p(\tau_1 - \tau_0)(x_0 - x_1)$$

We can rearrange and obtain

$$DWL = \frac{1}{2} p x_0 (\tau_1 - \tau_0) \frac{(x_0 - x_1)}{x_0}$$

.

We can approximate $\frac{(x_0 - x_1)}{x_0}$ using our estimated effects of the tariff rate changes on imported quantities from Table 2 multiplied by the change in tariff rate – in our case 6 percentage points. The remaining term, $px_0(\tau_1 - \tau_0)$, is the change in tariff revenue due to Smoot-Hawley.

From Table 1, we obtain x_0 and GDP measures from 1929. We use a change in tariff $(\tau_1 - \tau_0)$ of 6 percentage points. The tariff rate in 1929 times the change in the tariff rate gives us the value for $px_0(\tau_1 - \tau_0)$, which is equal to 0.25% of GDP of 1929. Plugging in values, this yields

$$DWL = \frac{1}{2} \times \ 0.25\% \times \sigma \times (\tau_1 - \tau_0),$$

resulting in a deadweight loss of 0.032% when $\sigma = 4.25$ and 0.026% when $\sigma = 3.43$.

We also measure the tariff area. That numbers will help to measure the deadweight loss if tariffs are not socially distributed. For the tariff revenue area, we obtain $x_1 = x_0 \times (1 - \sigma \times (\tau_1 - \tau_0))$ and multiply by the change in tariff. Using this assumption, we calculate a welfare loss of 0.187% when $\sigma = 4.25$ and 0.2% when $\sigma = 3.42$.

E.4 A Simple Trade Model

We now extend the New Keynesian model to obtain welfare implications. To do so, we take the steady-state version of the model. That model could be interpret as a simple Armington structure. We consider the case of an economy with full pass-through. As in the previous section, preferences over domestic and foreign goods are CES:

$$C = \left[\phi_H^{1/\sigma} C_H^{\frac{\sigma-1}{\sigma}} + \phi_F^{1/\sigma} C_F^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}},$$

where C_H denotes consumption of the domestic good, C_F denotes consumption of imports, and $\sigma > 1$ is the elasticity of substitution between domestic and foreign goods.

Let p_H be the price of the domestic good and p_F the pre-tariff price of imports. Imports are subject to an ad-valorem tariff τ, so the consumer price of imports is

$$p_F^c = p_F(1+\tau).$$

Under full pass-through, changes in tariffs translate one-for-one into changes in tariff-inclusive import prices.

The CES demand system implies that import demand satisfies

$$\frac{C_F}{C_H} = \frac{(p_F(1+\tau))^{-\sigma}}{p_H}.$$

Therefore, holding the pre-tariff import price and aggregate expenditure fixed, the model-implied change in imports after a tariff change from τ_0 to τ_1 is

$$\frac{C_{F,1}}{C_{,F0}} = \left(\frac{1+\tau_1}{1+\tau_0}\right)^{-\sigma}.$$

Equivalently, for small changes in tariffs,

$$\frac{\Delta C_H}{C_H} \approx -\sigma \Delta \log(1+\tau) \approx -\sigma \Delta\tau.$$

To compute welfare, we follow the sufficient-statistics approach of Arkolakis, Costinot, and Rodríguez-Clare (2012). Let λ denote the domestic expenditure share:

$$\lambda = \frac{p_H C_H}{p_H C_H + p_F(1+\tau)C_F}.$$

In a wide class of trade models, changes in real income can be summarized by changes in the domestic expenditure share and the trade elasticity:

$$\frac{W_1}{W_0} = \left(\frac{\lambda_1}{\lambda_0}\right)^{-1/\varepsilon},$$

where ε is the trade elasticity or $\varepsilon = \sigma - 1$. In our empirical implementation, we use the estimated trade elasticity directly. In our case, we approximate domestic expenditure share by 1 minus the share of imports.

When tariffs generate revenue that is rebated lump-sum to households, welfare is adjusted for tariff revenue. Let R_t denote tariff revenue as a share of GDP or factor income. Then the tariff-revenue-adjusted welfare change is

$$\frac{W_1}{W_0} = \frac{1+R_1}{1+R_0}\left(\frac{\lambda_1}{\lambda_0}\right)^{-1/\varepsilon}.$$

Using the approach from Arkolakis, Costinot, and Rodríguez-Clare (2012), we compute the implied change in tariffs, using $\tau_0 = 12.1\%$ and $\tau_1 = 18.1\%$ as describe in the text. Then, we use that implied new share of imports to calculate the new share of domestic expenditure $\lambda_1 = 0.968$, and compare it to the old share of domestic expenditure, $\lambda_0 = 0.958$. With these figures and the trade elasticity from our empirical estimates, we compute the change in welfare described in the text. Then, for the revenues, we use the share of imports over GDP and multiply by the tariff rate used, to obtain the revenues before and after tariffs.