The Regressive Nature of the U.S. Tariff Code: Origins and Implications

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Abstract

The U.S. tariff code has a surprising and little-known feature: Tariffs are systematically higher on lower-end versions of goods relative to their higher-end counterparts. For example, a handbag made of reptile leather has a tariff rate of 5.3 percent, while a plastic-sided handbag has a tariff rate of 16 percent. In this paper, we show that the negative correlation between unit values and tariff rates within narrowly defined goods holds across the entire U.S. tariff schedule, but is driven by consumer goods. We construct new time series of variety-level tariff rates back to 1930 to show that the negative correlation emerged during U.S. trade negotiations in the 1930s and 40s and has persisted until today. We also draw on other historical data and records to shed light on the forces that generated this regressive pattern. Despite its historical origins, the pattern is still relevant for U.S. consumers today: Back-of-the-envelope calculations suggest that equalizing rates on low- and high-value varieties would result in savings that disproportionately benefit lower income consumers.

Keywords: Trade Policy, Inequality, Gains from Trade, Tariffs, GATT

JEL Codes: F13, F14, N72, D63

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1 Introduction

Tariffs are often modeled as a simple "τ"—a tax that falls uniformly across goods. In reality, tariff schedules are much more complex—the modern day U.S. tariff code comprises over 4,000 pages of tariffs on nearly 20,000 varieties of goods. One surprising form of this complexity is that tariff rates are often higher on low-value varieties relative to their high-value counterparts. For example, the tariff on a $400 handbag made of reptile leather is 5.3 percent, while the tariff on an $8 plastic-sided handbag is 16 percent. This pattern has been noted anecdotally for a subset of goods, first by Gresser (2003) and more recently by Furman et al. (2017), but there has been little effort to determine whether the pattern is true more broadly and, if so, why tariffs are set in this way.

In this paper, we show that the negative correlation between unit values and tariff rates within narrowly defined goods holds across the entire U.S. tariff schedule, but is driven by consumer goods. We construct a new panel of variety-level tariffs, tracing legislated rates on all varieties back to 1930. We use this new dataset to show that the negative correlation originated during U.S. trade negotiations of the 1930s and 40s and has persisted until today. Despite its historical origins, the pattern is still relevant for modern-day consumers: Back-of-the-envelope calculations suggest that equalizing rates on low- and high-value varieties would disproportionately benefit lower-income consumers. For this reason, we refer to the negative correlation as "regressivity" in U.S. tariffs.

We start by documenting the presence of regressive tariffs in the modern U.S. tariff code by comparing tariff rates among "varieties" of narrowly defined "goods." We find that, on average, within goods, a doubling in unit value is associated with a 0.3 percentage point (p.p.) lower ad valorem tariff rate. This regressive pattern is entirely driven by consumer goods, where a doubling of unit value is associated with a 1 p.p. reduction in tariff rate. This negative correlation is robust and appears to be anomalous to the United States with respect to other advanced economies and even some developing economies. Lastly, we show that regressivity is not a new phenomenon, but has been a persistent feature of the data for the last 30 years—the time period over which detailed tariff data are readily available.

We create new time series of product-level tariff rates going back to 1930 in order to answer two questions: When did the regressive pattern emerge, and why? Our starting point is the Tariff Act of 1930—better known as Smoot-Hawley—because we find that immediately before and after this pivotal change in U.S. trade policy, tariffs did not exhibit regressivity. The negative correlation between unit values and tariff rates strengthened starting in the late 1930s, became statistically significant in 1948, following the first round of the General Agreement on Tariffs and Trade (GATT), and changed little thereafter. A two-part story explains this result. In the 1930s, 40s, and 50s, variation in tariff rates within goods rose substantially as the United States engaged in line-by-line tariff negotiations with individual countries. Starting in the 1960s, the nature of negotiations changed: Instead of line-by-line reductions, the United States agreed to reduce tariffs on almost all varieties, bringing tariff rates down in levels but preserving the within-good variation that emerged in the decades prior.

Why was the variation in tariff rates introduced in the mid-1900s regressive in nature? We find two primary forces were at play. First, the trade negotiations that the United States engaged in during the decades following Smoot-Hawley tended to be with advanced economies that tended to produce the higher unit-value varieties. As a result, tariff concessions in those early years were disproportionately made on high unit-value varieties, while low unit-value varieties were more likely to see their rates unchanged. In other cases, regressivity emerged because of protectionist motives: U.S. industries lobbied for tariff protection on the varieties they produced. In cases where domestic production was concentrated in the lower unit-value varieties, this protectionist motive kept rates elevated on those varieties, while rates on higher unit-value varieties came down. In many cases, tariff rates diverged to fulfill one of these two policy priorities, and the gap has persisted despite changes in where varieties are being imported from and what the United States produces today.

In addition to providing a window into the persistent nature of tariff policy, tariff regressivity has direct implications for consumer expenditures. In the last part of the paper, we perform two back-of-the-envelope calculations to assess the economic significance of tariff regressivity for modern-day consumers. We show that eliminating the regressive pattern would result in an annual loss of about 4.5 billion dollars in tariff revenue. If tariffs are fully passed through to consumer prices, this is the rough amount that consumers would save. A data-driven exercise leveraging variation in regional imports and income suggests that these savings would fall more heavily toward the lower end of the income distribution, as lower-income regions are more likely to import lower unit-value varieties. This finding is supported by the work of, for example, Faber and Fally (2022), who show that lower-income consumers are more likely to buy cheaper brands of goods.

One of the major contributions of this paper is the construction of the new product-level tariff dataset. Constructing this new dataset required two substantial components: digitizing historical U.S. tariff schedules and concording the frequently changing numerical product identifiers between 1930 and 1989. We digitized U.S. tariff schedules following every major trade agreement back to immediately before Smoot-Hawley. This provides coverage of all bilateral trade agreements that the U.S. engaged in between 1930 and 1946 and all of the multilateral negotiations that occurred as part of the GATT through 1988. This effort extends the work of Feenstra et al. (2002), who provide tariff data starting in 1989. We also make some improvements to this earlier work.

We build a concordance for these data that incorporates two major changes in the numerical systems used to classify imports, as well as year-to-year changes that occurred within classification regimes. Our concordance tracks changes through Schedule A codes from 1930 to 1962, through Tariff Schedules of the United States (TSUS) codes from 1963 to 1988, and between the two systems. *Schedule A* and *TSUS* were the predecessors to the modern day *Harmonized Tariff System* (*HTS*). Within classification systems alone, this comprises over 43,000 changes. We benefited in part from existing documentation, but constructed nearly two-thirds of this concordance by manually comparing tariff schedules from year to year. Here, we complement the work of Pierce and Schott (2012)—who provide year-to-year concordances of HTS codes starting in 1989—and Feenstra (1996)—who provides a concordance from the *TSUS* to the *HTS*, to which we also make improvements.

In addition to the data contribution, we contribute to several other strands of literature, starting with the small literature on classification in trade. Related to our finding that tariff rates were often set in order to appease certain trading partners, Grant (2023) argues that the entire system used to classify traded goods in the United States is determined endogenously, as the policymaker weighs the benefits of better policy targeting against the costs of more complex classification schemes. In earlier work, Gowa and Hicks (2018) and Tavares (2006) find that tariff lines are often split or reclassified to accommodate political goals. Our work provides evidence of this type of endogeneity, and its economic consequences. We also put these previous findings in a dynamic setting: Not only is classification endogenous, but it can be hysteretic as well. Endogenous classification decisions are not necessarily revisited and re-optimized in each period, but can persist even as the economic landscape shifts.

Other work has also shown that the cross-industry structure of tariffs can be biased in economically relevant ways. Shapiro (2021) shows that U.S. tariffs tend to be lower on more-polluting industries. Nunn and Trefler (2010) show that, globally, the extent to which tariffs are correlated with research and development activities at the industry level has consequences for economic growth. We highlight another important aspect of tariff heterogeneity at a higher level of detail, and shed light on its historical determinants.

We also contribute to the literature that seeks to understand the political economy of the world trade negotiations that took place throughout the 20$^{\text{th}}$ century and their subsequent effects. Related to our finding that variation in tariff rates emerged during the pre- and early GATT years, Bown and Irwin (2017) study tariff levels in the 1940s and early 1950s and find that tariffs fell by relatively more in the early rounds of the GATT for a core group of GATT participants than they did for many other important countries (including other non-core GATT participants). More recently, Bagwell et al. (2020) analyze recently declassified tariff bargaining data from the Torquay Round of the GATT and document that negotiations were characterized by a lack of strategic behavior among participants and an important multilateral element to bargaining. Our work shows the persistent economic consequences of these negotiations.

Our findings are also consistent with a group of papers that seek to understand the role that developing countries have played in multilateral trade negotiations over time. Many papers—for example, Jawara and Kwa (2004), Subramanian and Wei (2007), Bagwell and Staiger (2013)—have documented that, while developing nations were participants in the GATT negotiations, they did not benefit from these negotiations in the same way that advanced economies did. Special and differential treatment provisions for developing economies, like the Generalized System of Preferences (GSP), may have had perverse effects, actually weakening their negotiating power (see, for example, Grossman and Sykes (2005) and Özden and Reinhardt (2005) on GSP).[1] This asymmetric power dynamic rendered the markets most important to developing countries—like shoes, textiles, and apparel—the least negotiated, and were sectors where the "terms of trade externality" forces of multilateral negotiations (first outlined in Bagwell et al. (2002)) were least likely to play out (as shown in Ludema and Mayda (2009) and Ludema and Mayda (2013)). These, and other consumer-goods industries, are the ones where we find the strongest evidence of regressivity today, driven

[1] Nunn (2019) discusses similar asymmetries created by anti-dumping duties and other development policy.

precisely by asymmetric negotiating presence among different producing nations.

Lastly, we contribute to the growing debate within the literature on the distributional effects of trade. Estimating the gains from trade has been a central and long-standing question for policymakers and researchers. A more recent strand of the literature has acknowledged that the gains from trade may be distributed unevenly because individuals across the income distribution differ widely in the goods that they consume. Using data on aggregate expenditures and a non-homothetic demand system, Fajgelbaum and Khandelwal (2016) find that trade favors individuals at the lower end of the income distribution, who tend to concentrate spending in more traded sectors. He (2018) also finds that trade has pro-poor effects and reduces real-wage inequality, and Hottman and Monarch (2020) find that, due to non-homotheticities, low-income consumers experienced more import price inflation than high-income consumers between 1998 and 2014. On the other hand, Borusyak and Jaravel (2021) find that the purchasing-power gains from lower trade costs are distributionally neutral. We sidestep this direct question, but instead provide direct evidence from the data that the structure of tariffs at a detailed level appears to be regressive in nature.

The rest of the paper proceeds as follows: In Section 2, we document the presence of regressive tariffs in the modern U.S. tariff code. In Section 3 we describe our new dataset and provide details on its construction. In Sections 4 and 5 we present analysis on the historical origins and drivers of regressivity. Finally, in Section 6 we assess the economic implications of regressivity for modern-day consumers.

2 The Regressive Nature of the U.S. Tariff Code

In this section, we document the pattern that is the focus of this paper: Within detailed categories of goods, there is a negative correlation between legislated tariff rates and unit values of member varieties. We start by defining what "goods" and "varieties" are in the context of the HTS in Section 2.1, and present summary statistics of those goods in Section 2.2. In Section 2.3, we present our baseline results for the United States, and in Section 2.5, we compare the United States to a handful of other countries. Finally, in Section 2.6, we show that this pattern is not new, and has been a feature of U.S. tariffs for over 30 years.

2.1 Defining a "Good"

Documenting the pattern of interest in the tariff code requires a careful comparison of tariff rates and unit values among varieties of narrowly defined goods. The World Customs Organization classifies every internationally traded good by a six-digit Harmonized Commodity Description and Coding Systems (HS) numeric code. Countries are then permitted to provide more detailed classifications by adding digits to each good's HS code. In the United States, these detailed classifications take the form of ten-digit Harmonized Tariff Schedule codes, which are administered by the U.S. International Trade Commission (USITC) and enforced by the U.S. Customs Bureau. Following convention, we use the term "HS code" here to describe HTS or HS codes. Tariffs are set at the eight-digit level, and ten-digit codes provide additional detail used for statistical reporting (USITC, 2024). Accompanying these numeric codes are text descriptions of each good. Because an important part of our analysis is ensuring that we are comparing the tariff rates on different varieties of the "same good," we rely on the text descriptions to help define "goods" within the HTS. In robustness exercises in Appendix A, we show that our findings hold using alternative definitions of goods and varieties.

The best way to see how we use the text descriptions of the tariff code to define goods and varieties is by example. Table I reports all of the varieties (10-digit HS products) within the four-digit HS code 8215—a category that encompasses "*spoons, forks, ladles, skimmers, cake-servers, fish-knives, butter-knives, sugar tongs and similar kitchen or tableware; and base metal parts thereof.*" In the *HTS*, descriptions become more detailed as additional digits are added to the HS code. Unfortunately, however, because of the complexity of the *HTS*, there is no simple rule that establishes a level N such that all N-digit HS codes define goods, and M-digit HS codes (for $M > N$) are varieties of that good. This is apparent here, with spoons falling into two different six-digit codes (8215.91 and 8215.99). Additionally, in some cases, varieties of two different goods might be classified under the same N-digit HS code. For example, 8215.99 contains forks and spoons, with forks running from 8215.99.01 through 8215.99.22, and spoons starting with 8215.99.30.

Ameliorating these complications is the layout of the *HTS*, which uses different levels of indentation to highlight relevant splits of HS codes into "like" categories. Returning to the example in HS 8215.99, the fork/spoon demarcation becomes clear once we leverage these indentations: All of

TABLE I
2017 HTS: All Varieties with HTS Code 8215

HTS Code	Description	Noun Grouping
8215	Spoons, forks, ladles, skimmers, cake-servers, fish-knives, butter-knives, sugar tongs and similar kitchen or tableware; and base metal parts thereof:	
8215.10.00.00	Sets of assorted articles containing at least one article plated with precious metal	sets
8215.20.00.00	Other sets of assorted articles	sets
	Other:	
8215.91	Plated with precious metal:	
8215.91.30.00	Forks	forks
8215.91.60.00	Spoons and ladles	spoons
8215.91.90.00	Other (including parts)	X
8215.99	Other:	
	Forks:	
	With stainless steel handles:	
	With handles containing nickel or containing over 10 percent by weight of manganese:	
8215.99.01.00	Valued under 25¢ each, not over 25.9 cm in overall length	forks
8215.99.05.00	Other	forks
	Other:	
8215.99.10.00	Valued under 25¢; each	forks
8215.99.15.00	Other	forks
8215.99.20.00	With rubber or plastic handles	forks
	Other:	
8215.99.22.00	Without their handles	forks
	Other:	
8215.99.24.00	Table forks (including table serving forks) and barbecue forks with wooden handles	table forks
8215.99.26.00	Other	table forks
	Spoons and ladles:	
	With stainless steel handles:	
8215.99.30.00	Spoons valued under 25¢each	spoons
8215.99.35.00	Other	spoons
8215.99.40	With base metal (except stainless steel) or nonmetal handles	–
8215.99.40.30	Tablespoons and table ladles	tablespoons
8215.99.40.60	Other	tablespoons
8215.99.45.00	Other	–
8215.99.50.00	Other (including parts)	–

NOTE. This table presents an example of the layout of the HTS in 2017. The indentations replicate what is in the HTS, and the column "Noun Grouping" shows the relevant noun (or pair of nouns) that define the several goods within the HS-4 8215. A dash in the "Noun Grouping" column in a given line indicates that no less-indented noun is associated with that line, and an "X" denotes that the line has no associated unit of quantity, and is thus dropped from our data.

the forks lie under the "Forks" heading (or have descriptions beginning with "forks"), and spoons lie under the "Spoons and ladles" heading (or have descriptions beginning with "spoons"). Each additional level of indentation introduces additional descriptive text for the lines subsumed by it (that is, for varieties that are more indented). When this descriptive text begins with one or two *nouns*, and no nouns are used to start the description of any more-indented varieties, we use that noun as the definition of a good for that line in the *HTS* and all subsequent lines until the next noun or until the indentation becomes smaller.[2] We find the part of speech of each word using the Penn Treebank project, a standard sentence parser used in the natural language processing literature, described by Marcus et al. (1994).[3] To minimize the risk that different nouns could be used describe different goods (e.g., "fish" could be used to describe the animals or "fish hooks"), we only consider noun-groupings within 4-digit HS groupings. So, in the example of Table I, the goods introduced are 8215-sets, 8215-spoons, 8215-table forks, 8215-tablespoons, and 8215-forks.[4]

2.2 Coverage of the Tariff Schedule

Our analysis focuses on the subset of imports into the United States that can be reasonably classified into "goods," so we drop a few classes of imported varieties.[5] First, we drop two chapters of the schedule (98 and 99) that reflect special and temporary tariffs, and one chapter (52—cotton yarn and fabric) with exceedingly detailed classifications before 1989.[6] Total imports in 2017—our baseline year—were 2.3 trillion dollars, and this restriction reduces our sample to 2.2 trillion. Second, we drop goods with no listed unit of quantity, since our analysis requires us to define the unit value

[2] We also consider adjective-noun and noun-noun pairs, which (in the examples we have examined manually) does not split goods into varieties. Because we allow the prevailing noun to carry down to indentations of the same level (instead of only carrying down to more-indented lines), this approach retains lines designated as "other" with a relatively high frequency. In appendix A, we show results using a more restrictive approach that excludes lines with "other" that are immediately preceded by a noun and find similar results.

[3] This tagger considers not only each word individually but also its surrounding words. So, for example, in "I went fishing," fishing is a verb, while in "fishing reels," fishing is a noun.

[4] This technique produced far more reasonable results than other more-sophisticated natural language processing tools. To see why an untrained algorithm would have difficulty in defining a good, consider the following example. Suppose that the four lines in the *HTS* were silver forks, silver spoons, steel forks, and steel spoons. Without any additional information, algorithms that measured the similarity of each string have no way to know that spoon/fork is the right delineation, rather than steel/silver. The algorithm defined above leverages the fact that human beings created the layout of the HTS.

[5] Our sample excludes non-imported varieties as of 2017. We show in Appendix A that, excluding the special and temporary rates in chapters 98 and 99 of the *HTS*, only 4.6% of tariff lines (8-digit HS code) were not imported in 2017.

[6] Dropping chapter 52 has a negligible impact on our results—we drop it because the large number of codes and substantive changes to how fabrics/yarns have been classified make our concordance, described below, less informative. Feenstra (1996) notes similar complications with fabrics.

TABLE II
Summary Statistics

	All	Consumer	Intermediate	Capital	Other
Number of goods	2,911	916	1,602	363	48
Number of varieties	11,903	4,517	5,938	1,215	191
Imports ($, billions)	1,338	332	542	312	147
Import-weighted tariff	0.018	0.051	0.010	0.004	0.009
Fraction w/ tariff variation	0.409	0.534	0.385	0.215	0.083
Fraction w/ positive tariffs	0.668	0.751	0.667	0.471	0.458
Fraction with $\leq$ 2 varieties	0.541	0.457	0.582	0.570	0.646
$\leq$ 4 varieties	0.784	0.711	0.820	0.835	0.812
$\leq$ 10 varieties	0.936	0.908	0.949	0.972	0.938
Log unit value: 25$^{\text{th}}$ pctile.	-0.413	-0.415	-0.380	-0.673	-0.294
Log unit value: 75$^{\text{th}}$ pctile.	0.390	0.393	0.348	0.756	0.311

NOTE. This table presents summary statistics for the goods and varieties in our baseline 2017 sample. Trade data are from Schott (2008). Tariff rates are those applicable at the beginning of 2017. Rows with "fraction" describe statistics at the good level. The rows labeled "log unit value: x^{th} pctile." report the x^{th} percentile of the distribution of good-demeaned log unit values. In this paper, we use the term "log" to refer to the natural logarithm.

of imported varieties.[7] This reduces our sample to 1.9 trillion dollars of inputs. Third, we drop varieties that were not classified into a "good" using the algorithm described above. The vast majority of these cases arose from varieties that were described as "other" in the tariff schedule, as in the example of Table I. With this restriction, our coverage drops to 1.6 trillion dollars of imports. Finally, we only analyze goods with at least one variety, since our focus is on within-good tariff variation, leaving us with 1.3 trillion dollars of 2017 imports.

In Table II, we report summary statistics of the goods and varieties covered by our analysis. We include statistics for the full dataset and three subsets—consumer, intermediate, and capital goods—that are categorized using the UN's Broad Economic Category (BEC) classification of 6-digit HS codes.[8] A few patterns emerge. First, though tariff rates are often thought of or modeled as being uniform across goods or industries, the fifth row of Table II shows that substantial tariff variation remains even at very disaggregated levels: About 40 percent of all goods have tariff varia-

[7]The absence of a unit of quantity for an HS variety often arises if the items imported under that HS code are fairly heterogeneous. Such varieties often cover "parts" of manufactured goods, machinery, and instruments (e.g. 8503.00.95.50 "other parts of generators"). Units are also omitted for varieties that may be hard to measure (e.g. 0106.41.00.00 "bees").

[8]The BEC categorizes transportable goods according to their end use. The classification is more detailed than the three categories we present here, which are based on the categorization of BECs into three System of National Accounts categories, plus a residual. Details can be found in United Nations (2002). The crosswalk from BEC codes to 2017 HS codes is available from `https://unstats.un.org/unsd/trade/classifications/correspondence-tables.asp`.

tion, and over half of consumer goods have tariff variation. For consumer goods, this likely reflects the fact that these goods also have a higher average number of varieties-per-good than the other categories, which in turn suggests that these goods have received more attention from policymakers (in the framework of, e.g., Grant (2023)).[9] Lastly, consistent with the conventional wisdom that the United States has relatively low tariffs on average, the average (import-weighted) tariff rate across all goods is only 1.8 percent. Aggregation, however, masks substantial heterogeneity in tariff rates in different categories. Consumer goods have much higher average tariffs of 5.1 percent. Indeed, in our sample, consumer goods represent only 25 percent of imports in 2017, but account for 70 percent of total import duties.

2.3 Establishing the Pattern

To understand the relationship between unit values and tariffs, we estimate the following regression:

$$\tau_\omega = \beta \text{ Log Unit Value}_\omega + \delta_{g(\omega)} + \varepsilon_\omega, \tag{1}$$

where τ_ω is the legislated most-favored nation (MFN) tariff rate on variety ω of good g in percent, Log Unit Value$_\omega$ is the log of the unit value of that variety—unit values are calculated as nominal imports divided by import quantity—and $\delta_{g(\omega)}$ is a good-g fixed effect, using 2017 data. Throughout this paper, we exclude tariffs above 100 percent. The coefficient of interest, β, is a semi-elasticity representing the *within-good correlation* of unit values and legislated tariff rates.

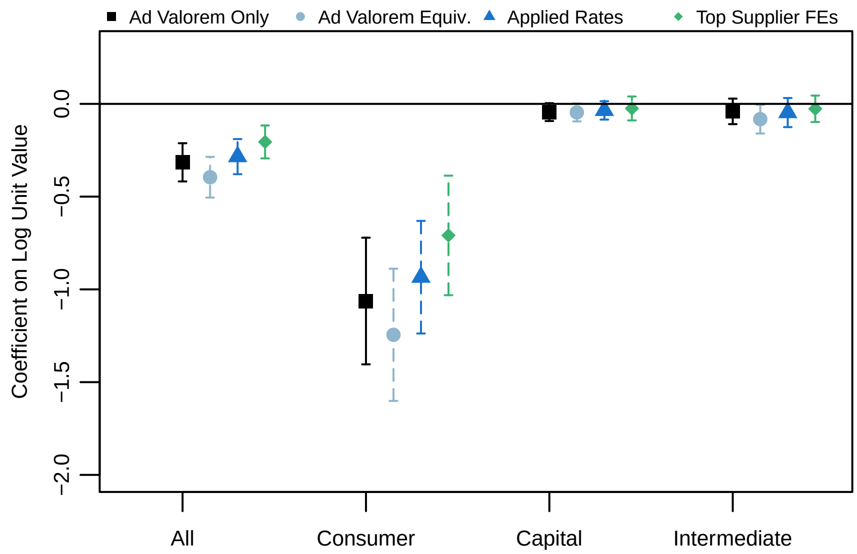
Our baseline results are shown by the black squares in Figure I. Our baseline sample includes only modern day varieties with legislated tariff rates of the *ad valorem* form—about 90 percent of all tariff lines. Averaging over the entire tariff schedule, within goods, a one hundred percent increase in unit value (a doubling) is associated with a 0.3 percentage point lower legislated tariff rate. This is shown in the far left panel of the figure.[10] This negative correlation is entirely driven by consumer goods (second from the left). For these goods, doubling the unit value is associated with a 1 percentage point lower tariff rate. There is no correlation between tariff rates and unit values for capital or intermediate goods, shown in the two panels on the right.

We also consider several alternatives to our baseline specification and sample. Our baseline

[9] The consumer good with the most varieties is a sweater, with 86 varieties, whose high-value varieties tend to be made from Kashmir goats, and whose low-value varieties are made of fabrics like cotton, flax, and "manmade" fibers.

[10] A doubling in within-good unit value is roughly equivalent to the interquartile shift—see Table II.

FIGURE I
Regressivity in Modern U.S. Tariffs



Note. This figure shows estimates of equation 1. From left to right, points correspond to the estimate for all goods, consumer goods, capital goods and intermediate goods, respectively. The "ad valorem only" estimates (squares) are our baseline, and include only MFN ad valorem tariff rates. We then replace ad valorem rates with either ad valorem equivalent (AVE) or applied rates, shown by circles and triangles, respectively. The estimates labeled "top supplier FEs" (diamonds) include fixed effects for the top three suppliers (i.e., countries) of each variety. Lines represent 95 percent confidence intervals, constructed using standard errors clustered at the 8-digit HS-code level.

includes only varieties for which legislated tariff rates are of the *ad valorem* form. We do this to assuage concerns that the negative correlation we find is a mechanical one, driven by the presence of specific, or per-unit, tariffs. To see why specific tariffs could pose a problem, consider an example: Suppose there is a specific tariff of $1 per pair on all varieties of shoes. On a low-unit value, $10 pair of shoes, this $1 per pair tariff has an ad valorem equivalent rate of 10 percent. On a more expensive, $100 pair of shoes, the ad valorem equivalent rate is 1 percent. Therefore, in this case, the regression yields a negative coefficient, even though the legislated rate is actually identical across varieties. We consider an alternative specification in which we include varieties with specific tariffs by converting those specific tariff rates into *ad valorem equivalent* rates, since specific rates *could* also vary in per-unit terms. Results from estimating equation 1 on this expanded sample are depicted by the light blue circular points in Figure I. The correlation becomes slightly stronger in this case, and we cannot reject the possibility that this is all or in part for mechanical reasons.[11]

The medium-blue triangular points in Figure I show the point estimates from the same regres-

[11]Note, even this "mechanical" negative correlation may be important to consider when thinking about the impact on consumers.

sion, but instead of using legislated tariff rates, we calculate *applied tariff* rates as calculated duties divided by nominal imports from the customs data. The results are almost identical to our baseline specification. Because our baseline uses MFN tariffs—the upper bound on tariff rates applied to World Trade Organization (WTO) members—if the negative correlation has been "corrected" by Free Trade Agreements, we would be unable to observe that in our baseline regression. The applied tariff results show that this is not the case: The tariffs that are actually paid on varieties that are imported into the United States feature the negative correlation.[12]

Importantly, our baseline result is not a causal relationship, but a correlative one. It is still possible, however, that there is an omitted variable that could explain the negative relationship between unit values and tariff rates. One that comes to mind is country of origin—say, if most low-unit value varieties come from countries like China, where there is less political incentive to reduce tariffs. To this end, we estimate equation 1 again, but this time include fixed effects for the top three suppliers of each variety. The negative correlation between unit values and tariff rates withstands this addition. In Appendix A, we present a tabular version of Figure I, along with a few other robustness exercises. We show that our conclusions are little changed when modifying the definition of "goods" and "varieties" to be more and less restrictive. We also present import-weighted estimates, and estimates designed to eliminate potentially-prohibitive tariffs. In all cases, we reach similar conclusions.

2.4 Regressivity, Incidence, and Coverage

We have shown thus far that there is a robustly negative correlation between unit values and tariff rates within narrowly defined categories of goods. Going forward, we refer to this negative correlation as being a "regressive" pattern—a potentially loaded term that requires a few important assumptions. First, we are implicitly assuming that poorer consumers are more likely to consume lower unit-value varieties of goods, and are therefore more exposed to this higher tax burden. To back up this assumption we rely on recent literature–for example, Faber and Fally (2022), who find that poorer consumers are more likely to buy cheaper brands of goods at the grocery store. We provide additional support through a data-driven exercise, which we present in Section 6. Second,

[12] In appendix B, we repeat our analysis using 2019 tariff rates (which incorporate the 2018 Trade War). We find broadly similar results, with one exception: The correlation using applied rates is more negative in 2019, since these incorporate higher rates on varieties coming from China which are likely mostly lower unit-value varieties.

we assume that tariffs are passed through to consumers, either fully or by the same proportion across varieties of a good. Recent papers by, for example, Fajgelbaum et al. (2020) and Amiti et al. (2019), have found evidence suggesting foreign export supply curves are relatively flat, which suggests that assuming full pass-through of tariffs to consumers is not unreasonable. Finally, because we do not have data on consumer prices, we are implicitly proxying for consumer prices using import unit values. Thus, if markups distort the relationship between tariff-inclusive unit values and consumer prices differentially within goods, we will be unable to capture this in our analysis.

It is also important to note that we are only considering the relationship between legislated tariff rates and unit values. Other non-tariff barriers (NTBs), such as safety and technical regulations or rules of origin requirements are not reflected in our analysis. This is in large part because we do not have a way to quantify these barriers in the same way we can quantify legislated tariff rates, especially at the required level of detail. Doing so is beyond the scope of our analysis. However, because many NTBs are in force in order to ensure the safety of U.S. consumers and quality of imports, we speculate that they are more likely to be binding for exporting countries that have health, quality, and safety standards that are below those of the United States. To the extent that these are developing countries producing lower unit-value varieties, it is likely that incorporating NTBs into our analysis would only exacerbate regressivity.

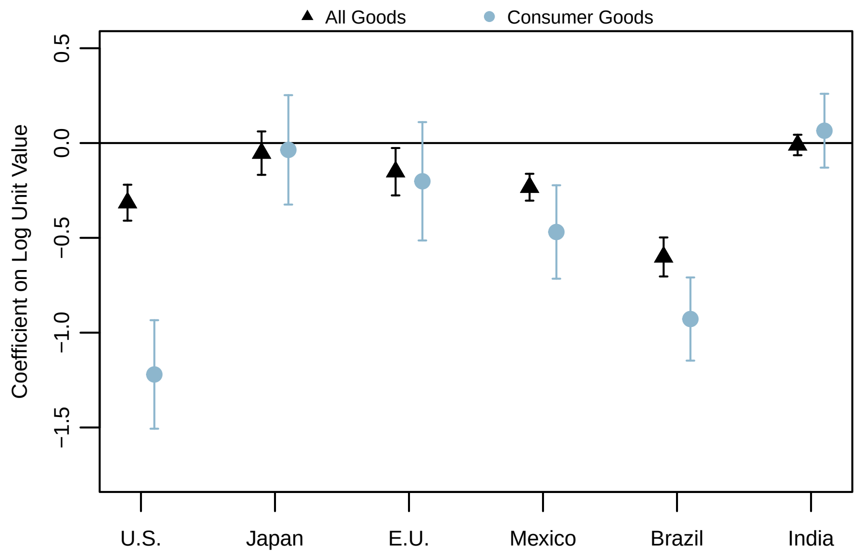
2.5 Regressivity Across Countries

While the United States is the primary focus of our analysis, there is a question of how widespread the regressive pattern is globally. In Figure II, we show the results from estimating equation (1) using data from a handful of developed (U.S., the E.U., and Japan) and developing (Mexico, Brazil, and India) countries. We carry out the analysis at the 8-digit commodity number, since that is the most-detailed level for which data was available for all countries. We define a "good" as the group of HS codes with the same first 5 digits.[13] We collected tariff rates from the WTO's "Tariff Analysis Online" portal when available, otherwise relying on data from the websites of the relevant statistical agency in each country.[14] As in our baseline analysis, we focus on ad valorem rates only in this exercise.

[13] For consistency, we repeat the exercise for the United States using this definition.

[14] Since this analysis requires imports at (at least) the tariff-line level, the data provided by the UN's COMTRADE platform is too aggregated. Appendix C contains details on the data we collected for this exercise.

FIGURE II
Regressivity in Other Countries



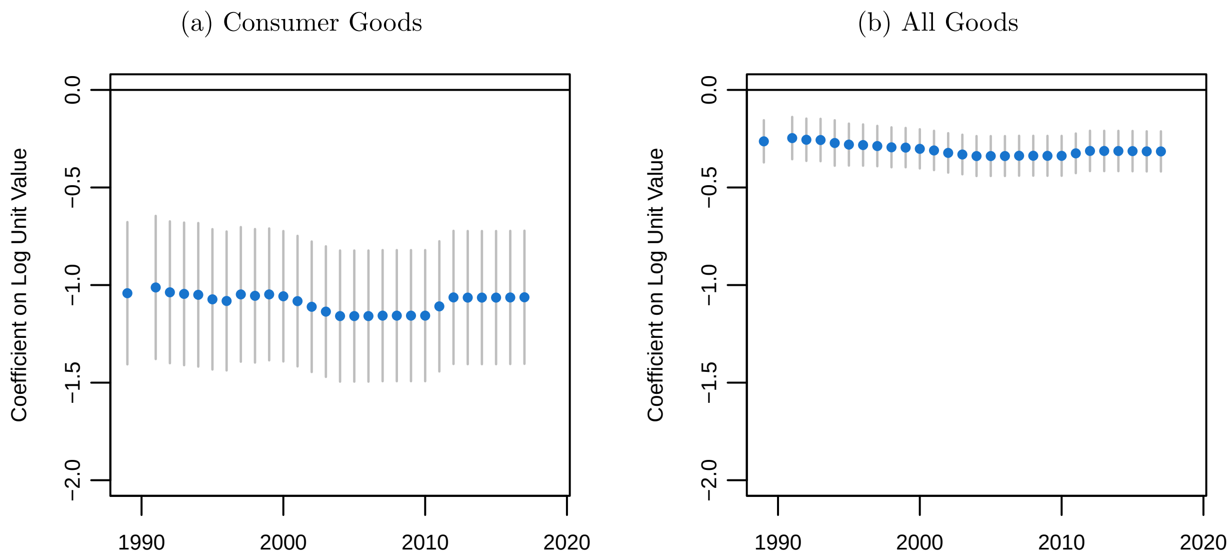
NOTE. This figure contains estimates of equation (1) using 2017 data on MFN ad valorem tariffs and log unit values from the countries shown in the columns. Varieties are defined as 8-digit commodity codes, and goods are 5-digit codes. The whiskers denote heteroskedasticity-robust 95% confidence intervals.

The results suggest that all countries have weakly regressive tariffs, but the United States stands out in the degree of regressivity of its tariff schedule, especially within consumer goods. With the exception of India, the developing countries (Mexico and Brazil) tend to have more regressive tariffs than the non-U.S. advanced economies. India shows essentially no correlation between unit value and tariffs—this largely arises from the fact that there is very little within-good variation in tariff rates in India following their 1991 liberalization (Topalova and Khandelwal, 2011). The divergence of the United States from the other developed economies is notable, and exploring the reason for this difference is a promising avenue for future research.

2.6 Regressivity is Not a New Phenomenon

The statistics presented thus far are representative of modern times, based off of the 2017 U.S. tariff schedule. Figure III shows, however, that regressivity is not a new pattern in the data. Both for consumer goods (left panel) and all goods (right panel), the negative correlation between within-good unit values and tariff rates has been quite stable since 1989—the earliest period for which detailed tariff data are readily available. This recent stability raises the question of *when* and *why* this regressive pattern emerged. We tackle these questions in the next several sections of this paper.

FIGURE III
Regressivity in Legislated Tariffs, 1989-2017



NOTE. This figure contains estimates of β in equation 1 in each year back to 1989 for consumer goods (left panel) and all goods (right panel) using the panel dataset described in Section 3. The whiskers denote 95% confidence intervals constructed using standard errors clustered at the 8-digit HS-code level.

3 New Data on Legislated Tariff Rates

The recent persistence of the regressive pattern forces us to look back further in time to uncover the pattern's origins, a task challenged by a lack of available data. In this section, we present our two major contributions to the data available to study U.S. tariffs over time. The first is a new dataset of tariff-line level tariff rates from 1930 to the present day. During this period, the numerical classification system used to identify tariff-lines changed from year to year, and, on top of these annual changes, underwent two major revisions. Our second data contribution is a tariff-line concordance that bridges these within- and across-regime changes. While the post-1988 data was largely available from prior work, cited below, we have improved upon some of this existing work.

Assembling this new dataset required several steps. We scanned and digitized physical copies of U.S. tariff schedules and concordances put together by the U.S. International Trade Commission (USITC) and its predecessor, the U.S. Tariff Commission (USTC), to put them in a machine-readable format. We also built substantial portions of our concordance manually, with year-to-year comparisons of tariff schedules. Our new concordance covers nearly every change in tariff lines going back to 1930. The resulting tariff dataset covers all bilateral trade agreements between 1930 and 1946, all rounds of the GATT through 1988, and each year thereafter.[15] In the rest of this section, we provide more detail on the new dataset, and on how we use it to trace tariff rates on modern varieties back to 1930.

3.1 A Brief History of U.S. Trade Negotiations, Post 1930

To put our new data and the rest of our historical analysis into context, we start with a very brief overview of U.S. trade negotiations since 1930. In 1934, Franklin Roosevelt signed the Reciprocal Trade Agreements Act, beginning what we refer to as the period of bilateral trade agreements. Between 1934 and 1939, the U.S. entered into trade agreements with nineteen different countries.[16] A 1938 agreement signed during this period with the United Kingdom is of particular relevance for our results. In 1947, the GATT was signed, beginning the period of multilateral negotiations that still exists today—the GATT was the precursor to the modern day WTO. Eight rounds of multilateral tariff negotiations were held between 1947 and 1994. During the first few rounds, negotiations occurred on a product-by-product basis, with the overarching goal of continuing to reduce tariffs on a global scale (WTO, 2024b). Starting in the mid-1960s, GATT negotiations became less "nitpicky," when it came to tariff reductions, instead lowering tariff rates linearly on broad groups of goods. In addition to tariffs, these later negotiations focused on other aspects of the world trading system, including anti-dumping and development—much more akin to trade negotiations of today (WTO, 2024a). This change in the nature of tariff negotiations will prove to be a driver of modern-day regressivity.

3.2 Tariff Data Sources

We obtain our data on tariff-line tariff rates from three regular U.S. government publications. The 1930 Smoot-Hawley tariff rates are from the Commerce Department's *Foreign Commerce and Navigation of the United States* (FCNUS), which we digitized in conjunction with Bouscasse (2023). The FCNUS provides tariff rates for each *Schedule A* code. With some exceptions, tariff rates were

[15] While there are some changes in tariff rates that occur outside of trade agreements before 1989 (when our data become annual), we believe these to be relatively minor and infrequent. In ongoing work, we are working to "fill in" missing years, though this is not necessary for our analysis here, since we generally focus on lower-frequency features of tariff rates.

[16] The nineteen countries are listed in the 1939 edition of *Schedule A*.

set at the level of the 7-digit Schedule A code.[17]

For trade agreements between the Smoot-Hawley tariff of 1930 and February 1952, we rely on the 1952 edition of *Schedule A*. This publication lists all tariff rates as of 1952 and, crucially, the entire history of tariff rates on each 1952 variety, including detail on the relevant trade negotiation in which changes were made. In addition to covering all bilateral trade agreements during the period between 1930 and the beginning of the GATT in 1947, it also covers the Geneva, Annecy, and Torquay rounds of the GATT. To cover tariff changes through 1956, we also digitized the 1956 edition of *Schedule A*.

The U.S. tariff schedule underwent a major overhaul in the early 1960s, culminating in the first edition of the *Tariff Schedules of the United States* in 1963. We digitized the 1963, 1968, and 1980 editions of the TSUS. These cover tariff rates set after the Dillon, Kennedy, and Tokyo rounds of the GATT, respectively. The 1968 and 1980 files also contain *staged rates*—the tariff rates promised through 1972 and 1987, respectively.[18] In our analysis, we treat these staged rates as actual legislated rates. Tariff rates between 1963 and 1988 were set at the level of the 5-digit TSUS code, but we have digitized the schedules at the 7-digit level (the most-detailed level available). We show examples of the documents we digitized in Appendix D.1.

The most-recent overhaul of the U.S. tariff schedule occurred in the late 1980s, in the switch from the TSUS to the modern-day HTS. Tariff data after this point is more readily available: From 1997 through 2017, we downloaded tariff data directly from the USITC. For the periods from 1989–1996, we downloaded and digitized the PDF tariff schedule for each year (excluding 1990) from the USITC.[19] More detail about how we digitize and parse the tariff schedules can be found in Appendix D.

[17] Before 1943, Schedule A codes were not in a standard 7-digit format, but the conversion to a standard 7 digits did not affect tariff rates.

[18] For the 1980 *TSUS*, we digitized only staged rates, and rely on staged rates from the 1968 *TSUS* to fill in any tariff rates that were not modified by the Tokyo round.

[19] These data are also available from Feenstra et al. (2002), though we found errant tariff rates for about 10% of tariff lines in their dataset. The majority of these errors arose from tariffs that had both an ad valorem and specific component, for which the data of Feenstra et al. had the ad valorem component set to zero. We have posted these data and more-detailed documentation online at `https://www.acostamiguel.com/tariff_data.html`.

3.3 Concordances

The numeric codes used to classify varieties in the tariff schedule change frequently for a variety of reasons: new varieties (Broda and Weinstein, 2006), the needs of policymakers to set tariffs or track imports at different levels of aggregation (Grant, 2023), and trade agreements (as we discuss below). This makes it challenging to systematically trace tariffs on a particular product over long periods of time. In addition to the major changes in classification systems described above (moving from the *Schedule A* to the *TSUS* to the *HTS*), changes occur at higher frequency within each of these systems. Thus, we ultimately need five separate concordances to assemble a complete time series: *Schedule A* over time (1930-1962); *Schedule A* to *TSUS* (1962-1963); *TSUS* over time (1963-1988); *TSUS* to *HTS* (1988-1989); and *HTS* over time (1989-2017).

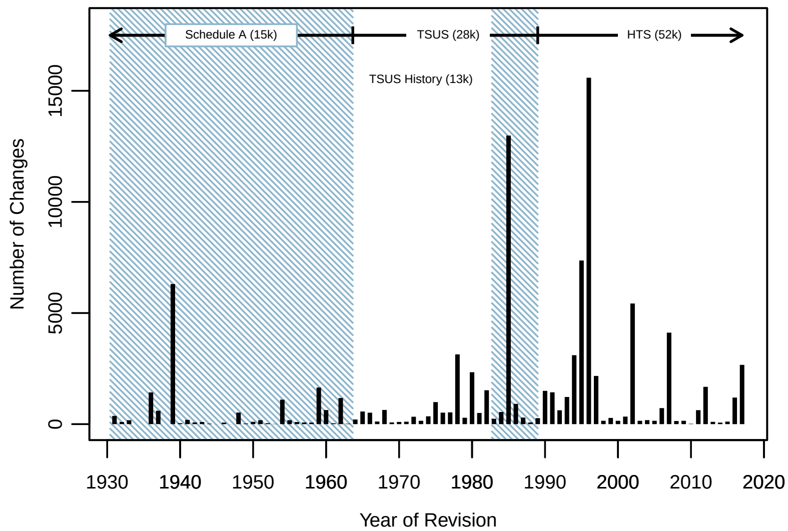
Starting from modern data, we use the data files provided by Pierce and Schott (2012) to build our concordance over the *HTS* period. Our concordance between the *HTS* and the *TSUS*, is based largely on the document *Continuity of Import and Export Trade Statistics After Implementation of the Harmonized Commodity Description and Coding System*, which was produced by the USITC. We digitized this document using optical character recognition (OCR) software.[20] To concord TSUS codes over time, we relied heavily on the USITC publication *History of the Tariff Schedules of the United States Annotated.* This document covers most of the changes made between 1963 and 1982. Over the 1982–1988 period, we manually concorded traded TSUS codes (from Feenstra (1996)) by comparing each edition of the *TSUS* over this period. To concord between the *TSUS* and *Schedule A*, we digitized the 1963 Department of Commerce publication *Dollar Value of U.S. Imports of Merchandise for Consumption.* And, lastly, to concord Schedule A codes over time, we manually examined each edition of *Schedule A*.[21] Appendix D.3 contains examples of the concordance documents that we digitized and how we used them to form our complete concordance.

Figure IV shows the number of changes in variety codes over time, excluding the major regime changes from *Schedule A* to *TSUS* and *TSUS* to *HTS*. Even excluding these major overhauls,

[20] This is the same document that formed the basis of the *HTS–TSUS* concordance constructed by Feenstra (1996). We found that Feenstra's concordance contained nearly 1000 HTS–TSUS code pairs that, based on our own digitization, are not in the USITC's concordance. A large portion of these pairs had HTS codes that are not in the 1989 *HTS*. We also found that this concordance was missing nearly 2000 HTS–TSUS code pairs that are in the USITC's concordance.

[21] Between 1939 and 1963, footnotes were included on each variety in the *Schedule* which indicated when the code was most-recently altered and, in some cases, what the previous code was. We use this information when available. Before 1939, we found all seven editions of Schedule A and manually compared from one edition to the next.

FIGURE IV
Changes in Variety Codes over Time



NOTE. This figure shows the number of "new-obsolete" pairs in each year in our concordance. A "new-obsolete" pair is a pair between a newly established code and one of the codes that it has replaced. If a code replaces n codes, there will be n pairs. Data from 1989 on are from Pierce and Schott (2012). The numbers in parentheses sum the number of new-obsolete pairs in the periods denoted by the breaks in the horizontal line. The shading denotes time periods for which we constructed our concordance by hand.

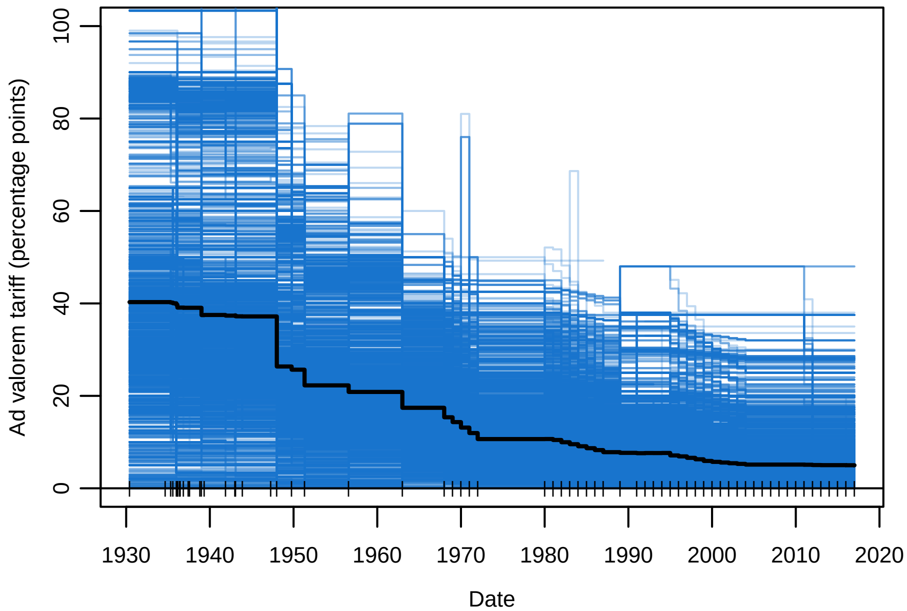
the number of changes is substantial. Within regimes, our 1930–1989 concordance includes over 43,000 changes, of which over two-thirds we constructed by manually comparing tariff schedules (the shaded regions in the plot). Additionally, our *Schedule A* to *TSUS* concordance maps just over 6,000 Schedule A codes to just over 5,000 (5-digit) TSUS codes. The *TSUS* to *HTS* concordance maps nearly 20,000 (7-digit) TSUS codes to just under 9,000 (8-digit) HTS codes. The concordances between regimes are more coarse than within regimes. Within regimes, we map varieties to varieties. Between regimes, our concordances map from the post-regime tariff-line level (the level at which tariffs are set, e.g. 8-digit HTS codes) to the pre-regime variety level (the level at which imports are recorded, e.g. 10-digit HTS codes). In Appendix D.3, we discuss additional properties of our concordance.

3.4 Putting it Together: Tariff Series for 2017 Varieties

We use our tariff data and concordance to assemble a panel of tariff rates on 2017 varieties going back to 1930. For each variety, our concordance tells us the corresponding set of varieties in each tariff schedule, whose tariff rates we then average in each year. Because the 1952 *Schedule A*

FIGURE V

Tariffs over Time



Note. This figure shows all of the ad valorem tariff rates in our panel, plotted at the 8-digit HS level in blue. the black line shows the average of these tariff rates. The ticks at the bottom indicate dates for which we have data.

provides the history of rates back to 1930, the set of varieties remains fixed between 1930 and 1952, at the 1952 Schedule A code level.

In Figure V, we plot all of the ad valorem tariff rates in our panel.[22] Each line corresponds to a 2017 tariff line (an 8-digit HS code). A few patterns emerge from the figure. First, tariffs have come down across the board by a significant amount since 1930. The average ad valorem tariff in 1930 was 40 percent, and fell to 4.5 percent by 2017.[23] Second, tariffs are persistent—the broad decline has thus been fairly slow on average. Pooling across all varieties, the annual autocorrelation of tariff rates is 0.98, implying a half-life of about 30 years.[24] Third, there is substantial heterogeneity in tariff rates. The interquartile range in 2017 is 6.5 percentage points and, at 25 percentage points, nearly quadruple that in 1930.

[22]We focus on primarily on ad valorem rates for two reasons. First, ad valorem rates do not mechanically induce a negative correlation between unit value and price. Second, as a practical matter, we have not consistently digitized unit values going back to 1930. The sample here thus includes observations with either a non-zero ad valorem rate, or a duty of zero (for which we set the ad valorem rate to 0.

[23]Weighting by 2017 imports, these rates are 24 and 3, respectively.

[24]This estimate is the result of regressing variety level tariff rates on their lagged values and a variety fixed-effect. We keep the earliest tariff rate in each year, and linearly interpolate between years.

3.5 Other Data

We complement our main tariff time series with several other newly digitized datasets, all at the variety level. First, from the *FCNUS* we also digitized tariff rates from immediately before the Smoot-Hawley Act, as well as variety-level import data from the first and second half of 1930 (before and after the effective date of the Act). Second, we digitized U.S. imports at the country-variety level in 1934, the earliest year in the 1930s for which we could find such data. These data come from the 1934 edition of the *FCNUS*. Finally, we digitized the list of varieties excepted from the U.S.'s linear tariff reductions during the Kennedy round of the GATT. This list comes from WTO's online archives.[25]

4 Origins of Regressivity: Timing

With our new product-level time series of legislated tariff rates in hand, we return to our exploration of the historical origins of the regressive pattern that we documented in Section 2. In Section 4.1, we describe our starting point—the Smoot-Hawley Tariff, and show that tariffs were *not* regressive before or after this major change in U.S. trade policy. In Section 4.2 we present several exercises that show that regressivity emerged in the late 1930s and 40s, and has persisted ever since.

4.1 Starting Point: The Smoot-Hawley Tariff

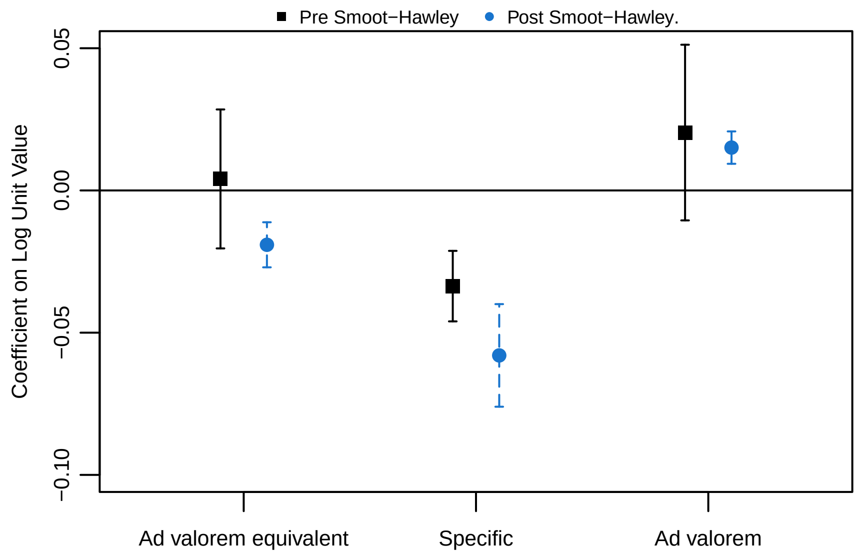
Our analysis starts with the 1930 Smoot-Hawley Tariff. According to Irwin (2011), the Smoot-Hawley Act was one of the most "infamous pieces of congressional legislation of the twentieth century," as it raised tariffs in the United States to historic levels and ushered in an era of global protectionism.[26] We consider 1930 as the starting point of our analysis because, in addition to being a pivotal moment in 20$^{\text{th}}$ century U.S. trade policy, it is a point at which the tariff schedule does *not* appear to be regressive in nature.

We take two approaches for measuring the regressivity of tariffs under Smoot-Hawley. First, we estimate a version of our baseline regression (equation 1) using 1930 definitions of goods, unit values,

[25] Within the documents provided by GATT (1965), we took the list of excepted varieties from the document *Nonagricultural articles excepted from the United States Offer of a Linear Tariff Reduction and Nonagricultural Articles Excluded for Nonparticipant Reasons from the United States Offer of a Linear Tariff Reduction.*

[26] Tariff rates under the Smoot-Hawley Tariff have been studied in great detail. A few recent examples include the work of Irwin and Soderbery (2021) and Mitchener et al. (2022).

FIGURE VI
Regressivity Pre- and Post-Smoot Hawley

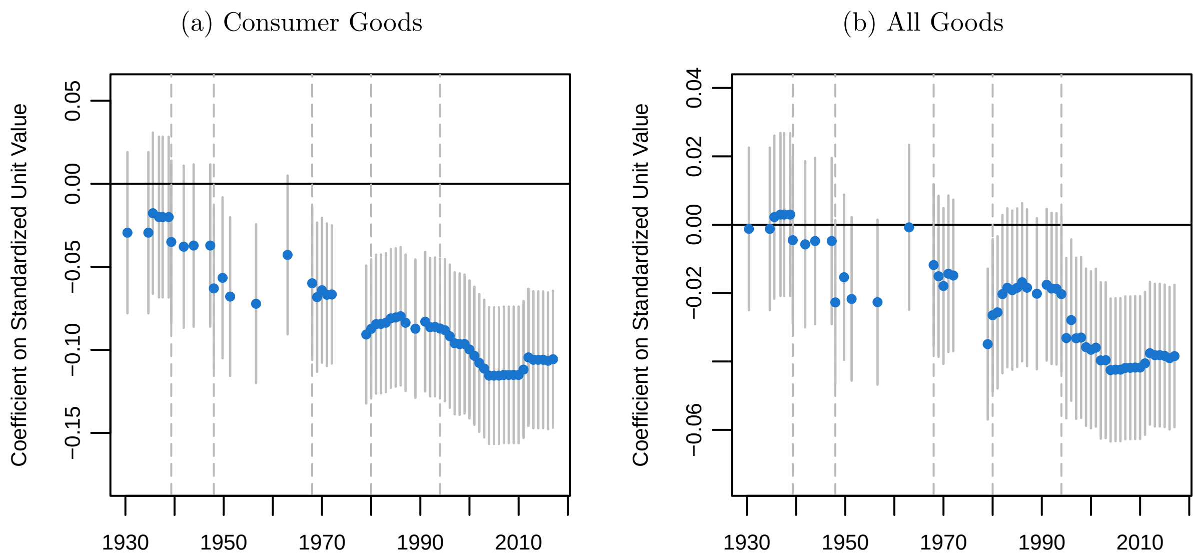


NOTE. This figure contains point estimates from a regression of the form of equation 1 for pre- and post Smoot-Hawley data. The left panel shows estimates for ad valorem equivalent tariffs (which includes the full tariff schedule), the middle shows estimates for the subset of the tariff schedule that has specific tariffs, and the right panel shows estimates for the subset of tariffs that are ad valorem—our baseline. A "good" includes all varieties with the same first-three Schedule A codes. We include good fixed effects, and report 95% confidence intervals constructed with heteroskedasticity-robust standard errors.

and tariff rates. We observe these values in the six months immediately before and immediately after the effective date of Smoot-Hawley. The estimates are plotted in Figure VI. Pre-Smoot-Hawley estimates are depicted with black squares, and post-Smoot-Hawley with blue circles. In the "ad valorem equivalent" column of the figure, we show that there is not a statistically significant correlation between pre-Smoot-Hawley tariffs and log unit values. Post-Smoot-Hawley, the overall tariff schedule looks slightly regressive. However, the "specific" and "ad valorem" columns show that this apparent regressivity is driven entirely by the presence of specific tariffs which, as aforementioned, can cause a mechanically negative correlation between tariff rates and unit values. Focusing only on ad valorem tariffs—the focus of our paper—post-Smoot-Hawley tariffs actually exhibit a positive correlation between unit values and tariffs.

In our second approach to assessing the regressivity of 1930 tariffs, we use 2017 definitions of goods and unit values, but 1930 tariff rates. These data come from our concorded dataset of 2017 goods. We present the full results of this exercise in Section 4.2: There, we show that there is a slightly negative, but statistically insignificant relationship between tariff rates and unit values

FIGURE VII
Within-Good Correlation of Tariffs and Unit Values, 1930-2017



Note. This figure contains estimates of β_t from equation (2). The index t includes all time periods for which we observe tariff rates (or "staged rates") in our dataset: bilateral trade agreements between 1930 and 1947, then after GATT rounds until 1987, and annually between 1989 and 2017. We cluster standard errors at the level of the 8-digit HTS code, and report 95% confidence intervals.

in 1930. Thus, because post-Smoot-Hawley ad valorem tariffs do not appear to be regressive in nature, the rest of our analysis is devoted to understanding when regressivity emerged in the years after Smoot-Hawley took effect.

4.2 When Did Regressivity Emerge?

With our new panel dataset of variety-level tariffs, we perform several exercises to address the question of when the regressive pattern in U.S. tariffs emerged. The results all point us to a similar conclusion: The regressive pattern of tariffs emerged in the late 1930s and 1940s, and has persisted over time. To see this, we start by estimating our baseline regression (equation 1) in each year going back to 1930. Specifically, we estimate:

$$\widetilde{\tau}_{\omega,t} = \beta_t \, \widetilde{\mathrm{uv}}_{\omega,2017} + \delta_{g(\omega),t} + \varepsilon_{\omega,t}, \tag{2}$$

where $\widetilde{\tau}_{\omega,t}$ is the standardized MFN ad valorem tariff on variety ω at time t, and $\widetilde{\mathrm{uv}}_{\omega,2017}$ is the standardized unit value of the same variety, held constant at 2017 levels. We standardize variables at the good level to adjust for the large level change in tariff rates that occurred between 1930 and the present day. As in our baseline, we include a period-good fixed-effect, $\delta_{g(\omega),t}$, so the coefficient β_t provides an estimate of the within-good correlation of (current) unit values and tariff rates at a given point in time.

We plot estimates of β_t from 1930 to 2017 in Figure VII for consumer goods (panel (a)) and for all goods (panel (b)). There are two important takeaways from the figure: First, while there is no statistically significant negative correlation between tariff rates and unit values on consumer goods at the beginning of the sample—i.e., no regressivity—the coefficient becomes increasingly negative starting in the late 1930s and is significantly negative starting in 1948—after the first round of the GATT. Second, once tariffs become "regressive" in the late 1940s, there is very little change in the degree of regressivity over the next 80 years. The pattern for all goods is similar, albeit muted—confirming our earlier finding that overall regressivity in the tariff code is and has been driven by regressivity among consumer goods. We repeat the analysis for capital and intermediate goods in Appendix E. While our baseline sample is varieties that had an ad valorem tariff rate in 2017, our new time series allows us to repeat the exercise and remove varieties that once had a specific tariff that was converted to ad valorem before 2017. The results, also shown in Appendix E, are unchanged from our baseline.

4.2.1 Rising Within-Good Variation

The changing nature of post-Smoot-Hawley tariff negotiations, described in Section 3.1, is important for understanding the initial emergence and subsequent persistence of regressivity. Between 1930 and 1964, within-good variation in tariff rates increased, as the U.S. engaged in line-by-line negotiations of rates. Starting with the Kennedy Round, the U.S. agreed to reduce rates on almost *all* tariff lines by 50 percent (with some exceptions). Similar, broad-based reductions were the standard for subsequent rounds of the GATT. Reductions carried out in this way brought tariffs down in levels, but preserved the within-good variation created in the decades prior. We perform a variance decomposition to help illustrate these dynamics. Specifically, we decompose the variance of the tariff schedule into within-good variation (across varieties of the same good) and across-good variation. The decomposition is shown in equation 3, below:

$$\text{var}(\tau_{\omega,t}) = \underbrace{\frac{1}{N}\sum_{g\in G}\sum_{\omega\in g}(\tau_{g,t}-\bar{\tau}_t)^2}_{\text{across}} + \underbrace{\frac{1}{N}\sum_{g\in G}\sum_{\omega\in g}(\tau_{\omega,g,t}-\tau_{g,t})^2}_{\text{within}}, \tag{3}$$

where ω indexes varieties, g indexes goods, N is the total number of varieties, $\tau_{g,t}$ is the average tariff rate of good g at date t, τ_t is the average tariff rate overall at date t, and $\tau_{\omega,g,t}$ is the tariff rate on variety ω of good g at date t.

We calculate this decomposition for each date t for which we have a complete digitized schedule. We rely on cross-sectional data for this exercise because the averaging introduced by using concorded data can mechanically obscure changes in the nature of variation. For this reason, we compute the variance decomposition at each date for both date t MFN rates and the Column 2 rates in the date-t schedule, which align with the 1930 rates in most cases.[27] We then plot the within-good share of variation at date t, relative to its 1930 (Column 2) level in Figure VIII. The increase in within-good variation that occurs in the 1930s, 40s, and 50s is striking, with the within-good share of variation increasing by 20 percentage points at its peak relative to 1930. Starting in the 1960s, aligned with the shift in the nature of negotiations, within-good variation moderates, but never returns to its 1930 level.

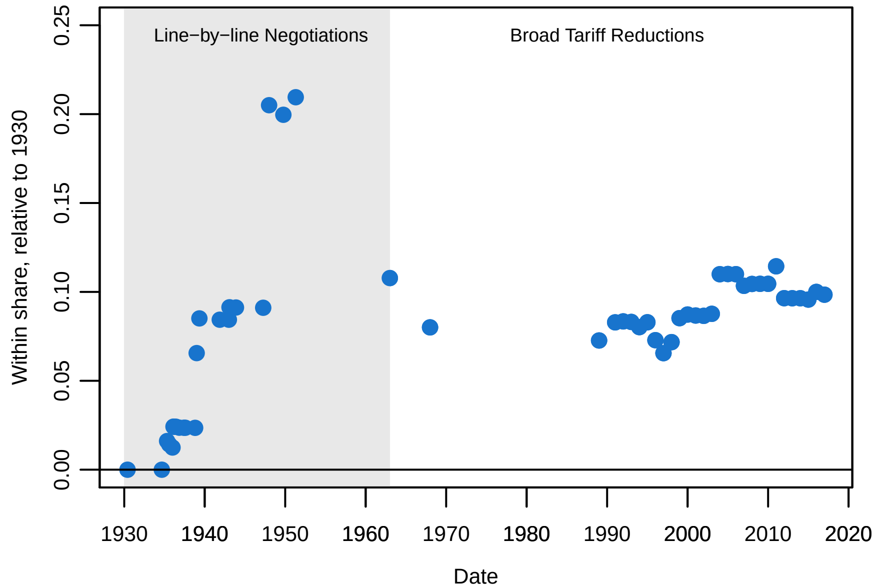
4.2.2 Contributions to Regressivity

To further quantify the importance of the 1930–64 negotiations in contributing to regressivity, we perform an exercise in which we ask how regressive modern tariffs would be if the legislated changes at some time, t, *had not* happened. We construct a "counterfactual" set of 2017 tariff rates by starting with 1930 tariff rates and letting ensuing changes in tariffs happen as legislated until we reach some date t. At date t, we "skip" the changes that occurred at that date. After date t, we continue with the legislated changes, all the way through to 2017. These steps leave us with a set of alternative tariff rates, $\hat{\tau}_{\omega|t,2017}$, that reflect the history of legislated changes excluding the changes made at date t.

[27] This precludes the need for using the concorded data which, as mentioned, can introduce noise into the decomposition.

FIGURE VIII

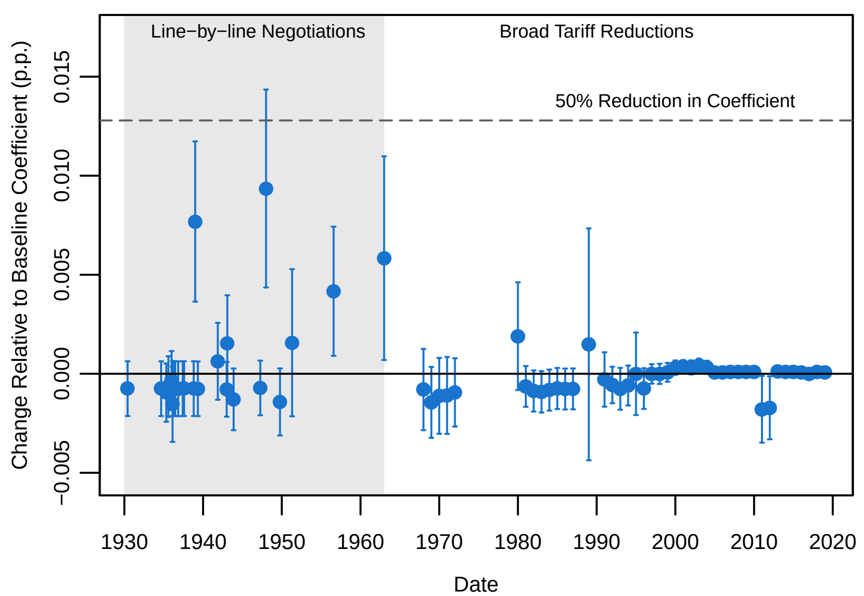
Variance Decomposition of Ad Valorem Tariffs



NOTE. Each point denotes the within-good share of variance, as defined in equation (3). Points are shown for all periods for which we have a digitized complete tariff schedule, including column 2 rates: These correspond to all trade agreements before 1952, 1963, 1968, and from 1989 to 2017. "Goods" for 7-digit codes (Schedule A and TSUS codes) are defined as all varieties with the same first three digits, and for the *HTS* are defined as all varieties within a 5-digit code.

FIGURE IX

Contributions to Regressivity of Consumer Goods



NOTE. This figure contains estimates of $\beta_t - \beta_{2017}$ from equation (2). We cluster standard errors at the level of the 8-digit HTS code, and report 95% confidence intervals.

With these alternative tariff rates in hand, we then estimate the following regression:

$$\text{Log Unit Value}_{\omega,2017} = \beta_t \ \hat{\tau}_{\omega|t,2017} + \delta_{g(\omega),t} + \varepsilon_{\omega,t} \tag{4}$$

In Figure IX, we plot the difference between the β_t obtained when estimating equation 4 on the alternative rates and the β_t obtained from estimating equation 4 on the actual rates (i.e., β_{2017}). We focus on consumer goods, since that is where regressivity is most applicable. A positive point estimate at date t indicates that modern day tariffs would be *less* regressive had the changes legislated at date t *not* occurred. For example, absent the Anglo-American Trade Agreement of 1938, our baseline coefficient would be about 30 percent smaller. A coefficient of zero, on the other hand, means that date t's legislated changes did not contribute to regressivity.[28] We see many significant, positive coefficients in the years between 1930 and 1964, before the change in the nature of tariff negotiations that we emphasize. However, starting with the Kennedy Round phase-ins in 1968, contributions to regressivity virtually disappear.

5 Origins of Regressivity: Drivers

Having established *when* regressivity emerged, we next show *why* the variation in variety-level tariffs that cropped up in the late 1930s was regressive in nature. We find evidence to suggest that regressivity had two primary drivers. First, trade negotiations in the decades following the Smoot-Hawley tariff tended to be made with advanced economies that produced the higher unit-value varieties. As a result, tariff concessions in those early years were disproportionately made on high unit value varieties, while low unit value varieties were more likely to see their rates unchanged. We provide systematic evidence for this pattern in Section 5.1. In other cases, regressivity emerges because of protectionist motives: U.S. industries lobbied for tariff protection for certain industries. In cases when domestic production was concentrated in the low unit-value variety, this protectionist motive kept rates elevated on those varieties while rates on higher unit-value varieties came down. We provide systematic evidence of this secondary driver in Section 5.2.

[28]Tariff changes from one time period to the next can be correlated, so this exercise does not formally decompose the 2017 coefficient into independent contributions from changes in rates in each time period.

5.1 Concessions

It is widely accepted that, in its early years, the GATT was somewhat of a "rich man's club." Many papers have documented that developed countries were the dominant players in negotiations, while developing countries were largely on the sidelines.[29] Negotiations occurred according to a "principal supplier rule," which dictated that agreements about tariff rates on a certain variety occur only with the principal supplier of that variety. Moreover, there was a sense of reciprocity in these negotiations—informal in some ways, but mandated by law in others[30]—such that countries would both ask for and grant concessions to trading partners. As a result, most of the "action" that occurred during the early GATT rounds involved tariff reductions on goods supplied by developed countries.[31] Most developing countries were neither principal suppliers nor major importing markets, and so little was asked of them in terms of their own trade liberalization and the interests of their export markets were ill-represented (Bown, 2009). The well-known result of these negotiation dynamics is that while tariffs were lowered substantially on a vast array of goods, trade barriers remained high in a number of markets that were of export interest to developing countries, like agriculture and clothing.[32]

Somewhat more surprising, however, is that this pattern appears to hold at the good level as well. In the decades following Smoot-Hawley, the United States made tariff concessions primarily on *varieties* that were of interest to negotiating partners. The history of tariff reductions on fishing reels is one of many examples of this behavior. As shown in Figure X, the tariff rate on fishing reels valued over $2.70 and the tariff rate on fishing reels valued over $8.45 were the same until around 1940. In fact, until that point, these two varieties of fishing reels were not differentiated in the tariff schedule at all. The distinction between the high- and low-value fishing reels originated in the Anglo-American Trade Agreement of 1938. According to a detailed analysis of the agreement by the United States Tariff Commission (1938), at that time, U.S. manufacturers were dominant fishing reel producers. Imports of fishing reels into the United States were equivalent to less than one half

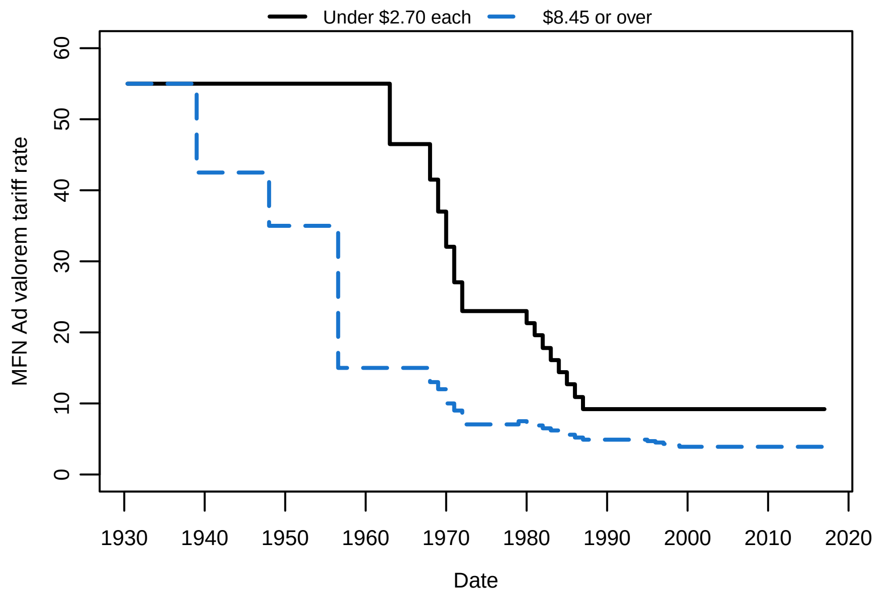
[29]For example, Jawara and Kwa (2004), Subramanian and Wei (2007), and Bagwell and Staiger (2013).

[30]According to Bown (2009), there is no article of the GATT 1947 that formally identifies reciprocity as a founding principle, however the articles that govern how countries are to renegotiate concessions (specifically, Articles XXVIII and XIX) if one party seeks to amend a bargain does contain language about reciprocity, suggesting that it played a role in how initial negotiations were carried out.

[31]And even more specifically, according to Bown and Irwin (2017), among a core group of GATT participants including the United States, United Kingdom, Canada, and Australia.

[32]See, for example, Ludema and Mayda (2013).

FIGURE X
History of Tariff Rates on Fishing Reels



NOTE. This figure shows the most-favored-nation tariff rate on two varieties of fishing reels back to 1930.

of one percent of U.S. production. The small number of imports that did come in were either high-quality reels from the United Kingdom or medium- to low-grade reels from Japan and Germany. By creating a distinction in the tariff rates between high-quality reels (those valued above $8.45) and low-quality reels (those valued below $2.70),[33] the United States was able to appease the United Kingdom in negotiations[34]—lowering import barriers for the type of fishing reel that the United Kingdom produced—without creating a threat to domestic producers.[35] Further concessions were made to the United Kingdom on expensive fishing reels during the GATT negotiations in Geneva in 1947, and though there were subsequent rate reductions for both varieties of reels during later rounds of GATT negotiations, the rates on the high- and low-value varieties never again equalized. It is worth noting that even though the valued goods thresholds have (surprisingly) hardly changed over time, there is still a substantial volume of imports that comes in, even under the lowest value

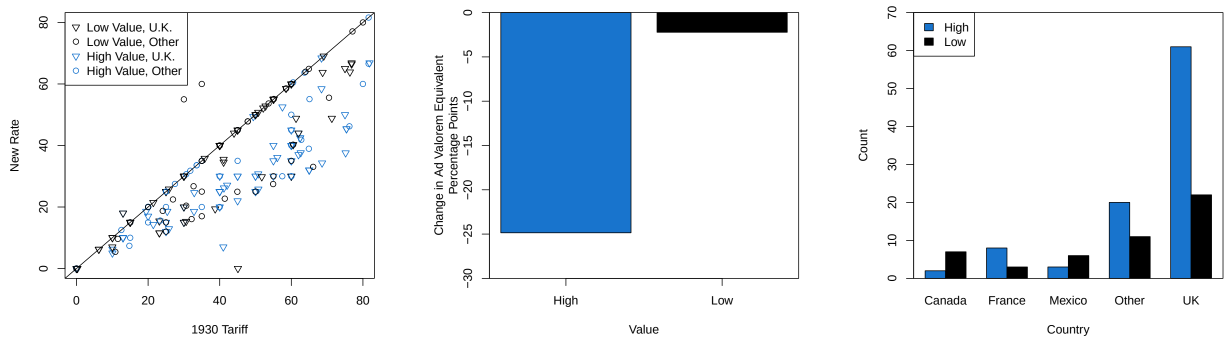
[33] A third group was also created for reels in between $2.70 and $8.45.

[34] That is stated in no uncertain terms in the U.S. Tariff Commission's 1939 Annual Report: "*It is noted in the report that a large number of the duty reductions relate to articles, imports of which consist of grades or qualities either not produced in the United States or produced only in small amounts. Furthermore, it is pointed out that many new import classifications are established by the agreement either for the purpose of confining concessions to products supplied principally by the United Kingdom, or in order to limit duty reductions to the less competitive portions of the old classifications.*" United States Tariff Commission (1939)

[35] While the Anglo-American Trade Agreement of 1938 was a bilateral negotiation between the United States and the United Kingdom, the negotiated rates were actually applied as most-favored nation rates for both countries. For more on this treaty, see Schatz (1970).

FIGURE XI
Tariff Changes on Valued Goods between 1930 and 1946

(a) 1930 vs. New Rate (b) Average Tariff Rate Change (c) Number of Reductions



Note. This figure shows different representations of changes in AVE tariff rates between 1930 and 1946. The left panel shows a scatter plot of 1930 rates against new rates established after 1930. The middle panel shows the trade-weighted changes in these rates for high- and low-valued goods, and the right panel shows the number of reductions on these goods by country. As described in the text, AVEs are constructed using 1930 import values and quantities, so all changes shown only arise from changes in legislated tariffs.

classification.[36]

The fishing reel example appears to have been commonplace during the 1930–1946 bilateral agreements period. To see this, we use data on a subset of legislated tariff changes that took place over the period from 1930 to 1946. For this exercise, we focus on what we call "valued goods," or goods whose varieties are *defined* by their unit value, like fishing reels. This practice appears for the first time in the Tariff of 1816,[37] and provides a set of goods with well-defined low- and high unit-value varieties. In many cases, goods that were not valued goods in 1930 became so in the 1930–46 period through the introduction of new varieties. Ultimately, our sample includes 105 valued goods in 1946, and their varieties.

For each variety, we compute ad valorem equivalent tariffs using 1930 unit values (import quantity divided by import value). We then compare these 1930 rates to new rates that were established between 1930 and 1946. If a good is split into several bins by unit value of its varieties, we retain only the top and bottom bin. Figure XI presents the data in several formats. Panel (a) contains a scatter plot of a variety's 1930 tariff rates on the x-axis, plotted against its new rate established over the 1930–1946 period on the y-axis. Unsurprisingly, almost all of the modifications that were made are decreases in tariffs, and many were substantial, consistent with the findings of

[36] In 2022, the United States imported $13.7 million worth of fishing reels valued under $2.70 each.
[37] See the tariffs on cotton products in the "Fourth" paragraph of the 1816 Act, to regulate the duties on imports and tonnage.

TABLE III
1934 Supplier Information Predicts Modern Data

	Ad Valorem Tariff		Log Unit Value	
	All	Consumer	All	Consumer
Core GATT ranked first in 1934	-1.18	-2.41	0.09	0.28
	(0.34)	(0.64)	(0.05)	(0.08)
Observations	11142	4039	11142	4039

NOTE. This table contains estimates of regressing either the 2017 MFN *ad valorem* tariff rate (in percent) or the log of unit value of each 2017 variety on an indicator for whether a core GATT participant was the top exporter to the United States of that variety in 1934. All regressions include good fixed effects, and standard errors are clustered by HS8.

Bown and Irwin (2017).[38] Panel (b) confirms that the cuts were substantial, and, more importantly, shows that reductions mostly occurred among high-value goods. The average decrease in tariff rates for high-value varieties was just under 25 percentage points, while the decrease for low-value varieties was only about 2 percentage points. Panel (c) presents simple counts of the number of reductions that were made on high-value and low-value varieties. This confirms what can be seen by visual inspection of the scatter plot: Most of the reductions were made on the high-value goods in the trade agreement with the United Kingdom.

The notion that regressivity was driven by concessions to important trading partners can be confirmed more systematically using our full tariff time series and newly digitized data on bilateral U.S. imports from 1934. Table III shows the results of estimating the following regression:

$$y_\omega = \beta \times \mathbb{1}_{\text{Core GATT top source in 1934},\omega} + \delta_{g(\omega)} + \varepsilon_\omega, \tag{5}$$

where y_ω is either the ad valorem tariff rate or log unit value of variety ω in 2017 and the indicator $\mathbb{1}_{\text{Core GATT top source in 1934},\omega}$ captures whether a core GATT participant was the top exporter of variety ω to the United States in 1934. Core GATT participants, as defined by Bown and Irwin (2017) include Australia, Canada, the United Kingdom, and eventual founding members of the European Economic Community (EEC, established 1957)—France, Germany, Italy, the Netherlands, and Belgium. As in our baseline regressions, we include $\delta_{g(\omega)}$—good fixed effects. The first column of Table III shows that *within goods*, if a variety, ω, was imported primarily from a Core GATT participant in 1934, it has a 1 percentage point lower legislated tariff rate in 2017. This negative

[38] Bown and Irwin (2017) find that tariff rates had come down substantially from Smoot-Hawley levels *prior* to the beginning of the GATT.

correlation is even stronger for consumer goods, where being imported primarily from a core GATT participant in 1934 is associated with a 2 percentage point lower tariff rate in 2017. The rightmost column shows that, for consumer goods, core GATT participants were more likely to export higher unit value varieties of goods—varieties primarily imported from core GATT participants in 1934 are associated with statistically significantly higher log unit values in 2017.

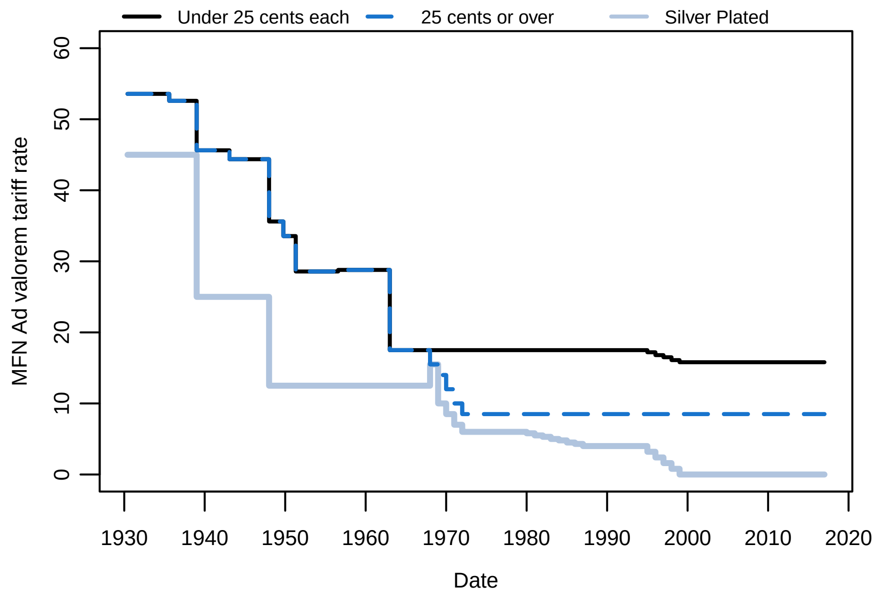
Taken together, these results suggest that as the United States began lowering tariff rates after Smoot-Hawley, concessions tended to be made on the varieties exported by important trading partners. Because the key participants in these early negotiations were advanced economies that tended to produce higher unit value varieties, the regressive pattern emerged.

5.2 Protection

In the second phase of multilateral negotiations, instead of reducing tariffs on specific products, the United States and other countries agreed to linear reductions of tariffs on broad groups of goods. For example, in the Kennedy Round of the GATT, which started in 1964, the United States agreed to reduce tariffs by 50 percent on all non-agricultural products, phased in over a number of years (GATT, 1965). As a result, granting concessions on individual varieties to trading partners became less of a factor. Instead, what drove increased variation in within-good tariff rates were cases when tariff rates were held back from linear reductions for exceptional reasons. When the varieties held back were the low-value ones, regressivity emerged: Tariff rates on those varieties remained high, while negotiations lowered rates on the more expensive counterparts.

The history of tariff reductions on stainless steel forks illustrates how this protectionist motive led to regressivity post-1964. Today, forks of stainless steel that are valued under 25 cents have a 15.8 percent tariff, while those valued over 25 cents have a tariff of 8.5 percent, and silver-plated forks enter duty free. Shown in Figure XII, the divergence in these MFN rates came about during the Kennedy Round in the mid 1960s. USITC (1982) provides a detailed description of the state of the stainless steel flatware (SSTF) industry during this period: In the mid-to-late 1950s, there were 21 manufacturers of SSTF in the United States. Most of these domestic firms were producing flatware of the low-value variety—valued between 8 and 25 cents per piece. At the same time, there was a sharp increase in imports of SSTF, and most of these imports were of the low-value variety (valued around 14 cents per piece) coming from Japan. In search of protection from foreign

FIGURE XII
History of Tariff Rates on Stainless Steel Forks



Note. This figure shows the most-favored-nation tariff rate on three varieties of table forks, back to 1930.

competition, the domestic SSTF industry petitioned for, and received, protection under an escape clause tariff rate quota (TRQ) starting in 1959 for flatware valued under 25 cents per piece.[39] Since domestic production of SSTF valued over 25 cents was not facing the same threat of import competition, the more expensive variety was not included in the escape clause protection. As a result of the escape clause protection, the tariff rate on cheap stainless steel forks was excluded from concessions during the Kennedy Round, remaining just under 20 percent, while the rate on the more expensive varieties of forks were lowered. Despite being lowered slightly during the Urugay round, the rate on cheap stainless steel forks was never reduced to the level of their more expensive counterparts.

This protectionist motive only increased regressivity when the protected variety was a low unit-value one. More systematic evidence from the Kennedy Round suggests that, indeed, varieties held back from the linear reductions tended to be lower unit-value varieties of today's goods. During the Kennedy Round of negotiations (1964-1967), the United States made three types of exceptions to its general 50 percent reduction in non-agricultural products: economic, mandatory, and technical

[39]Under the TRQ arrangement, imports of SSTF valued at less than 25 cents each were charged the concessionary tariff rate on the first 5.75 million dozen pieces imported. Above 5.75 million dozen pieces, imports were levied at a higher rate.

TABLE IV
Kennedy Round Exceptions

	Log Unit Value		Ad Valorem Tariff	
	All	Consumer	All	Consumer
Economic/Mandatory Exception	-0.11	-0.13	3.74	4.68
	(0.06)	(0.06)	(0.22)	(0.37)
Observations	11142	4039	11142	4039

NOTE. This table contains estimates of regressing either the 2017 MFN *ad valorem* tariff rate (in percent) or the log of unit value of each 2017 variety, ω, on an indicator for whether any of ω's 1964 varieties were in the list of varieties excepted from the linear tariff reduction in the Kennedy Round. All regressions include good fixed effects, and standard errors are clustered by HS8.

exceptions (GATT, 1965). Economic exceptions were granted in cases where a tariff reduction would cause severe hardship for a domestic industry. Mandatory exceptions occurred for three reasons: (1) An escape-clause restriction was currently in effect,[40] (2) If an escape-clause finding of injury had once been made by the Tariff Commission, the President had declined to take action, and the Tariff Commission had recently found that the economic conditions of the industry had not improved substantially since its initial finding, or (3) for national-security reasons. Lastly, technical exceptions were granted primarily in cases where the President had already used part of his legal authority to reduce tariffs in recent negotiations—for example, in the Dillon Round.

We show that protectionist motives in the 1960s are still relevant for understanding modern-day tariffs. To show this, we digitized the list of products excepted from the linear tariff reduction in the Kennedy Round (see Appendix D). We then estimate the following regression:

$$y_\omega = \beta \, \mathbb{1}_{\text{Kennedy Exception},\omega} + \delta_{g(\omega)} + \varepsilon_\omega, \tag{6}$$

where y_ω is either the log unit value or the MFN ad valorem tariff rate of variety ω in 2017, $\mathbb{1}_{\text{Kennedy Exception},\omega}$ is an indicator for whether any of 2017-variety ω's 1964 varieties was on the list of products excepted from the Kennedy Round's linear tariff reduction for economic or mandatory reasons, and $\delta_{g(\omega)}$ is a good g fixed effect. The results are shown in Table IV. The first two columns show that, within goods, modern-day varieties that were on the Kennedy Round economic or mandatory exceptions list tend to have lower unit values. The second two columns show that these same varieties also tend to have higher ad valorem tariff rates today.

[40]This was the case for stainless steel forks under 25 cents each.

5.3 Summary: Regressivity Born from Past Policy Priorities

If the two apparent drivers of tariff regressivity outlined in this section are indeed the causal forces, it is notable that the current pattern of tariff rates originated in a vastly different economic landscape than the one that exists today. U.S. trading partners in the mid-1900s and the types of goods that were imported from those partners have shifted dramatically over the last half-century, as has the composition of domestic industries. While concessions on high-quality fishing reels, for example, were made in the interest of the United Kingdom, in 2018 the U.K. accounted for less than 0.1 percent of U.S. imports of fishing reels valued over $8.45. For forks, despite continued TRQ protection and an increase in domestic demand for SSTF, the domestic SSTF industry has all but disappeared. A few domestic producers survived by diversifying production into higher-end flatware and other cookware, but today only one domestic manufacturer of SSTF remains: Sherrill Manufacturing (Liberty Tabletop). The retail price of a single stainless steel fork "Made in the USA" is $7.29.[41] There are no domestic producers left that are protected by the tariff on forks costing less than 25 cents per piece, yet the rate on those cheaper forks remains where it was in the early 1960s when the domestic industry was strong.

Though for most goods tariff rates have declined since the early GATT rounds, in many cases the divergence between rates on low- and high-value varieties has never been corrected. Rates on many low-value products remain high, even if those domestic industries no longer exist. In part, this is no surprise, as trade negotiations have become much more sophisticated over the years. As noted above, starting in the Kennedy Round of the GATT in the mid-1960s and continuing through the present day, trade agreement negotiations have been about more than just tariff rate reductions. Instead, modern day agreements focus on other important issues like provisions for intellectual property, environmental concerns, and labor protection. Moreover, given that firms, and not consumers, are the primary lobbying force for tariff rates, if there are no longer domestic firms in many of the industries in question in this analysis, it is not hard to believe that tariff rates on these products have been somewhat forgotten.

[41] See the *New York Times* article by Cowley (2015) for more on the state of the domestic flatware industry. Prices updated to 2024 from the Liberty Tabletop webstore.

6 Economic Significance

In addition to providing a window into the hysteretic nature of tariff policy, tariff regressivity has direct implications for consumer expenditures. In this section, we perform two back-of-the-envelope calculations to assess the economic significance of tariff regressivity for modern-day consumers. We start by computing the loss in tariff revenue that would accrue from eliminating legislated regressivity. We then present a second reduced-form exercise to show that the gains through consumer expenditures from eliminating regressivity would likely fall more heavily on the lower end of the income distribution.

6.1 Aggregate Implications

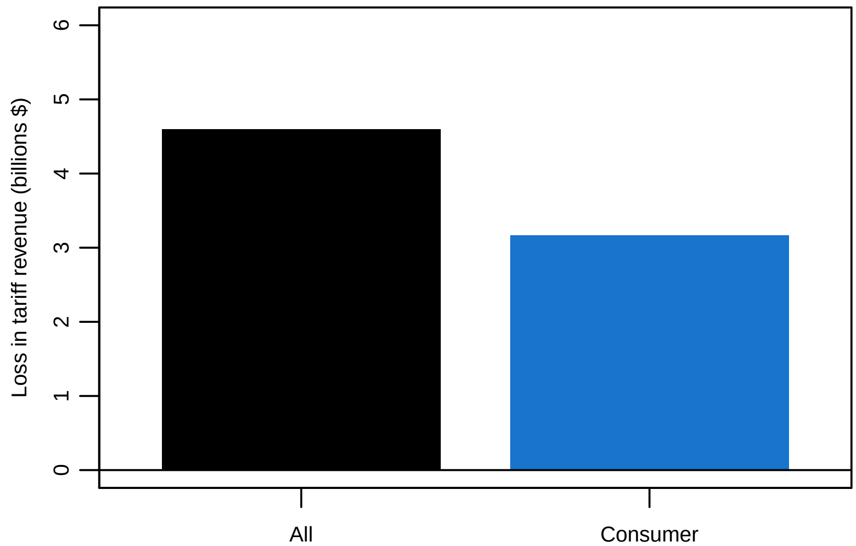
The economic relevance of the regressive pattern documented in this paper hinges on current consumption habits. In this section, we ask whether U.S. consumers are meaningfully taxed more heavily on their consumption of low-value varieties. To that end, we compare tariff revenues collected with current MFN ad valorem equivalent rates to an alternative set of tariff revenues that would be collected if the regressive pattern were eliminated. The alternative tariff rate for variety ω, given by $\tilde{\tau}_\omega$, is defined as:

$$\tilde{\tau}_\omega = \begin{cases} \overline{\tau}_{g(\omega)} & \text{if } p_\omega < p_{g(\omega)} \text{ and } \underline{\tau}_{g(\omega)} > \overline{\tau}_{g(\omega)} \\ \tau_\omega & \text{if } p_\omega \geq p_{g(\omega)} \text{ and } \underline{\tau}_{g(\omega)} > \overline{\tau}_{g(\omega)} \\ \tau_\omega & \text{if } \underline{\tau}_{g(\omega)} \leq \overline{\tau}_{g(\omega)} \end{cases}$$

where τ_ω is ω's actual tariff, $p_{g(\omega)}$ is the median unit value of good $g(\omega)$'s varieties, $\overline{\tau}_{g(\omega)}$ is the average tariff rate on varieties with unit values above $p_{g(\omega)}$, and $\underline{\tau}_{g(\omega)}$ is the average tariff rate on varieties with unit values no greater than $p_{g(\omega)}$. In words, for regressive goods (those with $\underline{\tau}_{g(\omega)} > \overline{\tau}_{g(\omega)}$), we replace the tariff on below-median unit-value varieties (those with $p_\omega < p_{g(\omega)}$) with the average tariff on above-median unit-value varieties ($\overline{\tau}_{g(\omega)}$). In Appendix Table A.II, we run our baseline regression on the alternative tariff schedule to confirm that it is no longer regressive—there is no longer a statistically significant correlation between tariff rates and unit values.

If we make the strong assumption that tariffs are fully passed through into consumer prices and holding import quantities fixed, the change in tariff revenue from switching to the alternative

FIGURE XIII
Revenue Loss from Eliminating Regressive Pattern



NOTE. This figure shows the revenue losses in levels for all goods and consumer goods under the alternative tariff schedule described in the text.

tariff schedule represents the amount that consumers would save each year from a reduced tax bill if regressivity were eliminated. We present the results in Figure XIII. Under the alternative—non-regressive—tariff schedule, consumers would save \$4.6 billion per year. If the change were implemented for consumer goods only, the savings would be just over \$3 billion per year. These savings are substantial, representing 10 percent of overall tariff revenue and 15 percent of total revenue collected on consumer goods.

6.2 Distributional Implications

The aggregate figures presented above mask an important aspect of this back-of-the-envelope calculation: If lower-income consumers are more likely to purchase low-value varieties, the gains from eliminating regressivity in the tariff code would likely not be distributed equally. There is some evidence in the literature to suggest this might be the case. Faber and Fally (2022), for example, use Nielsen scanner data (which covers a subset of consumer goods in our sample) to show that poorer households are more likely to purchase cheaper brands while richer households are more likely to purchase premium brands of the same goods. In our second back-of-the-envelope calculation, we attempt to measure the extent to which poorer consumers choose the lower unit-value varieties of imports.

Our goal is to compute the change in prices for an individual with income i, $\Delta \log P_i$, as:

$$\Delta \log P_i = \sum_{\omega} s^i_\omega \times -\left[\log(1+\tilde{\tau}_\omega) - \log(1+\tau_\omega)\right] \tag{7}$$

where s^i_ω is the expenditure share on variety ω of an individual with income i, and the term in square brackets is the change in tariff rate that we counterfactually apply to variety ω. This is a simplified version of the sufficient statistics approach in Borusyak and Jaravel (2021), and can be thought of as a first order approximation to the change in the consumer price index for an individual with income i.

6.2.1 Data

To estimate equation (7), we need data on the expenditure shares of each imported variety ω across the income distribution. As before, the counterfactual changes in legislated tariffs that we are considering are at the variety (10-digit HS) level. For this reason, we cannot rely on the same approaches to estimate these expenditure shares that have been used in prior studies (e.g., Borusyak and Jaravel (2021) or Fajgelbaum and Khandelwal (2016)), because the expenditure shares they estimate are too aggregated.

To estimate these detailed expenditure shares, we instead rely on two primary sources of data: First, we use 10-digit HS imports into U.S. customs districts. (A customs district is a collection of ports—there are 47 of them across the United States.) We also use data on population, household income, education, and other regional characteristics at the county level that are published by the Bureau of Economic Analysis and the U.S. Department of Agriculture. Intuitively, by pairing regional variation in imports with regional variation in income, we can estimate expenditure shares on detailed imports for individuals in different parts of the income distribution. This is similar to the approach taken in Fajgelbaum and Khandelwal (2016), who estimate expenditure shares for different income groups by pairing country-level imports with variation in income across countries.[42]

One drawback of this approach is that we cannot assume that a product is necessarily *consumed* in the same customs district into which it is imported. We adjust for potential "leakage" of imports

[42] We cannot use an identical approach, however, because standardized import data across countries is available only at the 6-digit HS level of detail.

outside of their import district using data from the U.S. Department of Transportation's Freight Analysis Framework (FAF). The FAF provides estimates of where imported goods travel once they enter into U.S. borders—for example, what share of imports that arrive in Los Angeles travel, by all modes of transportation, to San Diego or Denver. Specifically, the FAF tracks the movement of goods between 132 FAF zones, which we manually map to the 47 customs districts.[43] After adjusting for this intra-national movement of imports, we are left with a basket of 10-digit HS imports for each of the 132 FAF zones.

Finally, we use a crosswalk from the Department of Transportation that maps FAF zones to counties. This allows us to pair each FAF zone with the county-level statistics mentioned above. More detail on these datasets can be found in Appendix F. We assume, then, that each region has a representative consumer with median household income i—and we index regions by that i—and an associated import basket m_i. We estimate the expenditure shares for each 10-digit import for each representative consumer as:

$$s_i^\omega = \frac{m_i^\omega}{n_i \times i}, \tag{8}$$

where m_i^ω is imports of variety ω into region i, i is the average income for individuals that region, and n_i is the population of region i.

6.2.2 Comparison with the Consumer Expenditures Survey

To build confidence in the expenditure shares that we estimate, we show in this section that, when aggregated, they are highly correlated with expenditure shares calculated using data from the Bureau of Labor Statistic's Consumer Expenditure Survey (CE). The CE provides survey-based estimates of total expenditures in different product categories by various income levels. We map the CE to HS codes using the concordance developed by Furman et al. (2017).[44] While most of the CE categories are highly aggregated and are matched only to 4- or 6-digit HS codes, around 30 percent of the CE categories can be concorded to 10-digit HS codes. We focus on this subset, and aggregate 10-digit HS codes up to the relevant CE categories.[45]

[43] This mapping is straightforward, as most of the FAF zones correspond directly to U.S. port cities, and the port-to-customs district mapping is well defined.

[44] This concordance has subsequently been used in Hottman and Monarch (2020) and Borusyak and Jaravel (2021).

[45] The concordance between CE categories and 10-digit HS codes is not one-to-one. In cases where, for example, a 10-digit HS code is associated with more than one CE category, we aggregate the CE categories until we have a one-to-one mapping, leaving us with around 35 product categories.

TABLE V
CE vs. Regional Imports Correlation

	Log Expenditure Share (CEX)	Log Expenditure Share (CEX)
Log Expenditure Share (Imports)	0.257	0.279
	(0.062)	(0.057)
Income Band FE	No	Yes
Observations	218	218
R^2	0.066	0.152

NOTE. This table shows the correlation coefficient between consumer expenditure shares calculated using our regional import methodology and consumer expenditure shares from the BLS CE survey. We aggregate our 10-digit HS expenditure shares to the level of the CE to make the comparison. Heteroskedasticity-robust standard errors are shown in parentheses.

We then compare the expenditure shares calculated using the CE data to the expenditure shares for the same product categories and income bands that we estimate using our regional import data approach.[46] The correlation coefficient is shown in Table V: Expenditure shares estimated using our regional import approach are strongly correlated with the CE data. Within income bands (i.e., controlling for an income class fixed effect), the correlation coefficient (standard error) is 0.28 (.056). Recall that our method for estimating expenditure shares by income using the import data relies on the assumption that imports are consumed within the (FAF-adjusted) regions that they are imported into. That these measures align with the more commonly-used CE estimates is supportive evidence that this assumption is reasonable.

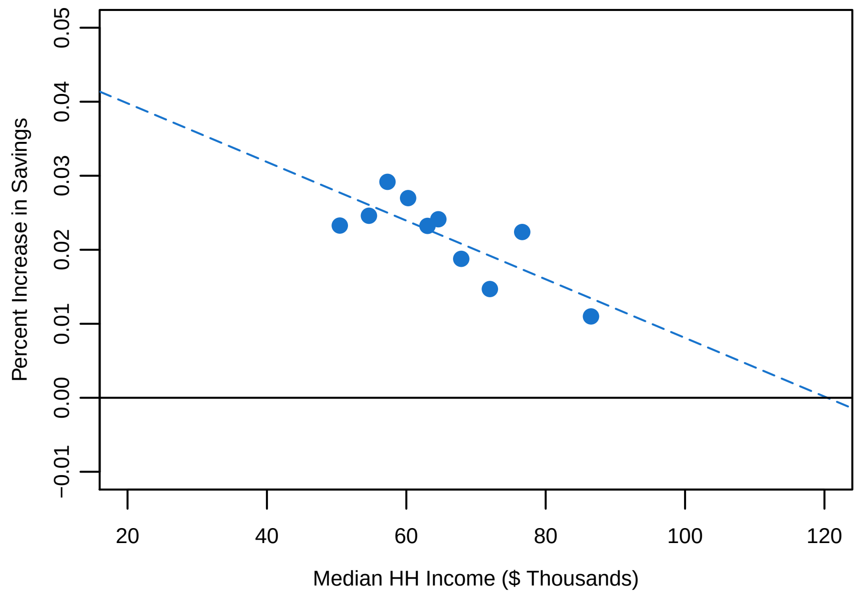
6.2.3 Estimation

With the expenditures shares in hand, we can now estimate the change in prices for different parts of the income distribution that would ensue if we switch to the alternative, non-regressive tariff schedule described above. For each region, i, we estimate the change in consumer savings (the negative of the change in prices) using equation 7. The results, in the form of a binned scatter plot over 10 quantiles of household income are shown in Figure XIV. We additionally control for rural-urban continuum codes—a classification scheme developed by the U.S. Department of Agriculture that distinguishes metropolitan counties by their degree of urban-ness. One drawback of our data is that the average regional incomes that we use are concentrated in the middle of the income

[46] The CE classifies nine bands of income from less than \$5,000 to over \$70,000. Our regional import approach allows us to compute expenditure shares for the fifth through ninth income bands in the CE.

FIGURE XIV

Effect of Eliminating Regressivity on Consumer Expenditures



NOTE. This figure shows a binned scatter of the computed change in consumer savings using equation 7. Results are in the form of a binned scatter over 10 quantiles of household income, controlling for the Rural-Urban continuum code from the USDA. The dashed line shows extrapolated values.

distribution in the United States. For this reason, we extrapolate the fitted values on both the left and right tails of the distribution to get a more complete picture. The key result is that the gains for consumers from eliminating regressivity are downward sloping across the income distribution. The gains for an individual making $20,000 per year are roughly four times the gains that would accrue for an individual making $100,000 per year.

Importantly, all of the exercises presented in this section are focused on the implications of regressive tariffs for U.S. consumers. Of course, one of the primary motives for tariff barriers are to protect domestic producers—a group that we are ignoring in this analysis. As discussed in Section 5, some of the industries that maintain high levels of tariff protection today are no longer in existence in the United States. This likely reduces any benefits tariffs may have on the producer side. That said, considering the effects of regressive tariffs through the production side is still an important question for future work.

7 Conclusion

We have documented that tariffs are systematically higher on low-value versions of goods relative to their high-value counterparts. This pattern holds across the entire U.S. tariff schedule, but is driven by consumer goods. These taxes on imported goods are economically meaningful for consumers, particularly those at the lower end of the income distribution.

Much of this paper is devoted to understanding why tariffs are set in this way. Understanding the forces at play required us to build a new variety-level dataset, in which we trace legislated tariff rates on today's varieties back to 1930. We hope that these data will be useful for researchers in the future. Our historical analysis helps to put previous findings on the endogeneity of import classification systems into a dynamic setting: Not only is classification endogenous, but classification and therefore tariff rates can be hysteretic as well. Due to the sheer magnitude and complexity of the tariff schedule, classification and tariff rate decisions are not necessarily revisited or re-optimized in each period, but can persist even as the economic landscape shifts, leaving us with a set of tariff rates that reflect policy objectives of a bygone era. Our suspicion is that similar forces likely gave rise to other interesting features of today's tariffs and a deeper understanding of the determinants of tariff policy seems like a fruitful avenue for future research.

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Appendix

A Regressivity of U.S. Tariffs: Robustness

We consider several alternative empirical specifications to assess the regressivity of U.S. tariffs, and present results in Table A.I. All specifications take the form of our baseline specification, equation 1, and we report the analogous estimates of β. Unless mentioned explicitly, we follow our baseline specification and use MFN ad valorem tariffs as our measure of tariffs.

Alternative measures of tariffs Panels (a), (b), and (c) present results that use three different measures of tariffs: ad valorem tariffs (our baseline), ad valorem equivalent tariffs, and applied tariffs, respectively. These are tabulations of the estimates shown in Figure I.

Weighting by Imports In panel (d), we weight observations by the total imports of the associated good in 2017. This specification is useful for understanding whether our results hold for a large number of varieties, or for a large amount of imports. We find results similar to our baseline, suggesting that this pattern also holds per dollar of imports.

Supplier fixed-effects In panel (e), we tabulate estimates of the estimates shown in diamonds in Figure I. That specification contains fixed effects for the top three suppliers of each variety, i.e., an indicator for each country j of whether j is the top supplier of variety ω, the second-higher supplier, or the third-highest supplier. Despite the large number of fixed effects, the relationship is only mildly attenuated relative to our baseline. We lose a few observations because of the fixed-effects.

Alternative definitions of "goods" and "varieties" In panels (f) and (g), we consider alternative definitions of goods and varieties. In panel (f), we use a more narrowly defined definition of goods that further reduces the number of varieties described as "other," as described in footnote 2. In panel (g), we define a good as a 5-digit-HS/unit-of-quantity pair. While these alternatives change the number of varieties/goods included in our estimation, the estimates are little-changed in both cases. Indeed, the fact that the narrowest definition (that used in panel (f)) yields similar estimates suggests that this subset provides most of the variation driving our estimates. We chose the wider definition (that shown in panel (a)) because it provides a wider coverage of U.S. imports.

Prohibitive tariffs In our baseline, we exclude any tariff rates above 100%, to ensure that outliers are not driving our results. In panel (h), we restrict the sample to tariffs below 40%. We chose 40% because there is a non-negligible mass of non-imported tariff lines with tariff rates above 40%. In contrast, almost no imported tariff lines have tariffs above 40%. In Figure A.I, we show the cumulative distribution function of tariff rates split by whether any imports were recorded in 2017 (excluding chapter 98 and 99). Just under 4.6% of tariff lines had no imports in 2017.

TABLE A.I
Robustness of 2017 Results

(a) Ad Valorem Tariffs

	All	Consumption	Capital	Intermediate
Log Unit Value	-0.32	-1.06	-0.04	-0.04
	(0.05)	(0.17)	(0.02)	(0.04)
Observations	11142	4039	1215	5696

(b) Ad Valorem Equivalent Tariffs

	All	Consumption	Capital	Intermediate
Log Unit Value	-0.40	-1.24	-0.05	-0.08
	(0.06)	(0.18)	(0.02)	(0.04)
Observations	11903	4517	1215	5938

(c) Applied Tariffs

	All	Consumption	Capital	Intermediate
Log Unit Value	-0.28	-0.93	-0.04	-0.05
	(0.05)	(0.15)	(0.03)	(0.04)
Observations	11903	4517	1215	5938

(d) Weighting by Good Imports

	All	Consumption	Capital	Intermediate
Log Unit Value	-0.31	-1.23	-0.19	0.00
	(0.12)	(0.43)	(0.24)	(0.04)
Observations	11142	4039	1215	5696

(e) Top-3-supplier Fixed Effects

	All	Consumption	Capital	Intermediate
Log Unit Value	-0.21	-0.71	-0.02	-0.03
	(0.05)	(0.16)	(0.03)	(0.04)
Observations	11036	3963	1161	5597

TABLE A.I
Robustness of 2017 Results — Continued

(f) "Narrow" Definition of Goods

	All	Consumption	Capital	Intermediate
Log Unit Value	-0.35	-1.12	-0.04	-0.06
	(0.06)	(0.20)	(0.03)	(0.04)
Observations	7696	2957	849	3740

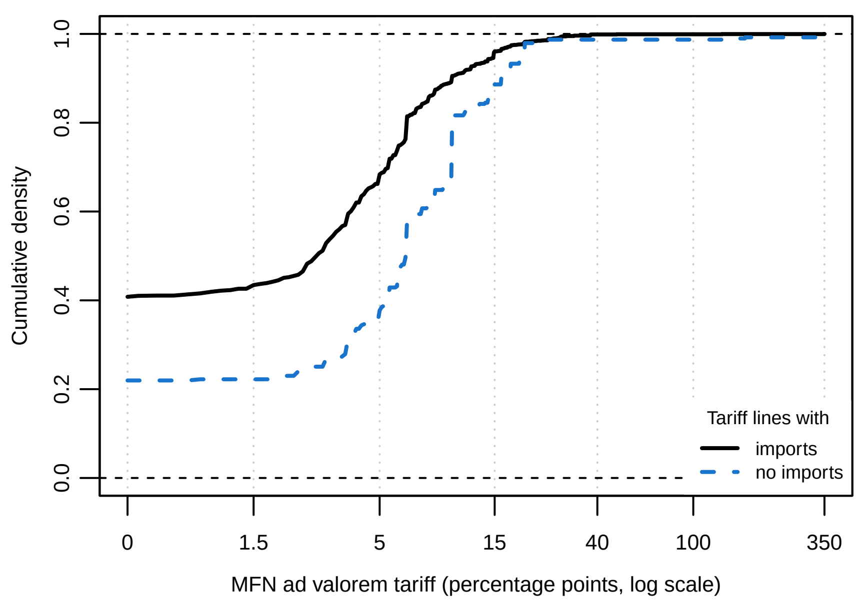
(g) HS5-Unit Definition of Goods

	All	Consumption	Capital	Intermediate
Log Unit Value	-0.33	-1.33	-0.03	0.06
	(0.05)	(0.17)	(0.02)	(0.03)
Observations	13396	4728	1476	6989

(h) Excluding ad valorem rates above 40%

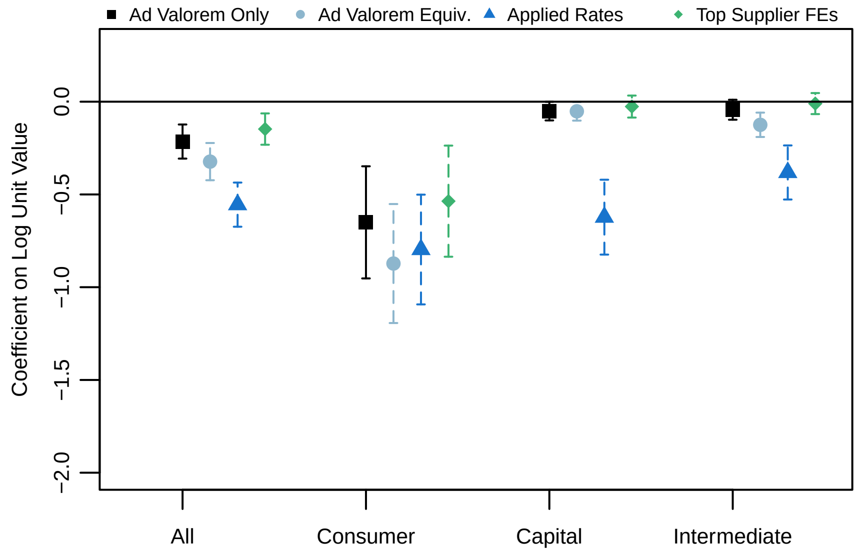
	All	Consumption	Capital	Intermediate
Log Unit Value	-0.30	-1.00	-0.04	-0.04
	(0.05)	(0.17)	(0.02)	(0.04)
Observations	11133	4030	1215	5696

FIGURE A.I
Cumulative Distribution Function of 2017 Tariff Rates by Import Status



NOTE. These lines represent the empirical cumulative distribution function of MFN ad valorem tariff rates in 2017 at the tariff-line (8-digit HTS) level depending on whether imports for that tariff line were positive (solid-black line) or zero (blue-dashed line).

FIGURE A.II
Regressivity in 2019 Data



NOTE. This figure contains estimates analogous to those shown in Figure I, using 2019 data.

B Including Trade War Data

Our baseline results are for the U.S. tariff schedule in 2017—before the 2018 Trade War began. In Figure A.II, we reproduce the analysis from Figure I using 2019 data, when the Trade War was well underway. There are two important takeaways from these results. First, using MFN ad valorem tariffs, ad valorem equivalent tariffs, and including top supplier fixed effects, the result is roughly unchanged from our baseline version. This is because the changes that were made to tariffs by the Trump Administration were not changes to the legislated MFN rates, but (primarily) to tariffs on imports from China, applied through Section 301 of the Trade Act of 1974, and provided for in Chapter 99 of the HTS (*Temporary legislation; temporary modifications proclaimed pursuant to trade agreements legislation; additional import restrictions proclaimed pursuant to section 22 of the Agricultural Adjustment Act, as amended*).

Where there is, however, a noticeable difference, is in the *applied tariffs*. This is because applied tariffs do not discriminate between MFN rates, free trade agreements, and special provisions like the Section 301 tariffs. In this case, applied tariffs actually become *more* regressive, likely because the U.S. was paying higher tariffs on imports from China which are likely predominantly lower unit-value varieties. Interestingly, with the Trade War tariffs in place, we see regressivity in capital and intermediate goods as well, unlike in our baseline.

C Non-U.S. Country Data

The analysis in Section 2.5 and Figure II relied on data on tariffs and imports from several countries.

Tariffs We collected tariffs from the WTO's "Tariff Analysis Online" portal (`tao.wto.org`). Within the portal, we selected "Tariff Line Duties" from the "Applied Duties and Trade" window in the "Reports" section. We downloaded the 2017 schedule for each country. The number of within-year revisions for each country is limited. For Mexico, Brazil, and Japan, revision 1 was available. For the U.S., E.U., and India, revisions 5, 3, and 2 were available.

Imports: Brazil Brazil's Ministry of Development, Industry, and Foreign Trade hosts trade data at `https://www.gov.br/produtividade-e-comercio-exterior/pt-br/assuntos/comercio-exterior/estatisticas/base-de-dados-bruta`. We download 2017 data (under Importação).

Imports: E.U. From the bulk download facility on the E.U.'s eurostat website (`https://ec.europa.eu/eurostat/databrowser/bulk?lang=en&selectedTab=fileComext&breadcrumbFilter=COMEXT_DATA%2FPRODUCTS`) we download the zip file `full201752.7z`.

Imports: India The Indian Department of Commerce hosts trade data on its TRADESTAT portal (`https://tradestat.commerce.gov.in/eidb/default.asp`). There, we downloaded quantities and value (in U.S. dollars) from the "commodity-wise" import page for the period 2016–2017 at the 8-digit level.

Imports: Japan Japan's Ministry of Finance hosts trade data at its Trade Statistics of Japan website. From there (`https://www.customs.go.jp/toukei/info/tsdl_e.htm`) we download 2017 import "values by commodity" for 2017.

Imports: Mexico Mexico's National Institute of Statistics and Geography (INEGI) hosts annual import data at `https://inegi.org.mx/app/descarga/ficha.html?tit=83063&ag=0&f=csv`. In the file `bcmm_anual_tr_cifra_2017.csv`, we keep imports (`VAL_USD`) and quantities (`UMED`) at the 8-digit level (values of `TARIFA` with 8 digits) for all importers (observations for which `PAIS_O_D` is empty).

D Historical Data: Additional Details

D.1 Tariff Data: Examples

Figure A.III displays portions of the four types of documents with tariff data that we digitized. Each panel shows tariff rates on fishing reels. Panel (a) shows the 1930 *FCNUS*, which includes both tariff (at the time, 55%) and import data. Panel (b) shows tariff rates in the 1950 (updated through 1952) edition of *Schedule A*. From this document, we extracted the history of tariff rates (going back to 1930) by parsing the "Trade agreement" column in that file. In this case, the 55% 1930 rate was changed to 30% for fishing reels valued over \$3.50 in 1939. We manually extracted all footnotes related to the value of each variety in the tariff schedule and created separate "pseudo-varieties" so that these goods could be tracked over time and merged with later data, where each pseudo-variety receives its own code (see panel (c)). In the first round of the GATT (the text in bold), the tariff rate was changed in a way that implied that varieties of fishing reels continued to be defined by their unit value. In Appendix D.2, we describe the process for using these tariff rates to create pseudo-varieties for each value of fishing reels.

Panel (c) shows tariff rates in the 1968 edition of the *TSUS*. Here, each variety of fishing reel has its own numeric code, each of which defines a variety based on its unit value. Finally, panel (d) shows the "staged rates" that we observe through 1987 (the numeric codes, "TSUS item," are the same as in panel (c)). In response to the Tokyo round of the GATT, tariffs on all varieties of fishing reels were brought down in lockstep through much of the 1980s.

FIGURE A.III
Examples of Digitized Tariff Schedules: Fishing Reels

(a) 1930: *Foreign Commerce and Navigation of the U.S.*

640 No. 9, Part 2.—IMPORTS ENTERED FOR CONSUMPTION—JUNE 18–DEC. 31, 1930

Class No.	Article	Unit of quantity	Rate of duty	Quantity	Value	Duty	Equivalent ad valorem
94314	Fishing rods, reels, and parts		55%		7,908	4,349.40	

(b) 1952: *Schedule A: Statistical Classification of Commodities Imported into the U.S.*

CLASSIFICATION OF IMPORTS 236a

Group 9.--MISCELLANEOUS--Continued

Schedule A Commodity Number	Commodity Description and Economic Class	Unit of Quantity	Rate of Duty: 1930 Tariff Act (except as noted)	Rate of Duty: Trade agreement	Tariff Paragraph
	DOLLS AND TOYS, ATHLETIC AND SPORTING GOODS--Continued				
	Athletic and sporting goods (except golf, tennis, and other rubber balls, see 2043 000, 2045 000, and 2046 000):--Continued				
	Fishing tackle:--Continued				
9420 400 [J]	Fishing reels, n.s.p.f. (formerly part of 9420 430 [a] and formerly part of 9420 450 [a]). (9)	No	55%	30% U. K.[7] $1.50 each GATT 15% min. GATT 55% max. GATT	

For explanation of superior notations against commodity numbers and GATT rates, refer to Foreword.

[6] If valued $10 or over each (T. D. 49753).
[7] If valued $3.50 or over each (T. D. 49753).

(c) 1968: *Tariff Schedules of the U.S.*

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SCHEDULE 7. - SPECIFIED PRODUCTS; MISCELLANEOUS AND NONENUMERATED PRODUCTS
Part 5. - Arms and Ammunition; Fishing Tackle; Wheel Goods; Sporting Goods, Games and Toys

7 - 5 - A, B
730.85 - 731.60

Item	Stat. Suf-fix	Articles	Units of Quantity	Rates of Duty: 1	Rates of Duty: 2
		Fishing reels and parts thereof:			
		Reels:			
731.20	00	Valued not over $2.70 each	No.	41.5% ad val.	55% ad val.
731.22	00	Valued over $2.70 but not over $8.45 each	No.	$1.12 each	55% ad val.
731.24	00	Valued over $8.45 each	No.	13% ad val.	55% ad val.

(d) 1980: *History of the Tariff Schedules of the U.S.*

HISTORY OF THE TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED

Notes p. 6
Schedule 7
Part 5

Staged Rates

Modifications of column 1 rates of duty by Pres. Proc. 4707 (Tokyo Round), December 11, 1979, 44 F.R. 72348, as amended and Pres. Proc. 4768 (Customs Valuation Code), June 28, 1980, 45 F.R. 45135, as amended (see Preface):

TSUS item	Prior rate	Rates of duty 1/, effective with respect to articles entered, or withdrawn from warehouse, for consumption on and after --							
		January 1, 1980 except as noted	January 1, 1981	January 1, 1982	January 1, 1983	January 1, 1984	January 1, 1985	January 1, 1986	January 1, 1987
731.20	23% ad val.	21.3%	19.6%	17.8%	16.1%	14.4%	12.7%	10.9%	9.2%
731.22	62.5c each	58¢ each	54¢ each	50c each	46c each	42¢ each	38¢ each	34c each	30¢ each
731.24	7.5% ad val.	7.2%	6.9%	6.5%	6.2%	5.9%	5.6%	5.2%	4.9%

D.2 Valued Goods in Schedule A

Tariff rates for the vast majority of tariff lines are straightforward to convert from text form to numeric format using natural language processing techniques. For example, the tariff rate on *edible gelatin valued below 40 cents per pound* after the 1936 trade agreement with the Netherlands was "2 1/2¢ lb. + 12%," which we record as an ad valorem rate of 12% and a specific rate of 0.025 dollars. One notable exception comes from a subset of varieties whose tariff rates were determined by their unit values. To be consistent with the modern-day tariff schedule, we split these tariff lines by the value of the good. This section contains more details.

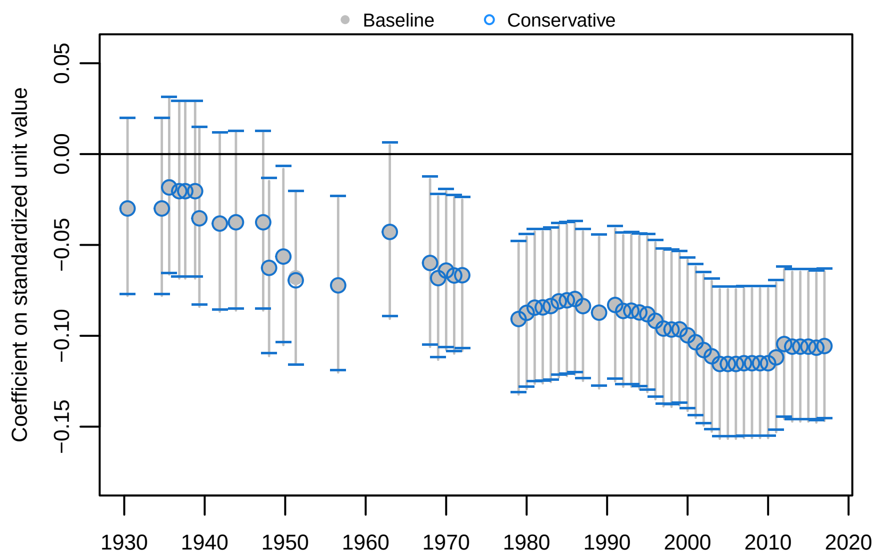
Staring with the beginning of the *TSUS* in 1963, every numerical tariff code was associated with only one tariff rate. This was not the case before 1963, in *Schedule A*. The most prevalent deviation from this practice was when the legislated tariff rate applicable to a particular variety depended on its unit value. Figure A.III shows an exmaple. In 1963 (panel (c)), fishing reels of different unit values were explicitly given numerical codes (in as much detail as needed to associate each code with only one tariff rate). In 1952 (panel (b)), instead, the tariff rate for a fishing reel was \$1.50 minimum, but not less than 15% ad valorem and not more than 55% ad valorem. Put differently, fishing reels valued below \$2.72 (= \$1.50/0.55) had a tariff rate of 55%; those valued above \$10 (= \$1.50/0.15) had a tariff rate of 15%; and those valued in between had specific tariff of \$1.50 per fishing reel. Not all varieties defined by unit value had these multi-part tariffs before 1963—indeed, some resembled the layout observed in panel (c)—but the practice is relatively common.

There are many formats of tariffs for which a variety's rate is legislated to depend on its unit value. Figure A.V provides a graphical representation of these different types of tariffs. Each panel shows the ad valorem equivalent tariff rate (y-axis) as a function of unit value (x-axis) with solid bold lines. The fishing reels example fits in to the case shown in panel (b): Tariffs are weakly decreasing as a function of unit value.

In order to be able to concord our modern-day varieties back in time more-precisely, we convert these varieties with multi-component tariffs into multiple varieties with single-component tariffs (and include them in our concordances). The effect is to have varieties, in this example, that resemble the layout in panel (c). Among these varieties, we also convert specific rates to ad valorem rates. For low-value varieties—say those valued below $\underline{p}$—we set ad valorem rate to the ad valorem equivalent implied by setting the unit value to $\underline{p}/2$. This has the potential to make the good look more regressive, so in Figure A.IV, we show that our results in Figure VII are robust to setting the ad valorem rate equal to the ad valorem equivalent implied by setting the unit value to $\underline{p}$. For high-value varieties—say those valued above $\bar{p}$, we set the ad valorem rate to the ad valorem equivalent implied by setting the unit value to $\bar{p}$. This will not mechanically lead to regressevity. In cases for which there is a "medium-valued" variety, we set the ad valorem rate to the ad valorem equivalent implied by setting the unit value to the midpoint of the thresholds (i.e., $(\bar{p} + \underline{p})/2$). In the fishing reel example, this would be just under 23.6% ($= \$1.50/((\$1.50/0.55 + \$1.50/0.15)/2)$).

FIGURE A.IV

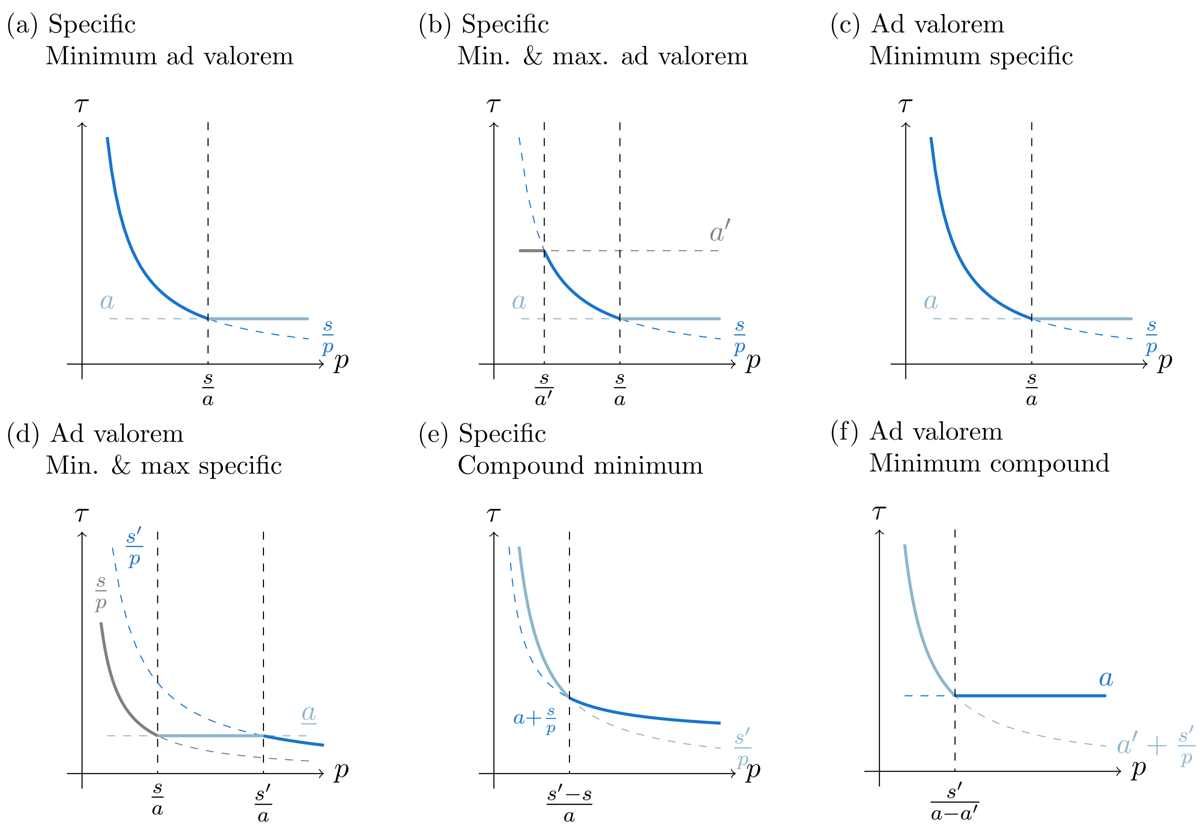
Conservative Ad Valorem Equivalent for Valued Goods



NOTE. This figure contains our baseline estimates (in gray) from Figure VII, and a "conservative" specification in which, for pre-1963 valued-goods, we set the ad valorem equivalent for low-valued varieties to that implied by setting the unit value to the variety's upper bound. Point estimates for this specification are represented by blue circles, and 95% confidence intervals by blue ticks.

FIGURE A.V

Valued Goods in Schedule A Tariff Rates



Note. Each panel shows ad valorem equivalent tariffs (τ) as a function of unit values (p) for a particular format of tariff rates. The solid bold lines represent the actual tariff rates. Panel (a) corresponds to a specific tariff of s per unit, with a minimum ad valorem tariff of a. Panel (b) represents a specific tariff of s, but with a minimum ad valorem tariff of a and a maximum ad valorem tariff of a'. Panel (c) corresponds to an ad valorem tariff of a and a minimum specific tariff of s. Panel (d) corresponds to an ad valorem tariff if a, but with a minimum specific rate of s and a maximum specific rate of s'. Panel (e) corresponds to a specific rate of s, but with a minimum compound rate of a ad valorem plus s specific (this is equivalent to a specific with a compound minimum). Finally, panel (f) shows an ad valorem tariff a with a minimum compound rate of a ad valorem plus s specific.

D.3 Concordances

We trace tariff rates on 2017 varieties back in time using the concordance that we built from the documents described in Section 3.3. Figure A.VI shows portions of these documents that describe how the tariff codes associated with reptile-leather handbags (2017 HTS code 4202.21.30.00) have evolved over time. Like 43% of other 2017 HTS codes, this variety never changed its HTS code, so its 1989 HTS code is the same as its 2017 code.

Panel (a) shows the relevant portion of the document *Continuity of Import and Export Trade Statistics After Implementation of the Harmonized Commodity Description and Coding System*, which is the primary basis of our concordance from HTS codes to TSUS codes. For reptile-leather purses, the concordance is straightforward: Its 8-digit code was associated with a single TSUS code: 706.06.00. Panel (b) shows the relevant portion of the 1968 *TSUS* which, together with an update in the 1982 *History of the Tariff Schedules of the United States Annotated*, form the basis for our concordance of TSUS codes over time. That document shows that 706.06.00 represented a merge of two previous codes: 706.06.20 (reptile-leather handbags) and 706.06.40 (other luggage of reptile-leather).

Panel (c)—which displays the relevant portion of *Dollar Value of U.S. Imports of Merchandise for Consumption*—shows the three Schedule A codes from which the 5-digit TSUS code (706.06) was derived: 0691 100, 0691 600, and 0692 800. The descriptions of these three varieties are shown in panel (d), which shows the 1960 (updated through 1963) edition of *Schedule A*. Reptile-leather handbags and purses (the *TSUS* definition) were taken from essentially the same products, with an added distinction of whether the items were fitted with special apparatuses for traveling, dining, sewing, etc.

Panel (d) also provides information about how we concord Schedule A codes over time. The footnotes on the "Schedule A commodity number" column indicate when the code was last changed. In this case, the "Commodity description" also provides information about which former codes were merged in to the current code. We used these footnotes, and all editions of *Schedule A*, to trace back codes over time. Footnotes like these were available on editions starting in 1939. From 1930 to 1939, we manually compared editions of *Schedule A* to create the concordance. Through this procedure, we recover two 1930 *Schedule A* codes: 06900 ("Bags, baskets, belts, satchels,

FIGURE A.VI

Examples of Digitized Tariff Schedules: Reptile Leather Handbags

(a) HTS to TSUS: *Continuity of Import and Export Trade Statistics...*

Cross-reference between the Proposed Harmonized Tariff Schedule and the 1987 Tariff Schedules of the United States Annotated

HTS No.	TSUSA No.	HTS No.	TSUSA No.	HTS No.	TSUSA No.	HTS No.	TSUSA No.
		42022130	7060600				

(b) TSUS over time: *1968 TSUS Annotated* (and *History of the TSUSA*)

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

Notes p. 8
Schedule 7,
Part 1

STAGED RATES AND HISTORICAL NOTES

Statistical Notes--(con.)

PROVISION	Effective date	PROVISION	Effective date
		706.06--	
		00--Estab.(transferred from 706.0620 & 40)....	*Jan. 1, 1966*
		20--Disc.(transferred to 706.0600)...........	*do*
		40--Disc. do	*do*

(c) TSUS to Schedule A: *Dollar Value of U.S. Imports of Merchandise for Consumption*

22 CORRELATION BETWEEN TARIFF SCHEDULES OF THE UNITED STATES ITEM NUMBERS AND SCHEDULE A COMMODITY NUMBERS EFFECTIVE DURING 1961

TSUS number	Schedule A number	TSUS number	Schedule A number	TSUS number	Schedule A number	TSUS number	Schedule A number	TSUS number	Schedule A number	TSUS number	Schedule A number
										70606	0691100 0691600 0692800

(d) Schedule A over time: All Editions of *Schedule A*

016 **CLASSIFICATION OF IMPORTS**

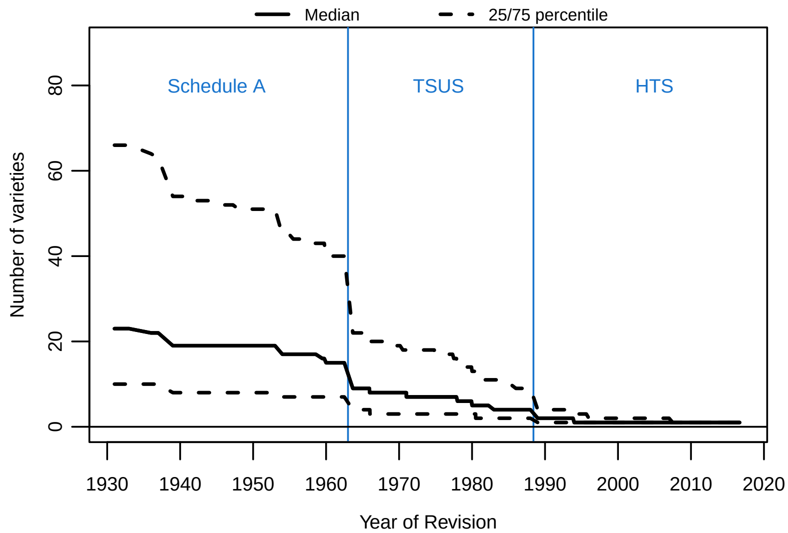
GROUP 0—ANIMAL PRODUCTS, INEDIBLE

(See Foreword for an explanation of all superior notations against classification numbers, units of quantity, and rates of duty)

Schedule A commodity number	Commodity description	Unit of quantity	Rate of duty: 1930 Tariff Act (except as noted)	Rate of duty: Effective trade agreement rate (GATT except as noted)	Tariff paragraph
	LEATHER, RAWHIDE, AND PARCHMENT MANUFACTURES—Continued				
	Luggage and related articles, n.e.s. (include suitcases, valises, satchels, traveling and overnight bags, hat boxes, trunks, and other luggage; and boxes, caskets, chests, baskets, rolls, brief cases, and other cases, except hand bags, and flat leather goods and belts, n.e.s.:				
0691 100$^{1}/^{60}$	Fitted with traveling, bottle, drinking, dining or lunching, sewing, manicure, and similar sets (include those wholly or in chief value of reptile leather, formerly 0691 300$^{11}/^{41}$; and other, formerly 0691 400$^{11}/^{41}$)	....	50%............	20%*...........	1531
	Not fitted:				
0691 600$^{11}/^{41}$	Wholly or in chief value of reptile leather..........	....	35%............	17 1/2% Arg.....	
0691 800$^{11}/^{41}$	Other..	....	35%............	20%............	
	Coin purses, change purses, billfolds, bill cases, bill rolls, bill purses, banknote cases, currency cases, money cases, card cases, license cases, pass cases, passport cases, letter cases, and similar flat leather goods:				
0692 600$^{11}/^{41}$	Wholly or in chief value of reptile leather............	....	35%............	~~15 1/2%~~ $^{7}/^{62}$....	1531
0692 700$^{11}/^{41}$	Other..	....	35%............	~~10%~~ $^{7}/^{62}$........	
	Women's and children's hand bags or pocketbooks:				
0692 800$^{11}/^{41}$	Wholly or in chief value of reptile leather............	No......	35%............	17 1/2% Arg.....	

FIGURE A.VII

Cumulative Number of Previous Varieties per 2017 Variety



NOTE. This figure shows quantiles from the distribution of the cumulative number of previous varieties associated with each 2017 variety over time. At each date t, the solid line shows the median number of varieties that a 2017 variety has after date t.

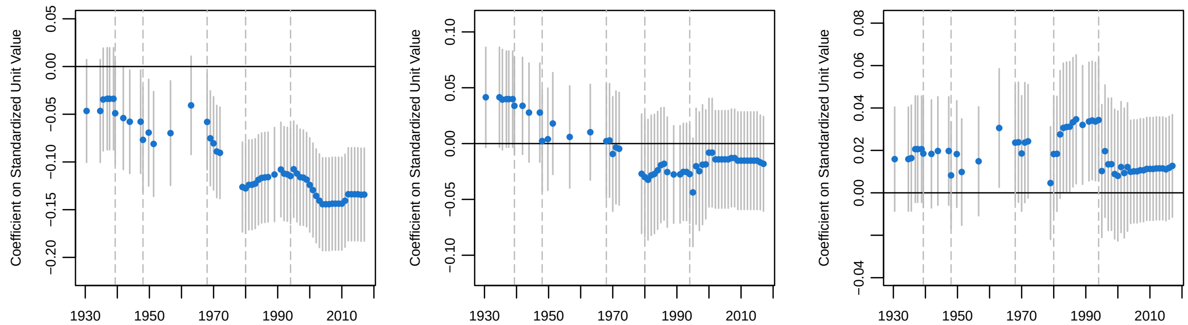
pocketbooks, and other boxes and cases of leather or parchment") and 06901 (similar to 06900, but with the stipulation that they include apparatuses for traveling etc.). The distinction between those made of reptile leather and those made of other types of leather was created by the 1941 agreement with Argentina, at which point rates on those with reptile leather were lowered to 25% (from 35%).

In practice, we use our concordance to build a single time series for each 2017 HTS variety. When an HTS variety is associated with multiple varieties, we average the associated tariff rates. Thus, reptile-leather purses and purses of non-reptile leather (those valued above \$20, (2017 HTS code 4202.21.60.00) and those valued below \$20 (2017 HTS code 4202.21.90.00)) are all concorded back to the same 1930 Schedule A codes. This approach is conceptually different from the approach of Pierce and Schott (2012), who create products (their "set-years") that include all varieties that are ever associated with one another. Were we to follow that approach in our data, we would lose much of the variation in tariff rates in the modern-day tariff schedule. In the example of purses, the set-year would include both reptile- and non-reptile-leather purses. That said, our underlying files can be used to construct a concordance similar to that of Pierce and Schott.

Figure A.VII shows the distribution of the cumulative number of previous varieties associated with each 2017 variety over time. By construction, the distribution is a point mass at 1 in 2017. Tracing the distribution back to the beginning of the *HTS* in 1989, we see that the median good is linked to 2 unique HTS codes. Going all the way back to the beginning of our sample, the number of previous associated varieties is just over 20 for the median variety. The biggest increases in the number of varieties occur when moving between tariff schedule regimes, since these are the changes for which we have the coarsest concordances: The median jumps from 2 to 4 when concording from the *HTS* back to the *TSUS*, and from 9 to 15 when concording from *TSUS* to *Schedule A*. Within regimes, the number of varieties is relatively stable. One exception is the increase going back through the 1930s. Recall, however, that all of our tariffs in or before 1952 are recorded with 1952 Schedule A codes, minimizing the concern that the concordance affects our main results during the 1930s and 1940s.

FIGURE A.VIII
Alternative Sample for Figure VII

(a) Never-Specific Consumer (b) Capital Goods (c) Intermediate Goods



NOTE. This figure contains estimates of β_t from equation (2) for three alternative samples. In panel (a) the sample includes consumer goods and varieties that have ad valorem tariffs in 2017 (as in our baseline) and have *never* had tariffs of the specific form. In panels (b) and (c), the samples include capital and intermediate goods, respectively. As in our baseline, we cluster standard errors at the level of the 8-digit HTS code, and report 95% confidence intervals.

E Origins: Additional Results and Robustness

In our baseline sample, we consider only varieties that have an ad valorem tariff rate in 2017. Regressivity could, however, be generated if specific tariffs are converted to ad valorem tariffs. In panel (a) of Figure A.VIII, we repeat the analysis from panel (a) of Figure VII, but further restrict our sample to consumer varieties that *never* had a specific tariff rate. The result is similar to our baseline.

In panels (b) and (c) of Figure A.VIII, we show the time-series regressions for capital and intermediate goods—goods for which modern U.S. tariffs do *not* appear to be regressive. There is no clear pattern for either category of goods in the correlation between tariff rates and unit values. Why capital and intermediate goods behave so differently from consumer goods is beyond the scope of this paper, but is a promising area for future research.

F Economic Significance: Further Details

F.1 Eliminating Regressivity

Table A.II shows our baseline regression using the alternative tariff schedule we construct that eliminates regressivity. Overall, tariffs become slightly progressive, but for consumer goods the correlation is still negative, but smaller in magnitude and not statistically significant.

TABLE A.II
Alternative Tariff Schedule: Eliminating Regressivity

	All	Consumption
Log Unit Value	0.14	-0.05
	(0.06)	(0.13)
Observations	11147	4040

F.2 Freight Analysis Framework Data

Our back-of-the envelope estimate of the distributional consequences of regressivity relies, in part, on data from the U.S. Department of Transportation's Freight Analysis Framework (FAF). In particular, we use the region-to-region import flows data, which can be found here: `https://faf.ornl.gov/faf5/dtt_import.aspx`. These data provide information on imports (volume and value) from all foreign origins, to all U.S. entry regions. These imports are then tracked as they move throughout the United States by all modes of transportation to destination regions.[47] Figure A.IX shows an example of imports that arrive in Los Angeles—the large orange circle. The orange lines trace where these imports travel within the United States, and where they ultimately land is depicted by the blue circles. The bulk of Los Angeles imports stay in California, heading to San Diego and San Francisco, but some travel as far as Maine and Alaska.

We use these data to create our regional import baskets. We merge the FAF regions with county level data using a crosswalk provided by the Department of Transportation (`https://www.bts.gov/archive/subject_areas/freight_transportation/faf/faf4/app_a`). County-level data on population, median household income, and Rural-Urban Continuum Codes are from the U.S. Department of Agriculture (`https://www.ers.usda.gov/data-products/county-level-data-s`

[47]The modes of transportation include truck, rail, water, air, multi-modal, pipeline, etc.

ets/) and county-level personal income data are from the Bureau of Economic Analysis (https://www.bea.gov/data/income-saving/personal-income-county-metro-and-other-areas).

FIGURE A.IX
Freight Analysis Framework Example