# Who Pays for Tariffs Along the Supply Chain? Evidence from European Wine Tariffs

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**Abstract**

We study how tariffs affect prices along the supply chain using product-level data from a large U.S. wine importer during the 2019-2021 U.S. tariffs on European wines. Combining confidential transaction prices with foreign suppliers, U.S. distributors, and retail prices, we trace tariff pass-through from producers to consumers. Pass-through at the border is incomplete, yet consumers paid more than the tariff revenue collected. The dollar markups per bottle for the importer contracted, but expanded for the combined distributor-retailer segment. Price changes along the chain reached consumers after one year. We also document tariff engineering that biases unit values in trade statistics.

**JEL Classification:** F13, F14, L66, L81
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# I Introduction

The economic impacts of tariffs are perhaps the most consequential policy debate facing the United States and the global trade system. And yet, economists seeking to inform this debate face a paucity of empirical estimates to rely on, as there have been virtually no cases of an advanced country unilaterally raising broad tariffs on a scale seen by the United States over the last decade. While the previous iteration of tariff increases during 2018-2019 induced a surge of research—especially on the key question of tariff pass-through—there remain many open questions central to understanding the experience of the United States during the subsequent tariffs imposed in 2025.

Prominent among these open questions: How are the costs of tariffs shared between foreign producers, domestic importers, trade intermediaries, and the final consumer? A wide range of studies find tariff pass-through at the border is more or less complete and immediate (Amiti, Redding and Weinstein, 2019, 2020; Fajgelbaum, Goldberg, Kennedy and Khandelwal, 2020), implying domestic actors bear the brunt of these costs. Yet empirical evidence on tariff pass-through to consumers is both limited in scope and mixed in conclusions. Some evidence points to complete pass-through (Flaaen, Hortaçsu and Tintelnot, 2020) while others find it is very low (Cavallo, Gopinath, Neiman and Tang, 2021). This paper seeks to resolve this disconnect by tracing the tariff impact on prices of an imported product throughout its journey from the foreign producer—via the importer, distributor, and retailer—to the final consumer. We find that high pass-through at the border can be consistent with low percentage changes in retail prices, while the dollar cost of tariffs is still largely borne by consumers.

We study this question in the context of U.S. tariffs on European still wines implemented in 2019 as part of the long-running dispute on aircraft subsidies between the E.U. and the United States. Our unique perspective on the supply chain comes from confidential transaction data from a large wine importer that has been matched at the product-vintage level to other downstream stages of the distribution chain. The wine industry is particularly well-suited to the study of tariff pass-through across the distribution chain due to features of the regulatory environment—namely legal requirements on the separation of ownership across the tiers of distribution: producers/importers may not be distributors, and distributors may not be retailers. The result of this structure is clear arm's-length pricing at multiple stages of the distribution chain from the border to the end consumer.

Our main finding is that the markups along a distribution chain make it possible for the consumer to fully pay for the cost of the tariffs in dollar terms even when the foreign supplier partially absorbs the tariff by lowering its price. This highlights the difference between *percent* pass-through, which compares the percentage increase in consumer prices to the percentage point change in tariffs, and *dollar* pass-through, which compares the actual dollar increase in consumer prices to the actual dollar amount of tariffs paid. Absent markups or other distribution costs, these two definitions are identical. On the other hand, when markups are significant (or with multiple markups compounded across multiple stages) even small percent changes in an upstream price in the distribution chain can translate into significant dollar increases for consumers. Hence, low pass-through estimates in percent terms on consumer prices do not imply that the costs of the tariffs to consumers are small relative to tariff revenue.

In order to estimate the price effects of the tariffs, we exploit the fact that they were levied only on still wines with $\leq 14\%$ alcohol by volume (ABV). We compare price changes along the distribution chain for products that were tariffed to a control group of wines that were not tariffed (still wines with $> 14\%$ ABV and sparkling wines). To minimize any indirect tariff effects, we restrict this control group to products from wineries that did not sell any other tariffed products. We find that tariff pass-through at the border is incomplete, as foreign producers lower their price by 5.2 percent following the applied 25 percent tariff. This implies that around one-quarter of the tariff revenue is paid by foreign producers, while the remainder is paid within the United States. At the next stage of the chain, we find the U.S. importer *increases* the price charged to their distributors by an average of 5.4 percent. Tariff pass-through continues to be incomplete at this subsequent stage, and even with the lower price paid to producers, the importer absorbs some portion of the tariffs as lower markups. Finally, tracking these particular wines at the stage of final sales by retailers, we find that the consumer price increases by 6.9 percent following the tariffs. While such a percent increase implies incomplete (percent) pass-through given a 25 percent tariff, the multiple stages of markups implies the corresponding dollar value change in consumer prices could be higher than the actual tariffs paid. For example, for a wine that costs \$5 at the border prior to tariffs, our point estimate implies \$1.59 in higher consumer costs relative to \$1.19 in tariffs paid per bottle. Hence, at the level of the consumer, the dollar pass-through estimate exceeds 100 percent. Even taking into account the cumulative statistical uncertainty of pass-through estimates across multiple stages, a one-sided test indicates with 90 percent probability that the consumer dollar cost per dollar of tariff revenue is larger than 68% .

The broader picture of pass-through that we capture in this paper offers an accounting of tariff incidence both across and *within* borders. While much of the focus has been on whether foreign or domestic actors pay for increased tariff revenue, we also study the incidence of tariffs between domestic intermediaries and consumers. These details provide useful information on the dynamics of firm profits, disposable personal income, and inflation following tariff changes. We find that among the domestic intermediaries, the dollar margins per bottle for the importer contracted, but expanded for distributors/retailers. We show how these patterns can arise in a simple model with multiple distribution stages and participation constraints.

Our event-study estimates of pass-through along multiple stages also provide a unique perspective on the timing of price changes following a tariff. In the case of these wine tariffs, it took around three months for the wine importer's prices to change, and consumer prices do not fully respond until nearly a year after tariffs were applied, with significant positive price impacts lasting well beyond after the tariffs expired. This finding provides useful perspective for policymakers wanting to understand the lag structure of the inflation effects of tariffs. The precise timing of these effects will depend on both the number of distribution or production stages in the supply chain and the duration of the price spell at each stage. Indeed, we provide evidence of a declining duration of price spells the further one moves along the distribution chain. However, even at the retail level, the typical price spell lasts five months.

While the finding of incomplete tariff pass-through at the border is in contrast to prevailing findings in recent literature, it is more consistent with theoretical predictions of monopsony power of a large market such as the United States. Further, we show the benefits of having precise price observations at the detailed product and transaction-level: pass-through estimates in our setting using publicly available unit values of HS-8-level product definitions give a misleading picture due to changes in product composition induced by the tariffs. Such changes in product composition reflect an intriguing case of tariff engineering by leveraging detailed product-level alcohol label data for all wines sold in the U.S. Because the initial tariffs only applied to wines defined by a threshold level of alcohol content ($\leq$ 14% ABV), we document a systematic shift in new product offerings toward higher alcohol content exempt from these tariffs, as well as engineering of existing wines to modify the listed alcohol content for exemption from these tariffs.

The findings of this paper offer important lessons for policymakers more generally, especially as they interpret pass-through estimates for tariffs imposed in 2025. Markups imposed across multiple distribution stages are a common feature of all goods transactions in the United States, and are especially relevant for imports. Bernard, Jensen, Redding and Schott (2010) and Ganapati (2024) document the important role played by the U.S. wholesalers and retailers in trade. Feenstra (1998) cites the famous example of the imported Barbie doll with an export value of $2 that retailed for $10 in the U.S. at the time. This paper argues that estimates of the consumer price impact of tariffs—in percent terms—must take into account prevailing markups along the distribution chain to adequately scale the impact to consumer prices relative to assessed tariff revenues. Such gross markups are quite significant, on average. Based on estimates from the Bureau of Economic Analysis, the average weighted gross markup across all personal consumption expenditure goods is a little over 100 percent between producer and purchaser prices.[1] If this gross markup rate in the domestic distribution sector prevails and foreigners absorb little of the tariffs, consumer prices could rise—in dollar terms—by substantially more than the tariffs paid. Although wine may appear to be a narrow product class, the mechanisms we highlight are general features of international trade settings, and thus our insights extend beyond this specific industry.

Our paper contributes principally to two areas of research. First, it adds to a growing literature on the consequences of tariffs, with a particular emphasis on their incidence.[2] Earlier examples include Feenstra (1989), who examines tariff pass-through to car prices, and Irwin (2019), who analyzes pass-through to sugar prices. More recently, Amiti, Redding and Weinstein (2019); Fajgelbaum et al. (2020); Alviarez, Fioretti, Kikkawa and Morlacco (2023) studied the pass-through effects of the 2018-2019 U.S.-China tariffs at the border, while Flaaen, Hortaçsu and Tintelnot (2020); Cavallo et al. (2021) examined them at the retail level. Our work contributes by connecting these two margins and documenting how price pass-through is transmitted along the supply chain from the port of entry to final consumers for the same products. We provide direct evidence of how trade policy propagates through import intermediaries to retailers—a key but previously under-explored channel in understanding the incidence of tariffs. In particular, we document that even though the foreign exporters absorbed part of the tariffs by lowering prices, consumers ultimately paid more than the direct dollar cost of the tariff, a pattern that conventional models of trade with no supply chains cannot rationalize.

Second, we contribute to the empirical explorations of pass-through. As in Nakamura and

[1]We derive this estimate from the 2017 personal consumption expenditure (PCE) bridge tables, calculated across goods categories pertaining to NIPA lines 7 through 141 corresponding to commodity codes in agriculture, mining, and manufacturing. We exclude PCE categories that are scrap or used goods. By this metric, the gross markup for wineries of 143 percent reported by the BEA is not that dissimilar to the estimate at the equivalent stage in this paper of 155 percent (excluding the importer stage), nor is it dramatically higher than the weighted average.

[2]Beyond the price effects, an active literature has examined the labor market effects of tariffs including Dix-Carneiro and Kovak (2017), Kovak and Morrow (2024), Cox (2025), Flaaen and Pierce (2024), Lake and Liu (2025). Handley, Kamal and Monarch (2025) examined the effects of import tariffs on exports. An early look at the retail price effects of the 2025 tariffs is provided by Cavallo, Llamas and Vazquez (2025).

Zerom (2010); Goldberg and Hellerstein (2013); Bergquist and Dinerstein (2020); Alvarez-Blaser, Cavallo, MacKay and Mengano (2025), we also study pass-through in multi-tier supply chains. Alvarez-Blaser et al. (2025) is particularly relevant since the authors also observe manufacturer gate price and the corresponding retail price for individual products. One of the differences in our paper to prior work on supply chain pass-through is that we study a country and product specific tariff shock rather than upstream cost in a stationary environment. In our setting, we show that the importer's derived demand along the domestic supply chain shapes how the burden of tariffs is shared between importers and their foreign suppliers. Regarding the role of distribution costs in shaping outcomes following policy shocks in a global setting, Burstein, Neves and Rebelo (2003) investigate how these costs affect the behavior of the real exchange rate during stabilization episodes. Atkin and Donaldson (2015) also emphasizes the role of domestic intermediaries in the cost pass-through from international trade.

Finally, our paper also relates to the work of Sangani (2025) which finds that cost shocks that are common to all market participants usually have a complete pass-through to retail prices in levels (dollars), but not in percentages. However, there are important differences to this prior work. We find a complete pass-through in dollars to retail prices for this tariff shock that affected a fraction of the market participants, while uncovering *heterogeneity in pass-through along the chain*. Here, the pass-through of cost increases at the prior stage of the chain is *incomplete* (even in dollars) from the importer to the distributor but *complete in percentages* from the distributor/retailer to the consumer.

The remainder of the paper is organized as follows. Section II presents a simple model to conceptualize tariff pass-through along the supply chain. Section III provides institutional details on the 2019 tariffs on European products and on the U.S. wine industry. Section IV documents the aggregate effects of the tariffs using customs data and presents evidence of changes in product composition and tariff engineering as mechanisms to avoid tariffs. Section V presents the main results on pass-through along the supply chain, based on confidential data from a large U.S. wine importer. Section VI concludes.

## II A model of tariff pass-through along the supply chain

In order to conceptualize the pricing responses of tariffs, we develop a stylized model of tariff pass-through along the supply chain. The aim of the model is to provide a rationale for why (a) the consumer price can rise by as much as the tariff paid (in dollar terms), even though the foreign supplier reduces its price, and (b) why the importer bears a substantial share of the tariff burden while the retailer appears to pass on the tariff fully (in percentage terms). Here in the main text we present the central components and results of the model, while the mathematical details are provided in Appendix A.1.[3]

We consider four types of agents: a continuum of consumers with CES preferences for wines; two domestic intermediary tiers (importers and retailers, abstracting from distributors for simplicity); and foreign wine suppliers. We focus on a case in which the tariff is imposed only on a small

[3]The advantages of the model presented here are its relative simplicity and intuitive features mapping to the setting of the wine market in the U.S. Alvarez-Blaser et al. (2025) for example, employ a model with Nash bargaining between stages of the chain to determine how profits are split in order to rationalize the negative correlation in markup changes they observe in their data.

subset of wines available to consumers. This setup mimics the empirical context, where imports account for one-third of consumption and only about one-third of those imports were tariffed. A consequence of this assumption is that the profitability of the retailer's outside option—offering a domestic wine or another non-tariffed foreign wine in the same shelf space—remains roughly unchanged. For our purposes, we do not go deeper into modeling domestic wine suppliers.

There are many importers, each of which imports a single differentiated variety of wine. For each variety, there are many foreign suppliers that supply these wines competitively. An outside option for the foreign supplier is to sell the wine to other markets, where they face downward-sloping demand.[4] This gives rise to an upward-sloping supply curve for each wine variety in the U.S. market. We assume the importer acts as a price taker in the input market when purchasing foreign wines.[5] Each importer operates in a monopolistically competitive market when selling wines to retailers, but subject to each retailer's participation constraint. The retailers, in turn, act monopolistically competitive when selling their wines to consumers.

The retailers' and importers' variable costs consist of the price of the wine at the respective stage of production. Retailers also have an opportunity cost, $F$, of providing shelf-space to a wine. Therefore, a retailer will sell a wine only if the participation constraint is met, that variable profits are at least as large as $F$. We abstract away from other variable costs the retailers and importers may face, and only impose that the profits of the importer are weakly positive.[6]

In the absence of tariffs, the equilibrium for the wine market is displayed in Panel A of Figure 1. Starting with convex iso-elastic CES final demand (black curve), one can easily verify that a monopolistic competitive retailer's marginal revenue (blue dashed curve) and importer's marginal revenue (red dashed curve) are parallel and shifted downward from the demand curve along the supply chain. The foreign supply of wine is represented by a gray straight line, and the intersection with the importer's marginal revenue curve determines the equilibrium point $\mathrm{F}_0$. Tracing upward, we find point $\mathrm{E}_0$ on the retailer's marginal revenue curve and, finally, point $D_0$ on the demand curve with corresponding price $p_0$. The segments $\mathrm{D}_0$–$\mathrm{E}_0$ and $\mathrm{E}_0$–$\mathrm{F}_0$ represent the retailer's and importer's markups in dollars, respectively. In this no-tariff situation, and where the participation constraint by the retailer is non-binding, the retailer's profits are captured by Area $\Pi_0$ (in green).

To connect directly to the policy debate of who pays for tariff costs along the supply chain, it is useful to start with an accounting identity where

$$\underbrace{(p_1 - p_0)}_{\text{Increase in Retail Price}} - \underbrace{\tau c_1}_{\text{Tariff Collected}} = \underbrace{(c_1 - c_0)}_{\substack{\text{Change in Foreign} \\ \text{Supplier Price}}} + \underbrace{\Delta\mu_I^D}_{\substack{\text{Change in Importer} \\ \text{Dollar Markup}}} + \underbrace{\Delta\mu_R^D}_{\substack{\text{Change in Retail} \\ \text{Dollar Markup}}}$$

In the standard trade model without any domestic retail–importer supply chain or intermediation, the incidence question is governed entirely by the terms-of-trade effect $(c_1 - c_0)$. Put differently,

[4] In Table B2 we show that for French, Spanish, and German wines the U.S. was an export destination of no more than 20% of products. Therefore, other markets are completely viable outside options.

[5] This assumption can be relaxed without altering the main conclusions. See Appendix A.2 for the mathematical derivations under an alternative scenario where the importer has monopsony power.

[6] Other variable costs at the importer or retailer level could lower the percent pass-through of the tariff increase. We discuss the presence of such costs in a later section. While these costs do exist, we estimate that they are moderate in magnitude—on the order of roughly 20 percent of the wine's cost. We further contrast the pass-through for importers in percentages and dollars/levels to shed light on the quantitative importance of these costs.

whenever tariff pass-through at the border is incomplete, consumer prices rise by less than the tariff revenue in dollar terms.

Once we introduce domestic retail and importer markups, however, the logic becomes considerably more nuanced. In that setting, tariff incidence depends not only on the border price response but also on how markups, in dollar terms, adjust along the domestic supply chain. Below, we outline three cases illustrating how these two components $\Delta\mu_R^D$ and $\Delta\mu_I^D$ may move either jointly in the same direction or in offsetting directions.

Panel B introduces the case with border tariffs under a non-binding participation constraint for the retailer. This serves as a convenient starting point, since both the importer and retailer apply constant percentage markups. The ad-valorem tariff, denoted by $\tau$, creates a wedge between the producer price ($c_1$) and the importer's purchase price ($(1+\tau)c_1$). At this new tariff-inclusive price, the traded quantity corresponds to points $D_1$, $E_1$, and $F_1$ on the demand curve, the retailer's marginal revenue, and the importer's marginal revenue, respectively. Because the foreign export supply curve is upward sloping, tariff pass-through at the border is incomplete; the importer's price therefore rises to $(1+\tau)c_1$, which is less than $(1+\tau)c_0$. Both the importer and retailer maintain their initial percentage markups, while the retailer's profit corresponds to Area $\Pi_1$ (in red).

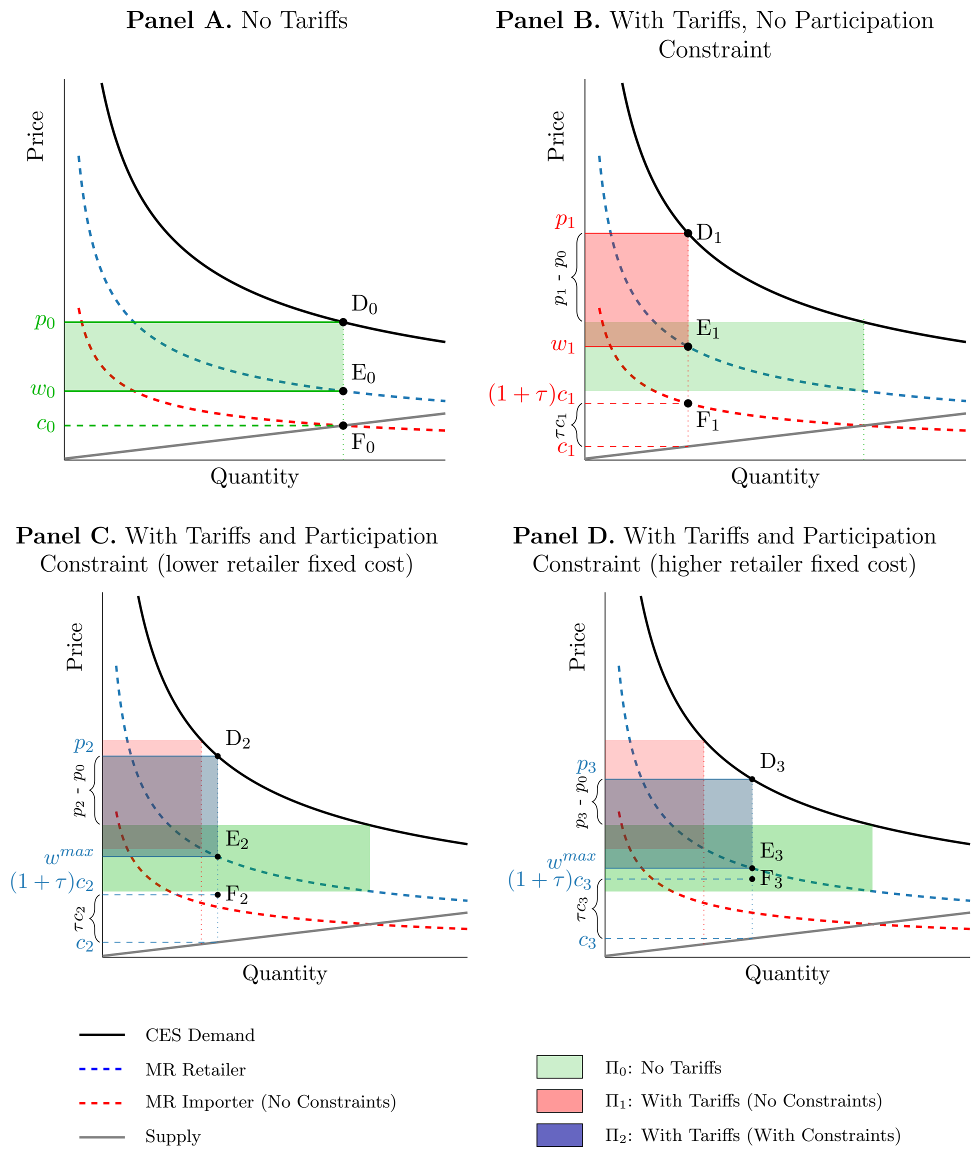
Several observations follow from this simple case. First, since both the importer and retailer apply constant multiplicative markups, the percentage pass-through of the tariff within the domestic market is complete. Second, a multi-layer importer–retailer supply chain amplifies the tariff-induced increase in the final retail price. The logic is straightforward: because both layers fully pass on the percentage increase in the after-tariff border price, their markups in dollar terms necessarily rise.

These predictions are, of course, stylized and hypothetical. Incomplete pass-through at any stage of the domestic supply chain can dampen the rise in the final retail price. Our model with a binding retailer participation constraint illustrates one such possibility, in which the importer absorbs a non-trivial share of the tariff burden. In this scenario, the reduction in the importer's markup partially offsets the increase in the retailer's markup in dollar terms. Panels C and D illustrate two contrasting cases: in Panel C, the consumer price rises by more than the tariff per bottle, whereas in Panel D, it rises by less.

In both Panels C and D, we introduce tariffs under a retailer participation constraint that accounts for the retailer's fixed shelf cost, $F$. When pre-tariff profits satisfy $\Pi_0 > F$ but post-tariff profits fall below it if the pass-through by the importer is complete ($\Pi_1 < F$), the constraint binds, ensuring that the retailer's profits just cover $F$; otherwise, the retailer would drop the wine from its portfolio. In Panel C, note that the foreign supplier's price adjusts to $c_2$, yielding a tariff-inclusive importer price of $(1+\tau)c_2$. The constrained equilibrium corresponds to points $D_2$, $E_2$, and $F_2$ on the demand curve, the retailer's marginal revenue curve, and the importer's tariff-inclusive purchase price, respectively. In this case, the importer's markup shrinks, and the retailer's profit—represented by area $\Pi_2$ (equal to $F$, shown in blue)—is just sufficient to maintain participation. However, the compression of the importer's markup is not large enough to offset the increase in the retailer's markup in dollar terms. As a result, the consumer price rises by more than the tariff collected.

In Panel D, the participation constraint remains binding, but the retailer's fixed cost is higher than in Panel C. This tighter constraint compels the importer to absorb an even larger share of the tariff burden, leading to a smaller pass-through. Consequently, the consumer price increase is less than the tariff paid per bottle.

**Figure 1:** Tariff Pass-Through Along the Supply Chain With and Without Participation Constraints




This model offers several useful features. Without domestic intermediation and with perfectly competitive foreign suppliers, a decline in the foreign price would necessarily lead the domestic consumer price increase to be *less* than the tariff revenue per unit of the imported good. With domestic intermediation, however, it is possible that the consumer price increase exceeds the tariff paid. There also exist scenarios in which the domestic intermediation could actually dampen the consumer price increase; for example, if at the initial equilibrium without tariffs the retailer's participation constraint were already binding.[7] Then, a small increase in the tariff could be fully

[7] In the Appendix section A.1 we provide exact formulas under which consumer price increases are larger than the tariff revenue per unit.

absorbed by the importer.[8]

The model also predicts that products that yield larger profits to the retailer are less likely to face a binding participation constraint following a tariff increase. Therefore, products that are initially more profitable for the retailer are likely to exhibit higher price pass-through from the importer to the distributor. We take this prediction to the data in Appendix Figure D3 by relating tariff pass-through in the importer's sales price to distributors to the initial profits that the importer earned for each product–distributor pair. While the relevant object is the retailer's profits, we expect the importer's profits to be highly correlated with retailer profits (in the model they are proportional). As predicted, products with higher initial profits display higher pass-through from the importer to distributors, suggesting that the retailer's shelf cost is a reasonable mechanism to explain incomplete pass-through from importer to distributor.

## III Import Tariffs and the Wine Industry in the United States

### *A Airbus-Boeing Subsidy Dispute and Tariff Timeline*

The origin of the tariffs studied in this paper lies in the long-standing trade dispute between the United States and the European Union over aircraft subsidies. The dispute began in 2004, when the U.S. filed a complaint with the World Trade Organization (WTO) concerning subsidies granted by the E.U. to Airbus, a European aircraft manufacturer. The conflict continued for many years, involving counter-cases brought by the E.U. against Boeing (the U.S. aircraft manufacturer), WTO rulings, appeals, and bilateral negotiations. Until 2019, however, neither side had imposed punitive tariffs.

In April 2019, the Trump administration launched an investigation on the grounds that the E.U. had not fulfilled its obligations under prior WTO rulings. The proposed action included an ad valorem duty of up to 100% on 317 potential HS-8 product codes, among them still and sparkling wines. On October 2, 2019, the WTO authorized the U.S. to impose countermeasures totaling up to $7.5 billion annually. Later that same day, the U.S. Trade Representative announced a tariff on a range of products from E.U. member states, including aircraft, wines, cheese, and fresh fruit. For wine, the U.S. imposed a 25% tariff on still wine with $\leq$ 14% alcohol by volume (ABV), packaged in containers of 2 liters or less, originating from France, Germany, Spain, and the United Kingdom. These tariffs took effect on October 18, 2019.[9]

After the U.S. tariffs went into effect, the E.U. imposed its own tariffs on a list of U.S. products in connection with the related WTO complaint against Boeing. The E.U. announced its retaliatory measures in November 2020 (U.S. wines were not included). In January 2021, the U.S. government expanded the list of products subject to additional tariffs, citing the aim of mirroring the E.U.'s reference period for calculating the volume of trade affected by tariffs. The expansion of tariffed products included all still wine imports from France and Germany (HS code 2204)—regardless of alcohol level or container size—excluding only sparkling wines (see Table E5 for the HS code descriptions). However, this expansion was short-lived. In March 2021, at the beginning of the

[8] If the tariff increase is too large, the importer would stop importing the product entirely when the importer's profits become negative.

[9] President Trump had threatened tariffs on French wines in June 2019 (Dopp and Talev, 10 June, 2019). Furthermore, some news reports in mid-September 2019 suggested that the WTO would allow the U.S. to set tariffs from the Airbus dispute and therefore tariffs on wines might be imminent (von der Burchard, 17 September, 2019). Nevertheless, industry experts we spoke with described the tariffs largely as a surprise, leaving little time to prepare.

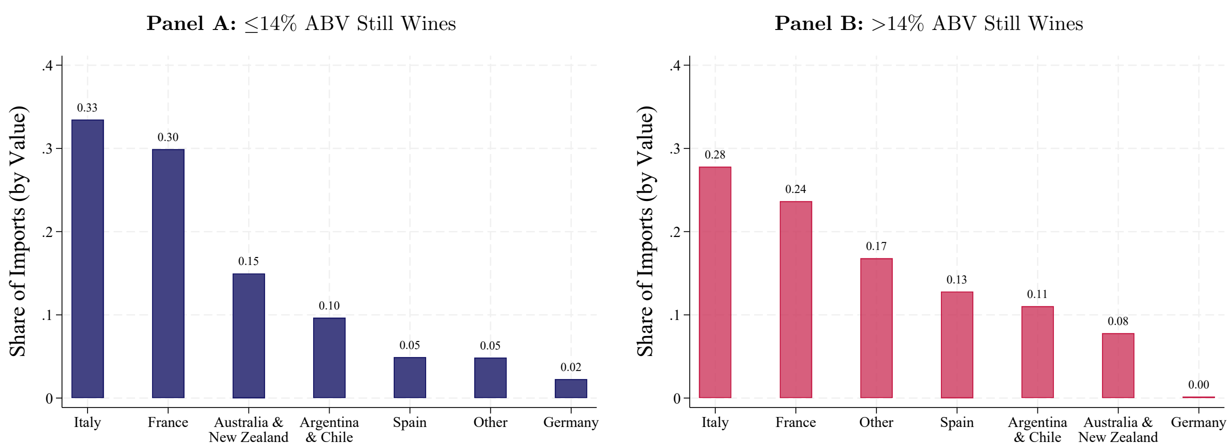
Biden administration, the U.S. and the E.U. reached an agreement to suspend all tariffs related to the aircraft dispute for four months. In June 2021, the suspension was extended for five years. These tariffs may return in June 2026 unless a further agreement is reached or the suspension is extended. During the period in which tariffs were in place, approximately $243 million were collected in tariff revenue. This amounted to an average of $1.14 per 0.75 liter of imported wine (standard bottle size).

### *B Institutional Details of the Wine Industry in the United States*

The United States is the largest wine market in the world, with roughly 3.9 billion liters (equivalent to approximately 5 billion standard bottles) consumed annually in 2017. Of the total market in 2017, 83 percent (by volume) is of still wine with an ABV content less than or equal to 14%, and a further 11 percent is still wine with an ABV greater than 14%. The overall foreign share of consumption (by volume) is around 30 percent, similar for both wines above and below 14% ABV.[10] Sparkling wine comprises around 6 percent of the market, with an import share of 53%.

Figure 2 shows that in 2018, France, Spain, and Germany together accounted for 37% of total imported wine value. For wines with an ABV content of 14% or less, imports are concentrated between Italy and France.[11] Meanwhile, Germany has a negligible share in the above 14% ABV category. Figure B1, in the Appendix, shows the combined share of quantities for these three countries facing the tariffs is 25% for still wines of $\leq$ 14% ABV and 37% for still wines of $>$ 14% ABV.

**Figure 2:** Source of U.S. Wine Import Value by Country, 2018




*Notes:* The figures exclude imports of wines in containers of over 2 liters.
*Source:* Authors' calculations for 2018, based on publicly available data from United States International Trade Commission (2010-2024).

The market for alcohol in the United States is regulated in several unique ways that ultimately

[10]These statistics are computed by combining domestic consumption data from the U.S. Alcohol and Tobacco Tax and Trade Bureau (TTB) with import data from the USITC for the year 2017, the last year for which TTB defined ABV splits identically to the Harmonized System for imports in the consumption data. Foreign shares calculated by value would likely be higher.

[11]The United Kingdom, part of the "Other" category in Figure 2 has a completely negligible amount of wine exports and is therefore omitted from all analysis.

prove useful in our study of the effects of tariffs across multiple stages of the supply chain. Two regulatory features of the U.S. wine market are particularly relevant: (1) the three-tier distribution system, and (2) labeling requirements. The three-tier distribution system mandated by U.S. states consists of domestic producers or importers, local distributors, and retailers. Each tier is required to operate independently from the others, with the goal of preventing any entity in one tier from exerting control over the others.[12] The benefits of this feature for our purposes are clear arm's-length transaction prices between the stages in the supply chain.

A second regulatory feature of the U.S. wine market relates to labeling requirements. Any wine imported into the U.S. or sold across state lines is required to have a Certificate of Label Approval (COLA) issued by the Alcohol and Tobacco Tax and Trade Bureau (TTB).[13] For regulatory purposes, still wines are classified into two groups—at or below 14% ABV, and above 14% ABV—with distinct labeling requirements for each. Those at or below 14% can have a margin of error of ±1.5% from the labeled ABV, while those above 14% are allowed ±1.0%. However, a wine cannot be labeled in one group if its actual ABV places it in the other—for example, a wine labeled at 13.5% should not actually reach 14.5% (Alcohol and Tobacco Tax and Trade Bureau, 2019). The most notable situations in which a wine product requires a new COLA occur if there is a change in brand, appellation of origin, product classification, or for certain changes in images or texts. For our study, it is particularly relevant that producers or importers need to update a COLA if the ABV of the wine changes outside the permitted tolerance range or if it crosses the 14% threshold, requiring reclassification. The data from these label applications allow us to track the flow of new products into the U.S. market based on their ABV content.

## IV Tariff Effects in Aggregate Data: A First Look

To motivate our analysis of supply-chain pass-through, we first examine the aggregate effects of the 2019 tariffs. Using publicly available data, we document sharp declines in U.S. import quantities, with notable shifts in product composition. We provide a first look at tariff pass-through at the border, measured with unit values. We then show how compositional effects can complicate pass-through estimates even at very detailed levels of HS categorization. This aggregate evidence bridges our work with the existing literature and sets the stage for our main contribution to trace how tariffs propagate from the border to consumers using more granular product data.

Figure 3 displays the monthly import quantities of wines from three of the tariff-affected countries (France, Spain, Germany) along with a non-affected country (Italy) for purposes of comparison. The solid lines in the Figure correspond to the still wines with ≤14% ABV (those facing tariffs beginning in October 2019), the dashed lines correspond to the still wines >14% ABV (those exempt from tariffs until briefly in early 2021), and the dotted lines correspond to sparkling wines (which did not face tariffs during the period of this study).

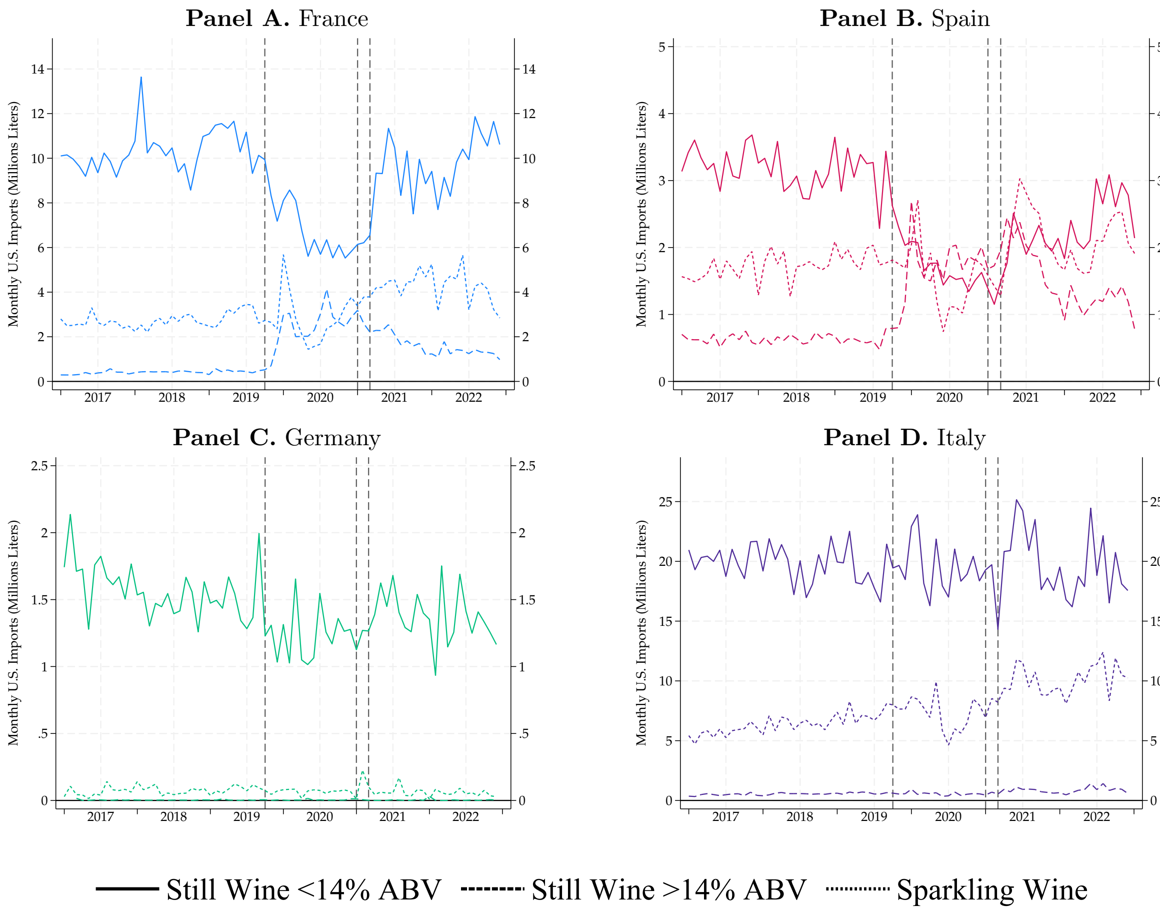
Panels A and B of Figure 3 reveal sharp drops in U.S. imports of ≤14% ABV wines from France and Spain, respectively. In contrast, there were only modest declines in U.S. imports from Germany

[12] A few states provide exceptions to this structure and allow producers or importers to obtain a wholesale license, enabling them to sell directly to retailers. While 17 states have state monopolies over the wholesaling or retailing of certain categories of alcoholic beverages (also known as control states), only four states (Mississippi, Pennsylvania, Utah, and Wyoming) impose such restrictions on wine sales of less than 16% ABV.

[13] Domestic products of less than 7% ABV are not required to have a COLA. Within the wine category there are also vermouths, sakes, and flavored wines which we exclude from all of our analysis.

(Panel C) and no noticeable changes in import quantities from a non–tariff-affected country such as Italy (Panel D). Perhaps equally striking as the declines in ≤14% ABV wines in Panels A and B are the corresponding jumps in U.S. imports of >14% ABV wines from France and Spain in the months following the new October 2019 tariffs. There are essentially no U.S. imports of >14% ABV wines from Germany, reflecting the near-universal imports of Riesling wines from that country, a variety typically in the range of 8–12% ABV. We will return to the substitution pattern towards > 14% ABV wines in greater detail below.[14]

**Figure 3:** U.S. Monthly Import Quantities by Source Country and Wine Type, 2017–2022



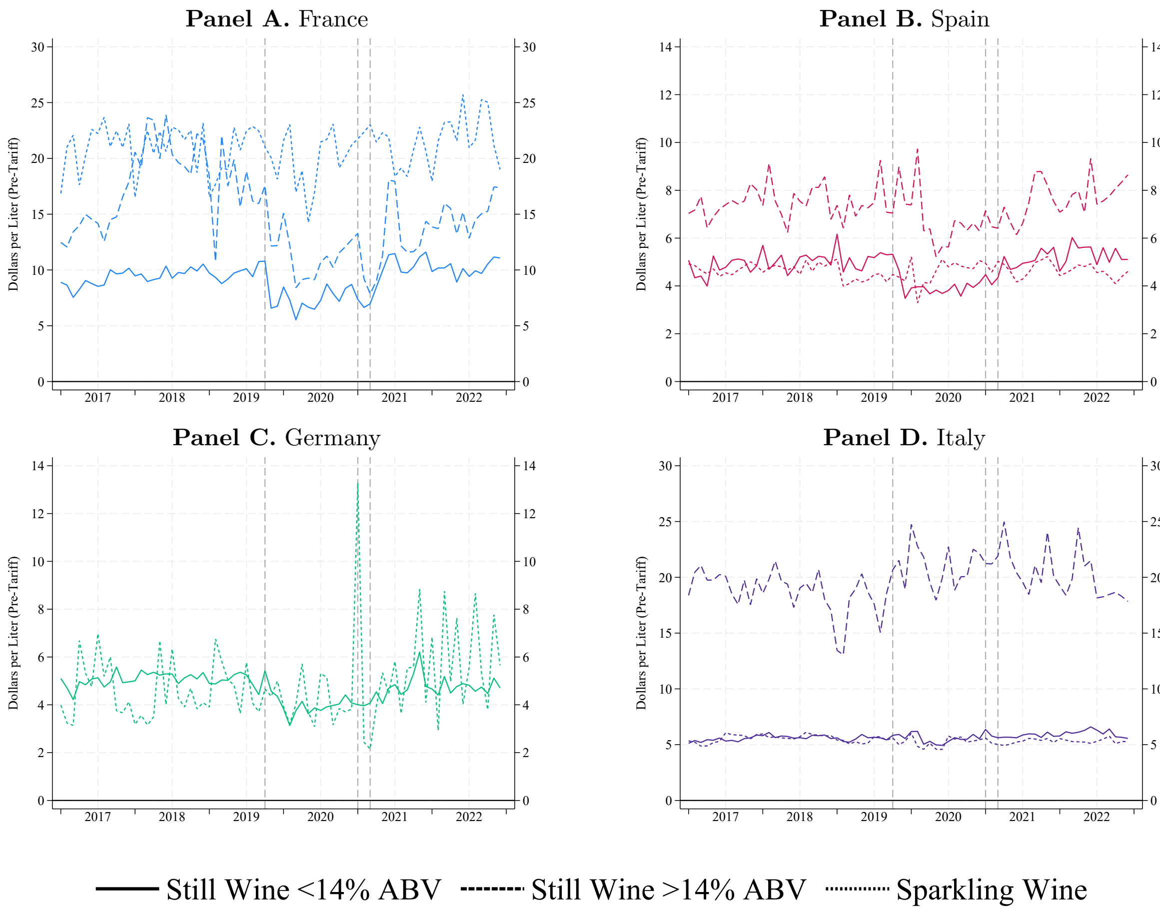

*Notes:* Still wines ≤14% ABV in containers of under 2 liters are classified under HS2204.21.50, still wines >14% ABV in containers of under 2 liters are classified under HS 2204.21.80, and sparkling wines are classified under HS 2204.10.00. Each series is seasonally adjusted using the X-13 ARIMA procedure. Vertical lines in the figure correspond to September, 2019 (tariffs on ≤14% ABV imposed), January 2021 (tariffs on all still wines from France and Germany), and March 2021 (tariffs removed).
*Source:* Authors' calculations based on publicly available data from United States International Trade Commission (2010-2024).

The lack of any offsetting increase in imports from Italy is striking amid the sharp drops elsewhere. The patterns of tariff-induced relocation are not as salient for the wine industry as production is tightly linked to local climate, soil, and topography (so-called *terroir*). This is

[14]Another pattern that suggests purposeful tariff avoidance is the increase in still wines with an ABV of ≤14% packaged in volumes greater than 2 liters. In Appendix Figure B2, we show a jump in imports of such larger-volume products for wines from France, but not for Spanish or German wines.

in contrast to the patterns documented for other industries such as washing machines (Flaaen, Hortaçsu and Tintelnot, 2020). Nevertheless, there are other possibilities for product substitution. One explanation for the little evidence for cross-country substitution is that the tariffs directly affected only a small portion—around 10 percent—of wine consumption in the United States. The little response from Italian wines also suggests we would expect only small effects on U.S. domestic wine producers.

**Figure 4:** Import Unit Values by Source Country and Wine Type, 2017-2022

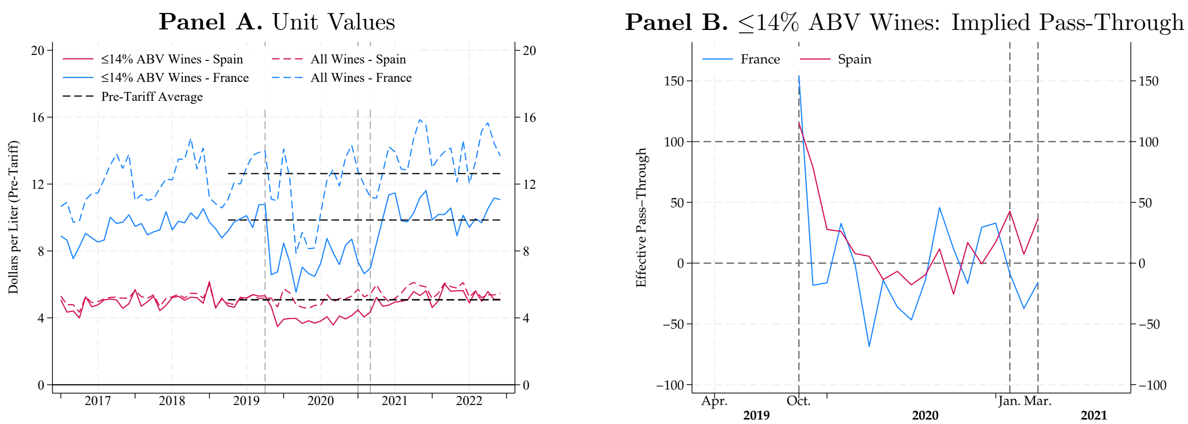



*Notes:* Wines ≤14% Alcohol are classified under HS2204.21.50, wines >14% alcohol are classified under HS 2204.21.80, and sparkling wines are classified under HS 2204.10.00. There are effectively zero imports of > 14% ABV wines from Germany, and so this line is omitted. Vertical lines in the figure correspond to September, 2019 (tariffs on ≤14% ABV imposed), January 2021 (tariffs on all still wines from France and Germany), and March 2021 (tariffs removed). *Source:* Authors' calculations based on publicly available data from United States International Trade Commission (2010-2024).

Combining values and quantities from publicly available trade statistics has been used for estimating rates of tariff pass-through at the border, most notably in Amiti, Redding and Weinstein (2019) and Fajgelbaum et al. (2020) for the 2018-2019 U.S. tariffs. The empirical approach is to relate changes in unit values to changes in tariff rates for particular country-product pairs. Indeed, an approximation of this approach can be visualized by inspecting whether or not the pre-tariff unit values remain constant (implying that the post-tariff unit values move up by the amount of the tariff – consistent with full pass-through), or decline in response (thus resulting in post-tariff unit values increasing by less than the amount of the tariff and consistent with partial pass-through). Figure 4 shows the unit values of the various types of wine imports by country. Focusing attention on the solid lines corresponding to ≤14% ABV wines subject to tariffs beginning in October 2019, there is evidence of declines in unit values across all tariff-affected countries that correspond to the timing of when tariffs were introduced. At face value, the empirical approach for measuring tariff pass-through at the border would interpret these patterns as evidence of incomplete pass-through.

Panel A of Figure 5 makes this concrete for the tariff-affected wines from both France and Spain, by visually using the mean unit value in a period before tariffs were imposed as a benchmark. Panel B of Figure 5 then relates these changes in unit values to the scale of the tariff, thereby translating these unit value movements over time into implied pass-through estimates during the tariff-affected period. From this perspective, it appears that foreign producers fully absorbed the tariffs by lowering prices, leaving tariff-inclusive prices unchanged.

**Figure 5:** Implied Pass-Through Rates




*Notes:* In Panel A, "all wines" series, dashed red and blue, include all wines in bottle sizes under 2 liters (sparkling, still ≤ 14% ABV, and still > 14% ABV). The pre-tariff average, dashed black line, is computed based on the average from April to September 2019.
*Source:* Authors' calculations based on publicly available data from United States International Trade Commission (2010-2024).

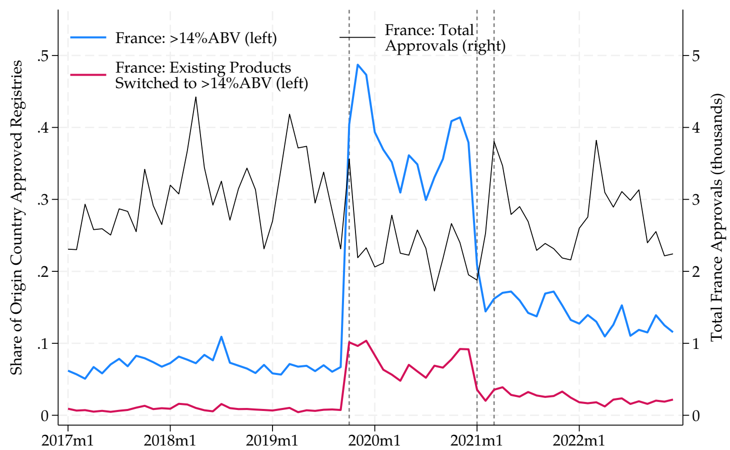
Yet this simple approach rests on many assumptions, not least of which is that the composition of products remains constant. Such an assumption is particularly strong for a product category like wine, which exhibits significant heterogeneity and quality differences. Indeed, Figure 4 shows that the unit values of >14% ABV wines (which were not tariffed) also shifted, potentially in response to the surge in U.S. imports during this period. The shift of certain varieties from the import basket of ≤14% ABV wines (the treated group) could lead to biases in estimates of pass-through derived from publicly available data. Additional evidence comes from the movement in unit values across all wine categories under 2 liters (sparkling, still ≤14% ABV, and still >14% ABV), shown in Panel A of Figure 5. For this aggregated category, which includes tariffed wines, unit values are essentially flat for Spain during the tariff period and dip only temporarily for France.[15]

How were these rapid changes in product composition in tariffed and non-tariffed categories

[15] One potential explanation for the temporary dip in France's unit values is another change in product composition, in which U.S. inventories of more expensive French wines were drawn down more heavily and therefore requiring fewer imports for such products.

achieved? We find that one of the tariff avoidance strategies was to change the alcohol content of wines. We use data from COLA applications to the U.S. TTB to examine how wine producers adjusted product composition in response to the tariffs. In Figure 6 we plot the share of COLA approvals for still wine by month that are above 14% ABV for French originated products. The blue line shows that the share of label approvals for still wines above 14% ABV increased by nearly 40 percentage points immediately after the tariffs took effect, before declining once the tariffs were removed.[16]

**Figure 6:** Certificate of Label Approval (COLA) Rates - The Case of French Wines




*Notes:* The figure shows the share of COLA approvals of still wines for France by ABV level (blue and red lines; left axis) as well as the overall COLA approvals (black line; right axis).
*Source:* Authors' calculations based on data from U.S. TTB Certificates of Label Approval (COLA) provided by COLA Cloud.

We then match the applications during the tariff period with earlier applications of the same product, and show that firm behavior extends beyond product substitution to more direct tariff engineering.[17] The red line in Figure 6 plots the share of COLA approvals for still wine products with >14% ABV for which we observe a prior COLA approval with ≤14% ABV. For France, this share jumped by nearly 10 percentage points in the months directly following the 2019 tariffs, accounting for roughly 25 percent of the increase in >14% ABV wines. In Figure 7 we show an example of a wine that had a COLA approval of 13% in September 2017, then had a new label approved for 14.5%ABV in December 2019, and finally dropped to 13.5% in May 2022, three months after the tariffs were lifted. Moreover, while ABV values were typically reported in multiples of 0.5 (e.g., 13, 13.5, ... percent) both before and after the tariffs were implemented, we find significant bunching of ABV values immediately above the 14 percent threshold during the tariff period (see Appendix C). As imported products substituted toward >14% ABV—driven in part by tariff engineering—aggregated customs data may be subject to substantial composition effects, making it challenging to evaluate pass-through at the border using such data. In the next section, we therefore evaluate pass-through both at the border and throughout the supply chain using detailed product-level data from a large wine importer.

[16]The fall occurs in January of 2021, when tariffs were imposed on all French still wines. Hence, there were no differential tariffs between ≤14% and >14% ABV still wines to exploit.

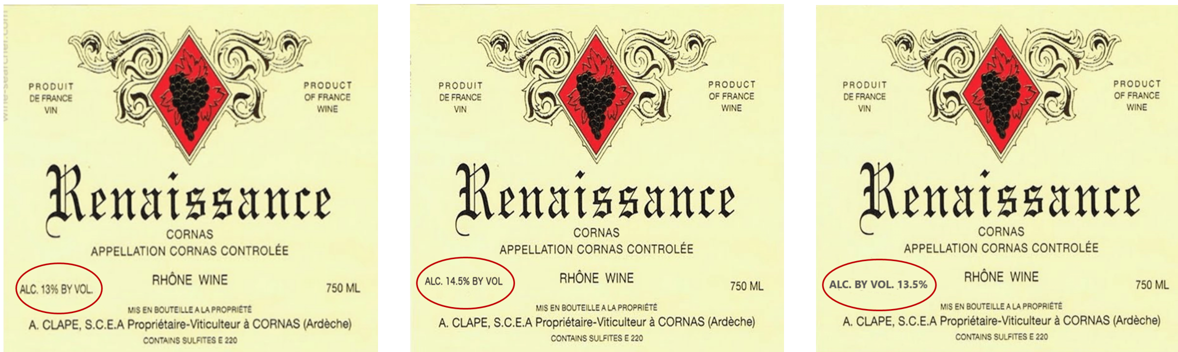
[17]We define a product by its unique combination of brand name, product name, country of origin, wine appellation, and bar-code (if available).

**Figure 7:** Example of Product ABV Switching

**Panel A.** Date of Label Application: September 18th, 2017 – **13% ABV**

**Panel B.** Date of Label Application: December 2nd, 2019 – **14.5% ABV**

**Panel C.** Date of Label Application: May 5th, 2022 –**13.5% ABV**




## V Tariff Pass-Through Along the Supply Chain

### *A Data*

The aggregate evidence highlights broad shifts in import volumes and border prices, and the model of pass-through along the supply chain shows how successive markups can amplify tariff incidence beyond the statutory rate. However, in order to reveal how these mechanisms play out in practice for actual firms, we turn to confidential transaction-level data from a major U.S. wine importer, which allow us to trace tariffs from foreign producers through the importer to U.S. distributors.

The confidential dataset contains all purchases and sales invoices of the importer's Spanish and French wines between October 2018 and March 2022 (covering one year before tariffs were imposed and one year after they were lifted). Under a non-disclosure agreement, we keep the firm's identity anonymous. This importer has significant sales volume and distributes to nearly all states in the U.S. On the purchase side from foreign producers, the data consists of purchase orders and their corresponding customs forms. Key variables include the foreign exporter, product, vintage, quantity, price, transport costs, and tariffs paid. On the sales side to U.S. distributors, the data consist of sales invoices that similarly include product, vintage, distributor identifier, quantity and price.

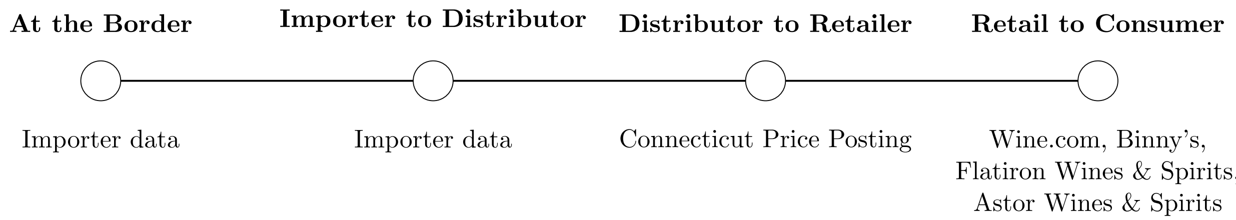
We trace these products along the supply chain using multiple supplementary data sources. Specifically, we obtain distributor-to-retailer price data for Connecticut, one of the few states that operates a price-posting system requiring distributors to report their prices to the state liquor control board.[18] To our knowledge, enforcement regarding the accuracy of these reports and the consistency of posting is limited, so we only use this data for descriptive purposes in Figure 9.

Finally, we obtain retail price data from the e-commerce platform Wine-Searcher. The platform tracks monthly retail prices at various wine stores, and we acquired the monthly wine prices at Wine.com, Binny's, Flatiron Wines & Spirits, and Astor Wines & Spirits for the wine products we observe in the transaction-level data provided by the U.S. importer.

Figure 8 summarizes the data sources at each stage of the supply chain.

[18] Price posting is more common for liquor than for wine. Conlon and Rao (2023) use Connecticut liquor price posting data in their study of the effects of corrective taxes versus imperfect competition in addressing products with negative externalities.

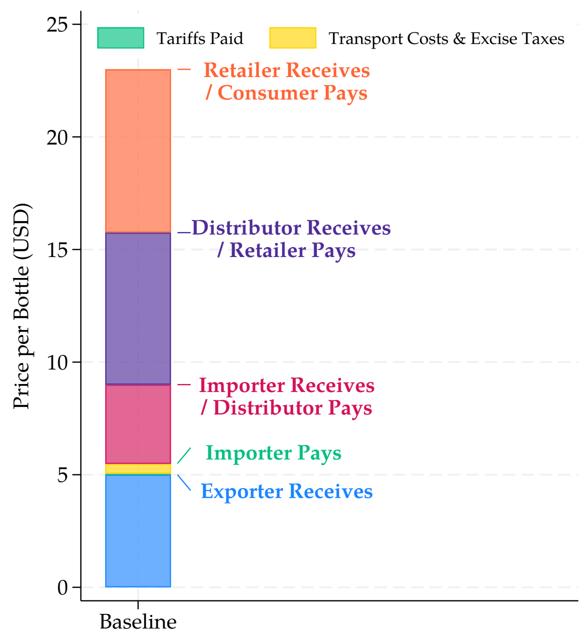
**Figure 8:** Data Sources Along the Supply Chain




### *B From Foreign Supplier to Domestic Consumer: The Evolution of Wine Prices*

Before analyzing price changes from the 2019-2021 tariffs, we first outline the pricing structure across the supply chain. Figure 9 illustrates the typical evolution of prices for the set of products sold by our importer.

**Figure 9:** Prices Along the Supply Chain: Baseline (Pre-Tariffs)




*Notes:* To construct the price levels in the figure, we compute the ratio of price paid and sales price at each stage and cumulatively multiply them to the base price paid to the exporter of $5 per bottle for the example product. I.e. we compute the ratio of importer sales price (pooling all distributors-months) to foreign producer price (pooling all months). The ratio of distributor sales price (pooling distributors-months) to importer sales price (pooling all distributors-months). Finally, the ratio of retail prices (pooling all retailers-months) to the distributor sales price (pooling all distributor-months). Finally, gross markups are computed based on pre-tariff months only. Average gross markups are weighted with total product quantities imported in the pre-tariff period. Results are similar if we restrict to have a common sample of product-vintages that we observe in all stages.
*Source:* Authors' calculations based on data from the Liquor Control Division of the State of Connecticut, a U.S. wine importer, and retail price information from Wine-Searcher.

Consider an example product for which the importer pays the foreign supplier $5 per bottle. The importer pays more to bring the product into the U.S. once tariffs, transport costs, and excise taxes are included. The majority of such costs are additive. Specifically, the pre-2019 tariffs were a specific tariff of 6.7 cents per liter, transport costs were 21 cents per bottle, federal excise taxes were

22 cents per bottle, and storage costs averaged between 25 and 56 cents per bottle.[19] Combining transport costs, storage costs, and excise taxes, these other variable handling costs—beyond the cost of the wine itself—could account for around 20 percent of total variable costs. Other costs, such as labor, equipment, and buildings, are best characterized as fixed overhead costs.

To document how prices increase along the chain, we calculate the sales price to price paid for each product-vintage of wine sold. We then take the averages across all products. Specifically, we compute the average ratio of importer sales price to importer purchase price, distributor sales price to importer sales price, and retail sales price to distributor sales price. For this computation, we restrict the sample to the year prior to the tariffs, calculate averages weighted by import quantities, and pool across months and distributors/retailers.

Using the calculation above of the weighted average relative (pre-tariff) prices, the wine price charged to the distributor is about $9 per bottle, reflecting a gross markup (inclusive of other variable costs) of about 80 percent relative to the exporter's price. Using Connecticut price posting data, we observe that retailers pay distributors about $16 per bottle, reflecting an additional gross markup of 75 percent. Finally, using online retail price data, we find that consumers pay about $23 per bottle, after a further 50 percent markup from the distribution stage.[20] However, for the analysis of tariff pass-through, it is important to keep in mind that tariffs are charged only on the price paid to foreign exporters—about one-quarter of the final price that retailers charge consumers.

We next discuss the internal and external validity of the numbers shown here. The U.S. Census Annual Retail Trade Survey and the U.S. Census Annual Wholesale Report for 2019 show a gross margin as a percentage of sales of around 30 percent for the beer, wine, and liquor industry, for both retailers and wholesalers.[21] Our estimated gross margins as a percentage of sales are somewhat higher for wine distributors and the importer, at around 45 percent each, and near 35 percent for wine retailers. These reports also indicate that the margins of the retail and wholesale wine industries are not exceptional. Retail margins are quite similar to those of electronics and appliance stores, general merchandise stores, and health and personal care stores. Wholesale margins are comparable, for example, to those in apparel, hardware and plumbing, and machinery and equipment.

### *C Tariff Pass-Through Estimates Along the Chain*

**Pass-Through at the Border**

We now turn to estimates of tariff pass-through at each stage of the supply chain. Reflecting recent evidence in Flaaen, Hortaçsu and Tintelnot (2020), which shows that tariff costs were spread across both tariffed goods (washers) and non-tariffed goods (dryers), we take a cautious approach

[19] We observe transport costs at the shipment level; hence, per-bottle transport costs are calculated as the quantity-weighted share of the total transport costs of a given shipment. According to our importer, storage costs in the industry range from $0.75 to $1.50 per case per month. We estimate that products are stored for roughly four months on average after arrival in port before being sold to distributors. Additionally, state excise taxes in non-control states range between $0.05 and $0.50 depending on the state. This tax is usually levied on the importer or distributor, depending on which one handles the product first in each state.

[20] Alvarez-Blaser et al. (2025) find that manufacturer and retail markups are negatively correlated across products in the cross section. In our setting, we do not observe the foreign producers' markups. Looking at a later stage in the chain, we do find that the gross markups of the importer and the combined gross markups of the distributor and retailer are uncorrelated (weakly positively correlated when weighting products by sales quantity).

[21] For the purposes of the survey, both importers and distributors are included in the wholesale category. Data from the Retail Trade Survey can be found here. Data from the Wholesale Report can be found here.

in constructing the control group for this study. Specifically, we define the control group as the sample of products sold by foreign producers that *only* sell products unaffected by tariffs (sparkling wines and still wines with an ABV >14%). We then classify as *indirectly treated* those non-tariffed products from producers that also sell tariffed products. Naturally, our main treatment group consists of wines subject to the new tariffs (still wines with an ABV ≤14%). Treatment status is defined based on ABV during the tariff period.[22] Based on these criteria, 63% of all purchases fall into the treatment group, 21% into the control group, and 16% into the indirectly treated group.

We thus follow an event study approach to estimating tariff pass-through described in equation (1) in which our unit of observation is the purchase of wine product $i$ in month $t$ from various foreign producers to the U.S. importer from which we obtain data. $T$ represents the month when tariffs were imposed and $\omega_t$ and $\delta_i$ represent month and product fixed effects, respectively. We cluster standard errors at the product level, and we apply weights corresponding to the total quantity purchased before tariffs were imposed. The event-study regression differences-out any exchange rate effects as they are common to our treated and control groups.

$$\begin{aligned} \log(\text{Purchase price per bottle})_{it} = & \sum_{t \neq T-3} \alpha_1^t \, \text{Month}_t \times \text{Below 14\% ABV}_i \\ & + \sum_{t \neq T-3} \alpha_2^t \, \text{Month}_t \times \text{Indirect treatment}_i \\ & + \omega_t + \delta_i + \varepsilon_{it} \end{aligned} \tag{1}$$

Panel A of Figure 10 shows that the purchase price paid by the U.S wine importer started to fall three months after tariffs took effect, and remained low relative to the control group for nearly eight months after the tariffs expired. A difference-in-differences regression finds an average price decline of 5.2% (S.E. = 1.0%) for tariff-affected wines relative to the control group of products.[23] Panel B of Figure 10 also shows a price decrease for the indirectly treated products—an average difference-in-differences coefficient of -4.1% (S.E. = 0.8%). This suggests that the importer and exporter negotiated prices for the entire bundle of products, not just those that were tariffed.

The total quantities of tariffed wines purchased by this importer dropped by 19% between the pre-tariff and tariff periods, relative to the control group. This decline in quantities is driven by a differential response in the intensive margin, as the growth in the total number of products purchased by the importer is similar across our three product group categories over the sample period.[24]

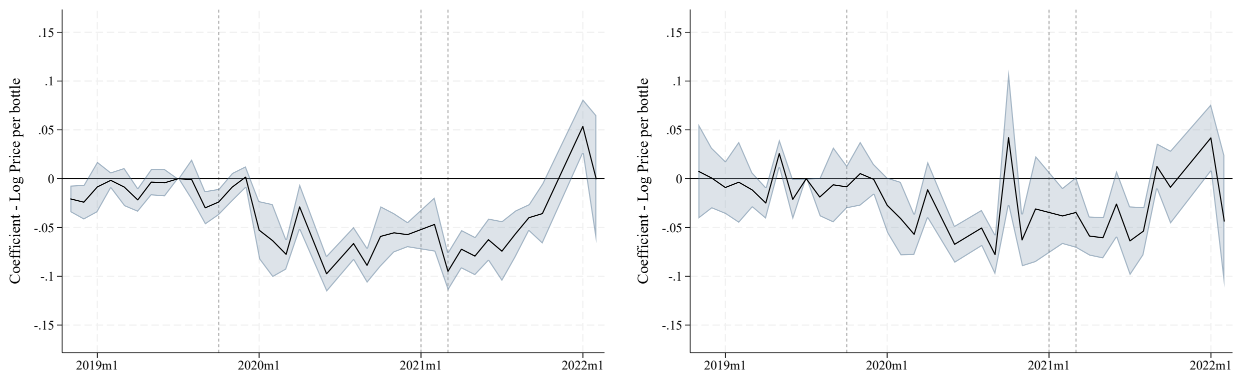
[22] In cases where a product crossed the 14% threshold during the tariff period—which was very rare in our transaction-level data—we defined treatment status according to the ABV classification with the larger import volume during that period.

[23] This number comes from the difference-in-differences regression in which we categorize the months into four groups based on the event-study plot. We have the base period (Oct. 2018–Sep. 2019); a delay period (Oct. 2019–Dec. 2019); the treatment period (Jan. 2020–Feb. 2021); and a post-treatment period (Mar. 2021–Mar. 2022). See Table D1 for detailed regression results.

[24] We explore the possibility of quantity discounts at the shipment level for both purchases and sales of the importer in Appendix D.1. In general, we do not find any evidence for quantity discounts at the wine-shipment level.

**Figure 10:** Event-Study Regression of Tariff Pass-Through: Importer Purchase Price

**Panel A.** Tariffed Products **Panel B.** Indirectly Treated Products




*Notes:* The figure shows the results of the event study regression in equation 1. The control group consists of products that were not tariffed (sparkling or still wines >14%) that were sold by producers that did not sell tariffed products to the importer. The indirectly treated products are non-tariffed products sold by producers that also sold tariffed products to the importer. We omit the period three months before tariffs were imposed. 90% confidence intervals computed from standard errors clustered at the product level. The sample is weighted by the total quantities purchased of a product in the period before the tariffs were imposed. Because imports are lumpy, we are forced to drop a few months from our sample due to insufficient data to jointly observing imports of the two treatment groups and the control group: Oct. 2018, May and July 2020, Nov. and Dec. 2021, and Mar. 2022.
*Source:* Authors' calculations based on data from a U.S. wine importer.

### Pass-Through to Distributors

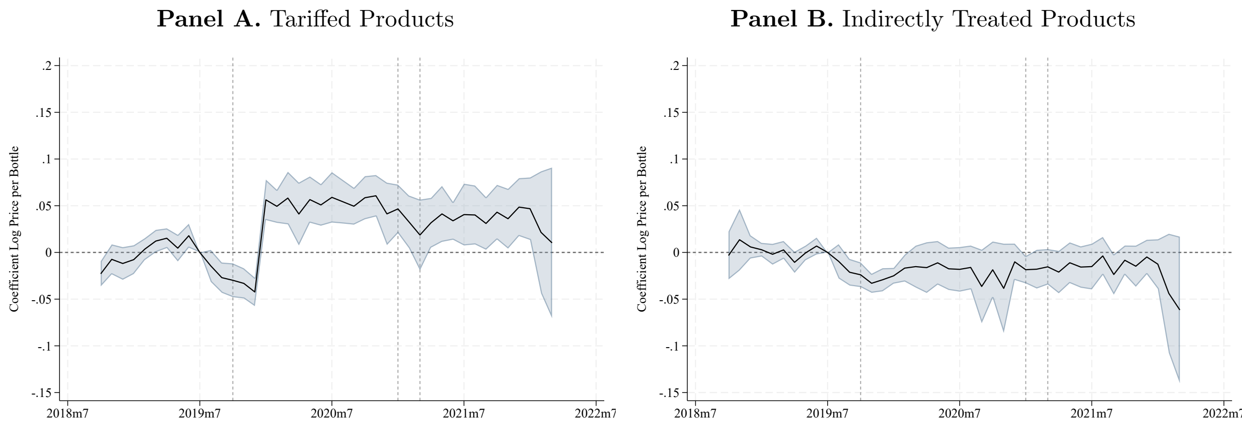
We now move on to a second stage in the impacts of tariffs on prices through the supply chain: the sales price of wine products from the importer to U.S. distributors. We use the same event-study approach as in Section V but replace the left-hand side variable with the sales price of product $i$ to distributor $j$ in period $t$. Moreover, equation (2) now includes distributor fixed effects ($\phi_j$) along with time and product fixed effects. We continue to weight the regression by the total quantity sold of a product (to a distributor) in the pre-tariff period, and cluster standard errors at the product level.

$$\begin{aligned}\log(\text{Sales price per bottle})_{ijt} = &\sum_{t\neq T-3} \beta_1^t \,\text{Month}_t \times \text{Below 14\% ABV}_i \\ &+ \sum_{t\neq T-3} \beta_2^t \,\text{Month}_t \times \text{Indirect treatment}_i \\ &+\eta_t + \varphi_i + \phi_j + \epsilon_{ijt}\end{aligned} \tag{2}$$

Panel A of Figure 11 documents, similar to the pass-through at the border, a price increase three months after the tariff took effect. The difference-in-differences regression has a coefficient of 5.4% (S.E. = 1.4%) of tariffed wine products relative to the control group. We see some lasting effect of the increase in price for roughly a year after tariffs expire, coming down close to the end of our sample data.[25] Panel B of Figure 11 shows no evidence of price effects on indirectly treated products.

[25]Our results remain robust when we exclude products with ABV between 14 and 16 percent from the control group. The remaining still wines of higher alcohol are predominantly Port and Sherry.

**Figure 11:** Event-Study Regression of Tariff Pass-Through: Sales Price to Distributors




*Notes:* The figure shows the results of the event study regression in equation 2. The control group consists of products that were not tariffed (sparkling or wines >14%) that were sold by producers that did not sell tariffed products to the importer. The indirectly treated products are non-tariffed products sold by producers that also sold tariffed products to the importer. We omit the period three months before tariffs were imposed. 90% confidence intervals computed from standard errors clustered at the product level. The sample is weighted by the total quantities sold of a product to a distributor in the period before the tariffs were imposed.
*Source:* Authors' calculations based on data from a U.S wine importer.

Sales quantities of tariffed wines fell by 12.7% between the pre-tariff and tariff periods, relative to the control group. Since the decline in sales is smaller than the decline in purchases, it indicates a relative decline in inventories for tariffed wines compared to the control group. Changes in the number of products sold were very similar between tariffed products and the other categories, indicating that the sales reduction was driven by a differential response in the intensive margin.

We explore two dimensions of heterogeneity in pass-through. First, we use the data to assess whether the fixed shelf–cost mechanism in our stylized model can account for the imperfect pass-through from the importer to distributors. A key testable prediction of the model is that products that provide higher profits are less likely to face a binding participation constraint. Consequently, such products should exhibit higher pass-through. Panel A in Appendix Figure D3 confirms this pattern: products that generated larger profits to the importer prior to the tariffs display higher pass-through rates.

Second, we explore heterogeneity in pass-through depending on the initial price of the wine. One potential source of heterogeneity could be that the importer faces handling costs such as transportation and storage, which are arguably more additive in nature rather than scaling multiplicatively with the value of the wine. If these costs were sizable, we would expect to see lower pass-through for cheaper wines, since these additive costs would represent a larger share of total costs. However, Panel B in Appendix Figure D3 suggests that this is not the case. If anything, pass-through appears to be somewhat higher for lower-priced wines. This finding suggests that the magnitude of other additive costs is not very large.

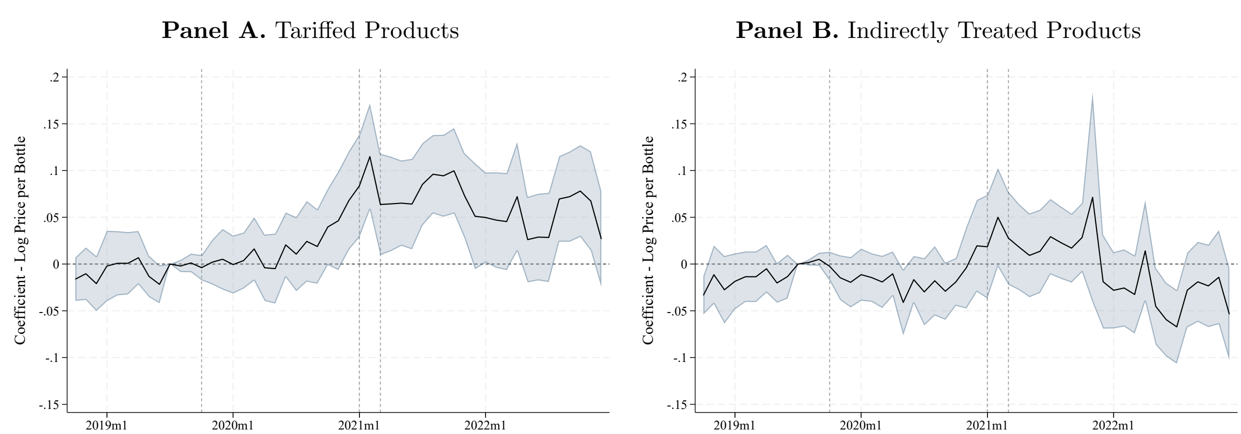
### Pass-Through to Consumers

We turn finally to the end stage of prices affected by these wine tariffs as the product is sold from retailers to consumers. This stage merits particular emphasis as these are the price changes both experienced by the consumer and also incorporated into estimates of inflation tracked carefully by policymakers. The underlying price data for this analysis no longer comes directly from the importer, but nevertheless we focus on the same set of wine products and vintages. The regression specification is similar to the above, but we modify our fixed effects to include month and product-by-retailer fixed effects, reflecting the fact that we have different retail locations for a given bottle of wine.

Panel A of Figure 12 exhibits a price increase to consumers which took a full 12 months to materialize after tariffs took effect. Our difference-in-differences estimate has a coefficient of 6.9% (S.E. = 2.4%) of tariffed wine relative to the control group.[26] The longer lag of price effect at this stage could reflect the additional time that the product spends in transit and in inventory at the distributor and subsequently the retailer. Prices remain high more or less through the remainder of our sample after tariffs expire (essentially through the end of 2022). The indirectly affected wines (Panel B) do not exhibit any significant price increases.

The evidence we provide on the lag between tariffs imposed and their impacts on consumer prices is useful for policymakers evaluating the inflationary effects of tariff increases. The timing of such lags may depend on inventory management practices and on the typical duration of price spells at each stage of the distribution chain. In Appendix D.4, we show that price spells decline along the distribution chain: the median price spell is 14 months for importer purchases, 11 months for importer sales to distributors, and only 5 months for retailer prices.[27] Given the substantial price spells at each stage of distribution, some tariff impacts may have been absorbed into the normal cycle of price adjustments rather than prompting immediate repricing, contributing to the delayed response of retail prices to tariff changes.

**Figure 12:** Event-Study of Retail Sales Price




*Notes:* The figure shows the results of the event study regression in equation 2. The control group consists of products that were not tariffed (sparkling or wines >14%) that were sold by producers that did not sell tariffed products to the importer. The indirectly treated products are non-tariffed products sold by producers that also sold tariffed products to the importer. We omit the period three months before tariffs were imposed. The 90% confidence intervals are computed from standard errors clustered at the product level.
*Source:* Authors' calculations based on data from a U.S wine importer and retail price information from Wine-Searcher.

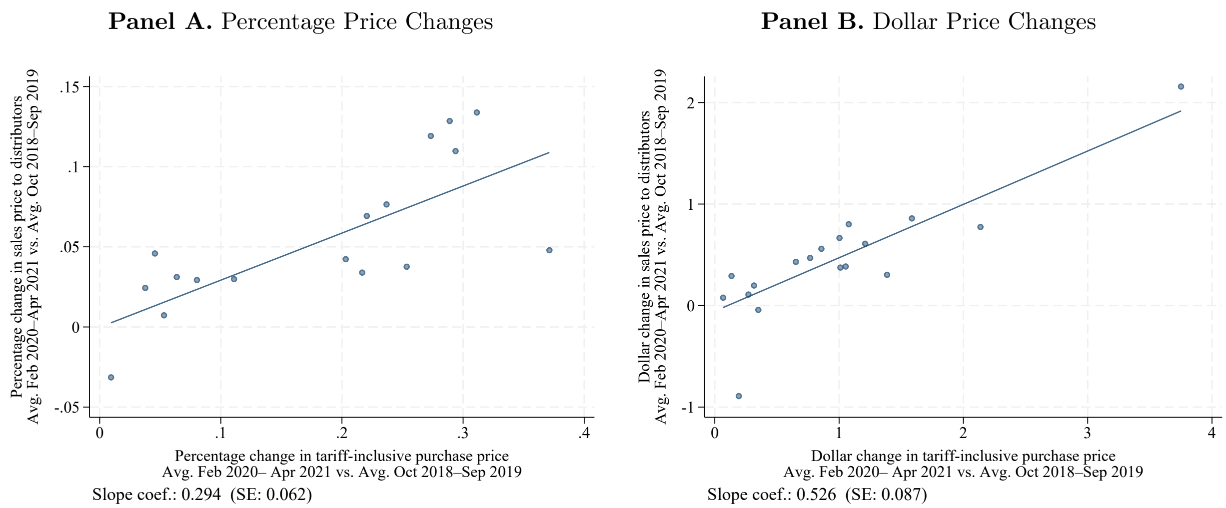
[26]The periods used in the difference-in-differences estimate at this stage are the following: the base period (Oct. 2018–Sep. 2019); a delay period (Oct. 2019–Oct. 2020); the treatment period (Nov. 2020–Oct. 2022); and a post-treatment period (Nov. 2022–Dec. 2022). See Table D1 for detailed regression results.

[27]These patterns qualitatively align with Alvarez-Blaser et al. (2025) who find that during the Covid pandemic there was a quicker reaction to cost shocks at the retailer level than at the manufacturer level.

### Corroboration of Pass-Through Along the Chain

The results thus far suggest that the price changes resulting from tariffs pass along the stages of the supply chain, and ultimately to the final consumer. To reinforce that this is indeed the case, rather than a coincidence of price changes at each stage driven by different factors, we exploit the product-level detail of our data and consider the correlation of these product-level price changes across stages. The binscatter in Figure 13 shows a strong positive correlation between the change in tariff-inclusive purchase prices of the importer (x-axis) and the change in importer sales price (y-axis). Panel A demonstrates this relationship on a percent basis, while Panel B indicates the correlation is even stronger on a dollar basis. The estimated slope coefficients indicate imperfect pass-through from the importer to the distributor both in percent and in levels.

**Figure 13:** Binscatter of Correlation Between Changes in Tariff-Inclusive Purchase Prices and Changes in Importer Sales Prices to Distributors



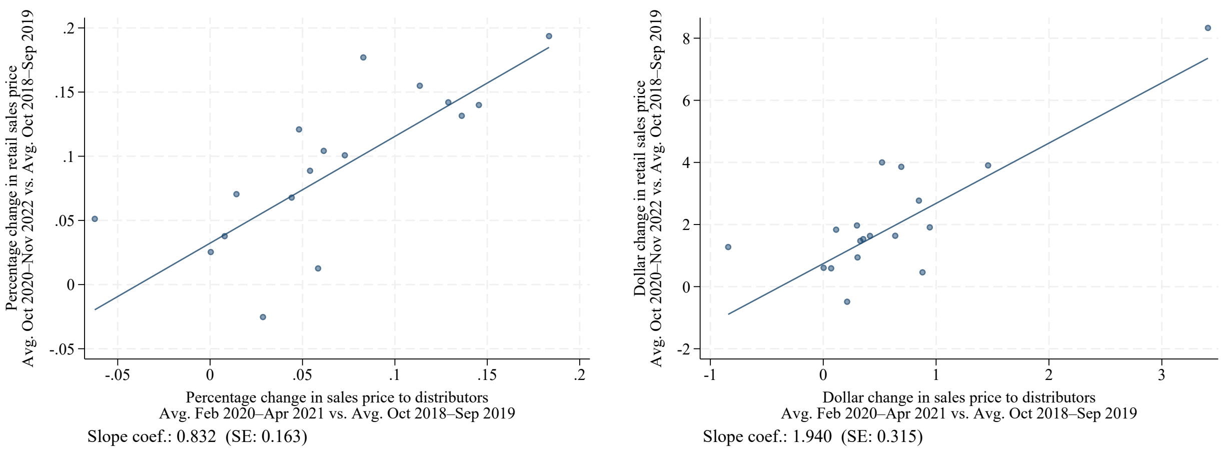

*Notes:* The binscatter includes all products and is weighted by the total quantity of purchased products in the pre-tariff period. To calculate the change in prices we first compute the average price for each product in the periods displayed in the figure axis'. Slope coefficient and robust standard error displayed below the figure.
*Source:* Authors' calculations based on data from a U.S wine importer.

Further along the chain, Figure 14 shows a strong positive correlation between the price changes from importer to distributor (x-axis) and the price changes from retailer to consumer (y-axis). Panel A considers percentage price changes and evidences a correlation with slope coefficient that is not statistically different from 1, consistent with the estimates of full pass-through from distributors/retailers to consumers in percentages. Examining dollar price changes, the slope coefficienty of 1.94 in Panel B indicates the more than full pass-through in levels. All told, these results reinforce the interpretation of this section as showing pass-through of tariffs into prices along the supply chain.

We also run a version of our event study at each stage of the supply chain restricting to a balanced sample of products. The results are remarkably similar in this balanced sample. In particular, at the border we estimate a price reduction of 5.1% (S.E. 1.0%). For sales to distributors, we find a price increase of 5.4% (S.E. 1.4%) in the balanced sample. Finally, at retail, we estimate a 6.9% (S.E. 2.4%) price increase to consumers. Our balanced-sample estimates are close to the full-sample estimates since we are able to match most products across the three stages, especially as a share of quantities sold by the importer.

**Figure 14:** Binscatter of Correlation Between Changes in Importer Sales Price to Distributors and Changes in Price at Retail

**Panel A.** Percentage Price Changes **Panel B.** Dollar Price Changes




*Notes:* This figure includes all products matched between the importer and Wine-Searcher. The binscatter is weighted by the total quantity of products sold in the pre-tariff period. To calculate the change in prices we first compute the average price for each product in the periods displayed in the figure axis'. The slope coefficient and robust standard error are displayed below the figure.
*Source:* Authors' calculations based on data from a U.S wine importer and retail price information from Wine-Searcher.

### Summarizing Tariff Impacts Along the Chain

The results in this section trace out the price effects of the 2019 wine tariffs across all U.S. stages of the supply chain from importer to final consumer. Linking these impacts together allows for a unique perspective on the interplay between tariffs, markups and the ultimate impact on consumer prices.

Panels A and B of Figure 15 visualize the results of this section, building on the example product in Figure 9, for which the importer paid \$5 to the exporter before the tariff. Panel A describes the changes impacting the domestic importer. While the foreign producer reduced the price they received by an average of 5.2% (\$0.26 per bottle), this is only a fraction (22%) of the resulting tariff liability: $\$5 \times (1 - 0.052) \times 0.25 = \$1.19$ per bottle, or a net tariff of 23.7% on the initial price. The roughly 19% increase in costs (\$0.93 per bottle) is also partially offset by the 5.4% (\$0.49 per bottle) increase the importer passed on to the distributor. The result is that the initial 64% (\$3.52) markup (i.e. the gross markup net of import shipping costs, excise taxes, storage, and tariffs) of the importer declined to 48% (\$3.08) after the new tariffs are imposed. Hence, in dollar terms the importer markup declined by \$0.44 per bottle. The impacts to the foreign producer and U.S. importer are summarized, on a per-bottle basis, in the blue and red bars in Panel C of Figure 15.

Panel B illustrates the impact to the combined gross markups of the distributor and retailer. The 5.4% increase in costs (or \$0.49 per bottle) paid by the distributor passes through into what the retailer eventually sold to the consumer—a 6.9% increase in price or \$1.59 per bottle. Hence, the gross markup of the combined distributor and retailer actually expanded by $1.10 per bottle following the tariff. These impacts are summarized in the purple and orange bars in Panel C of Figure 15. But what is particularly notable from Panel C is that our point estimates indicate that the dollar increase in consumer costs resulting from the tariffs ($1.59 per bottle) is actually *higher* than the tariff revenue ($1.19 per bottle). Hence, tariff revenue for this particular tariff event was more than fully offset by increases in consumer prices. Our point estimates suggest that the ratio of consumer price increase to tariff collected was 134%. Considering the estimation uncertainty along multiple stages, we can say with 90% confidence that the consumer dollar cost per dollar of tariff revenue exceeds 68%.[28]

We also analyze tariff pass-through along the chain by estimating the same differences-in-differences regressions but with prices in levels instead of logs. The resulting estimates (see Appendix Table D2) imply very similar tariff impacts in dollars to our discussion above from Figure 15. If there were a substantial amount of handling costs per bottle at each stage of the intermediation, we would expect the regressions in dollars to depart from our estimates in logs when subsequently multiplied by the average prices.[29]

The results on markup responses to this tariff shock shares similarities and differences with what others find in the literature. Alvarez-Blaser et al. (2025) find a negative correlation between manufacturer and retail markups in their setting; despite being a single cost shock, our results do suggest offsetting markup changes between the foreign producer and U.S. importer and the distributor/retailer. Other recent work studying tariff pass-through in Minton and Somale (2025) assume constant dollar markups in distribution stages following full pass-through at the border, while Barbiero and Stein (2025) explore multiple markup assumptions on the inflation impact of 2025 tariffs. Our results find greater than constant dollar markups, as the cost increase faced by the importer ($0.93) is ultimately much higher ($1.59) by the time it reaches the final consumer. However, the ratio of retail price to border cost (after tariff) has modestly declined.

This discussion emphasizes not only important distinctions between pass-through estimates in percent vs. dollars, but also how those distinctions can be magnified through different stages of the supply chain when the relevant cost shock (such as tariffs) occurs relatively upstream. Table 1 translates the estimates from above into measures of pass-through both in percent and dollar terms in the spirit of Sangani (2025). The numerator of the pass-through rates corresponds to the percent change or dollar change in the price paid by the importer, distributor, and consumer, respectively. The tariff cost to domestic parties depends not only on the applied tariff rate but also on the price reduction by foreign producers. Hence, the denominator contains either the percent tariff rate or the dollar amount of tariffs paid, each adjusted for the terms-of-trade gain, which lowers the price on which tariffs are assessed. Table 1 also provides the formula to calculate pass-through at each stage for both measures.[30]

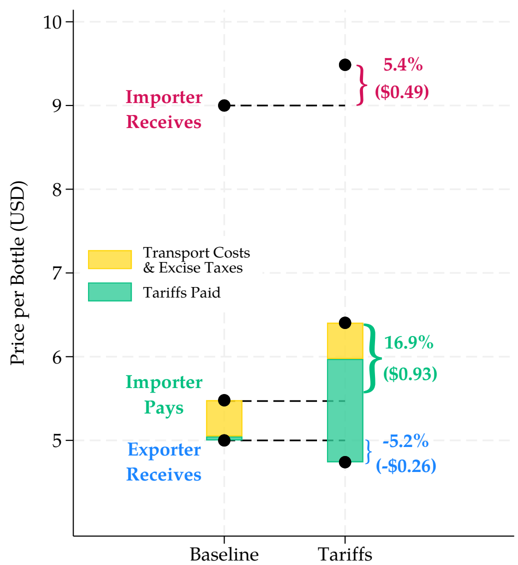
[28] These measures of statistical uncertainty in Figure 15 and Table 1 result from a bootstrap in which we draw products from the importer purchases data (with repetition) and then use those products in regressions for all subsequent stages of the chain. The 68% number is not contained in Table 1 and comes from a one-sided test.

[29] We are grateful to David Atkin for the suggestion.

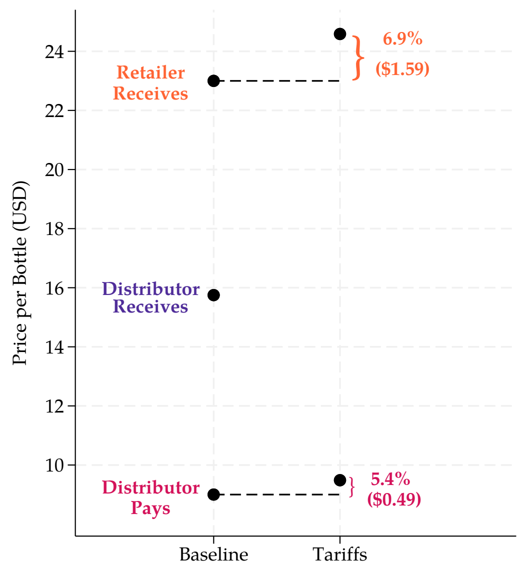
[30] In the Appendix Table D3 we expand on pass-through estimates to be expressed as a fraction of the cost shock experienced at each stage, rather than the initial tariff cost. From those results it is clear that, even as a fraction of the cost shock, neither the percent nor dollar pass-through are constant across stages.

**Figure 15:** Summary of Tariff Effects Along the Supply Chain

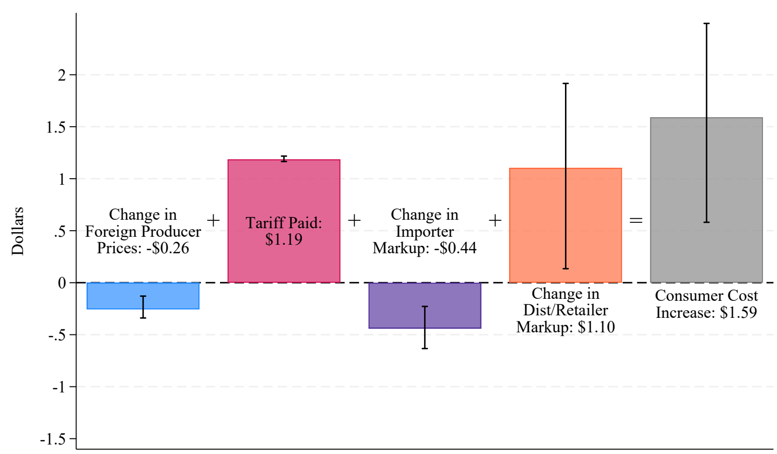
**Panel A.** Foreign Producer and Importer Impact




**Panel B.** Distributor-Retailer and Consumer Impact




**Panel C.** Tariff Cost Along the Supply Chain




*Notes:* This figure visualizes the price changes for a bottle of wine for which the importer paid $5 to the exporter before the imposition of tariffs. The 90% confidence intervals in brackets are computed from a bootstrap with 5000 iterations and clustered at the product level. Each repetition of the bootstrap draws a set of products from the purchases data (with replacement) and uses that sample to estimate the difference-in-differences coefficients in the three stages.
*Source:* Authors' calculations based on data from a U.S wine importer and retail price information from Wine-Searcher.

The main message from Table 1 is that while dollar and percent pass-through estimates are identical at the border (by construction), they diverge with each successive stage in the supply chain. The pass-through rates (in both dollars and percentages) are identical at 78% as the foreign producer absorbed 0.052/0.25 =20.6% of the tariff. Pass-through rates in later stages—from the importer to the distributor, and subsequently from the distributor through the retailer to the consumer—are higher when expressed in dollars than when expressed in percentage terms. Moreover, the gap between these estimates expands markedly at each stage, such that the pass-through to consumer prices appears to be a modest 29% when expressed as a percentage, but rises to 134% when expressed in dollar terms. These results share both similarities and differences with Sangani (2025), who examines pass-through (of non-tariff shocks) at the retail price stage and consistently finds complete pass-through in dollar terms but incomplete pass-through in percentage terms. Our findings point to the combined distributor-retailer stage featuring complete pass-through in percentage terms, whereas the importer stage features incomplete pass-through in both dollars and percentage terms.

**Table 1:** Summary of Pass-Through Estimates Along the Supply Chain

| | **Pass-Through of Tariff Cost** (in percent) | | (in dollars) | |
|---|---|---|---|---|
| Exporter →Importer | 78% [71%,89%] | $\frac{\tau(1+\Delta\%c)+\Delta\%c}{\tau(1+\Delta\%c)}$ | 78% [71%,89%] | $\frac{\tau(1+\Delta\%c)c_0+\Delta c}{\tau(1+\Delta\%c)c_0}$ |
| Importer →Distributor | 23% [14%,35%] | $\frac{\Delta\%w}{\tau(1+\Delta\%c)}$ | 41% [25%,63%] | $\frac{\Delta w}{\tau(1+\Delta\%c)c_0}$ |
| Dist./Retailer →Consumer | 29% [11%,46%] | $\frac{\Delta\%p}{\tau(1+\Delta\%c)}$ | 134% [49%,210%] | $\frac{\Delta p}{\tau(1+\Delta\%c)c_0}$ |

*Notes:* The formula to compute the pass-through measures are provided in gray. In the expressions, $c$ is the foreign producer sales price, $w$ is the importer sales price, and $p$ is the retail sales price. The terms $\Delta\%x \equiv \frac{x_1}{x_0} - 1$ and $\Delta x \equiv x_1 - x_0$ represent the percentage change and the dollar change in variable $x$ between before and after tariffs, respectively. $c_0$ is the foreign producer sales price before tariffs. The percentage change in prices at any stage are directly obtained from our differences-in-differences regressions. The 90% Confidence intervals in brackets are computed from a bootstrap with 5000 iterations and clustered at the product level. Each repetition of the bootstrap draws a set of products from the purchases data (with replacement) and uses that sample to estimate the difference-in-differences coefficients in the three stages.
*Source:* Authors' calculations based on data from a U.S wine importer.

## VI Discussion and Conclusions

By tracing prices of an identical product from exporter to importer, importer to wholesaler, and retailer to consumer, this paper provides the first evidence on how *tariffs* pass through the distribution chain. Using tariffs imposed on European wines in 2019 as a case study, for the central question of "who pays for tariffs", we find that it is possible that domestic consumers fully pay for these costs even when border pass-through is incomplete. The reason is that markups along the chain of intermediation between importer and consumer can scale up the percent pass-through in tariff costs, cumulating over distribution stages and resulting in a direct dollar impact on prices to be greater than tariffs paid, even though the percent change in consumer price is less than the tariff ad-valorem rate.

While our results pertain to one particular product in a specific tariff episode, the critical feature of markups is prevalent in the overall economy. The overall weighted average markup (from producer value to purchaser value) across goods categories according to data from the Bureau of Economic Analysis is 111 percent (see Appendix B.1). These statistics pertain to domestically produced goods, and hence the gross markups pertaining to imported goods may be larger because of an additional stage and additional costs (i.e. transport costs). Finally, we show in Appendix Table B1 that the estimated BEA markups for wines are only slightly above this weighted average, and comparable to many other consumer goods categories that have been the subject of tariff discussions in recent years.

These results are also helpful for understanding the full incidence of the tariffs introduced in 2025 and how that incidence could ultimately translate into effects on inflation, disposable personal income, and profits. For example, suppose that the border pass-through of tariffs was complete. Given a tariff rate increase of around 16 percentage points (thus far through September 2025) and a prevailing set of gross markups affecting PCE goods of 111%, then markups could decline 15 percentage points (13.7 percent) even while the consumer dollar cost increases of the associated imported goods would still fully cover increased tariff revenue (dollar pass-through equal to one).[31] In this scenario, the percent pass-through of tariffs to consumer prices would be only 48 percent (the inverse of the markup).[32] Other scenarios could consider alternative assumptions on border pass-through or changes in distribution markups.

This paper has several additional findings useful for policymakers studying the measurement of tariff pass-through, many of which result from the use of confidential data from a large U.S. wine importer. First, we find that aggregate customs data is ill-suited to measure pass-through at the border in the setting of 2019 tariffs on wine because of strong compositional changes induced by the tariffs. In an example of tariff engineering, products switched their alcohol content to avoid the tariffs, and new products were introduced that were not subject to the tariffs.

Second, we trace the pass-through of the tariffs along the supply chain from the foreign producer to the final consumer, unpacking how prices and markups adjust to this cost shock along multiple stages. We find that foreign producers partially absorb the tariff by lowering their prices, leading to incomplete pass-through at the border. In the next stage, domestic importers only pass about a 5% price increase to their distributors, resulting in a contraction in their markups relative to before the tariffs. Finally, markups actually expand between distributors and final consumers: despite an additional stage of markups, prices increase to the consumer by close to 7 percent relative to before tariffs were imposed. Despite a significantly smaller percent increase in prices than the percent applied in new tariffs, multiple markups resulted in the dollar increase in what consumers paid ($1.59 per bottle, in our example) that was ultimately greater than the increase in tariff revenue ($1.19 per bottle).

Finally, we document important features of the timing between when tariffs are imposed, and when these price changes occur along the supply chain. For the case of tariffs on European wines, price impacts to the consumer didn't materialize until 12 months after tariffs were imposed, re-

[31] One can obtain this markup by solving the following equation: $\tau = \mu_1(1+\tau) - \mu_0$ with the assumption of no border pass-through ($c_1 = c_0$). Where $\mu_0$ is the initial markup – 110% in this scenario.

[32] The percent pass-through when there is no border pass-through is determined by the following equation $\frac{\mu_1(1+\tau)c_1 - \mu_0 c_0}{\mu_0 c_0 \times \tau} = \frac{1}{\mu_0}$.

flecting the role of inventories and multiple stages of trade intermediation.[33] Additional research on inventory behavior, the stages and timing of domestic production and distribution chains, and markup behavior would benefit our overall understanding of the impacts of future tariffs on domestic economies.

[33] See Minton and Wheaton (2023) for more ways in which lags can be introduced between cost shocks and consumer prices.

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# Who Pays for Tariffs Along the Supply Chain? Evidence from European Wine Tariffs

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Daniel Yi Xu

## Online Appendix

# A Model Details

## A.1 Baseline Model

In this section, we provide the mathematical derivations and additional details of the model described in Section II. In the model, there are four types of agents: consumers, retailers, importers, and foreign suppliers. For simplicity, we abstract from the additional layer of distributors.

### Final Demand

A continuum of consumers have CES preferences for wines. This results in the following iso-elastic demand function:

$$q(p) = Dp^{-\sigma} \quad , \sigma > 1 \tag{A1}$$

### Retailer Problem

The retailer purchases the wine from an importer at price $w$ and sells it to consumers at price $p$. In addition to the marginal cost $w$, the retailer faces a fixed shelf cost $F$ for carrying the wine. The retailer operates under monopolistic competition. Therefore, the retailer's profit maximization problem is given by equation A2. If the variable profits of the retailer are not sufficient to cover the fixed cost $F$, the retailer will not carry the wine.

$$\max_p \Pi_r(p;w) = \begin{cases} (p-w)Dp^{-\sigma} - F & \text{if} \quad \max_p (p-w)Dp^{-\sigma} \geq F \\ 0 \quad \text{if} \quad \max_p (p-w)Dp^{-\sigma} < F \end{cases} \tag{A2}$$

The retailer's pricing rule is given by the standard CES constant markup rule and the quantity demanded by the retailer from the importer are shown in equations A3.

$$\begin{aligned} p(w) &= \mu w \qquad \text{where} \quad \mu \equiv \frac{\sigma}{\sigma - 1} \\ q_r(w) &= D(\mu w)^{-\sigma} \end{aligned} \tag{A3}$$

With these, we can determine the retailer's participation constraint in terms of the wholesale price $w$ that requires variable profits to be weakly above the fixed cost $F$. This condition is given by equation A4, where $B \equiv D\frac{(\sigma-1)^{\sigma-1}}{\sigma^{\sigma}}$.

$$\Pi_r(w)^{\text{var}} = (\mu - 1)w \cdot q_r(w) = Bw^{1-\sigma} \geq F \tag{A4}$$

Then, we can define the maximum wholesale price, $w^{max}$, that the retailer is able to pay to carry the wine, given the participation constraint. The maximum wholesale price is given by equation A5. Therefore, we say that if $w < w^{max}$ the participation constraint (PC) is slack or non-binding, and if $w = w^{max}$ the PC is binding.

$$w^{max} = \left(\frac{B}{F}\right)^{\frac{1}{\sigma-1}} \tag{A5}$$

**Importer Problem**

The importer purchases the wine from a foreign supplier at a price $c$ and sells it to the retailer at a price $w$. It must also pay for the tariff with rate $\tau$. The importer operates under monopolistic competition when setting the price and takes the foreign price $c$ as given (we relax this second assumption in a later subsection). First, consider the case where the retailer's PC is non-binding. In this case, the importer's profit maximization problem is given by equation A6.

$$\max_{w} \ \Pi_i(w; c, \tau)^{\text{int}} = (w - (1+\tau)c)D(\mu w)^{-\sigma} \tag{A6}$$

The importer's pricing rule will be the standard CES markup over marginal cost rule: $w^{int} = \mu \cdot (1+\tau)c$.

In case that $w^{int} > w^{max}$ –the retailer's PC is binding– then the importer is forced to set $w = w^{max}$. The importer's optimal pricing rule is given by equation A7. The first case corresponds to the interior pricing solution, as the PC is non-binding. The second case corresponds to the situation where the PC is binding, but the importer can still make non-negative profits. The third case corresponds to the situation where the PC is binding and the importer cannot make non-negative profits, in which case the importer will not import the wine.

$$w(c) = \begin{cases} \mu \cdot (1+\tau)c & \text{if} \quad \mu \cdot (1+\tau)c \leq w^{max} \\ w^{max} & \text{if} \quad \mu \cdot (1+\tau)c > w^{max} \text{ and } w^{max} \geq (1+\tau)c \\ \text{N/A} & \text{if} \quad \mu \cdot (1+\tau)c > w^{max} \text{ and } w^{max} < (1+\tau)c \end{cases} \tag{A7}$$

The optimal quantity demanded by the importer is thus given by equation

$$q(c) = \begin{cases} D\mu^{-2\sigma} \cdot ((1+\tau)c)^{-\sigma} & \text{if} \quad \mu \cdot (1+\tau)c \leq w^{max} \\ D\mu^{-\sigma} \cdot (w^{max})^{-\sigma} & \text{if} \quad \mu \cdot (1+\tau)c > w^{max} \text{ and } w^{max} \geq (1+\tau)c \\ 0 & \text{if} \quad w^{max} < (1+\tau)c \end{cases} \tag{A8}$$

**Foreign Producer**

Based on the evidence that European wines are mostly sold in other markets outside of the

U.S. (see Table B2), we assume that foreign producers have an upward-sloping supply curve when selling to the U.S. market. The foreign producer has a supply curve given by equation A9, where $K > 0$ and $\eta > 1$, and operates in a perfectly competitive market. We abstract from the foreign producer facing fixed costs of production and hence from incentives for the foreign producer to stop exporting altogether to the U.S.

$$c(q) = Kq^{\eta} \tag{A9}$$

**Pre-Tariff Equilibrium**

We focus on a case in which prior to the imposition of tariffs, the PC is slack and it is profitable for the importer to sell the wine. The equilibrium in this model, which is summarized in Panel A of Figure 1, is determined by the exporter sales price, $c_0$, such that A10 holds. We use the 0 subscript to denote pre-tariff outcomes.

$$c_0 = K\left[D\mu^{-2\sigma} \cdot (c_0)^{-\sigma}\right]^{\eta} \tag{A10}$$

Then, from the equilibrium quantity imported –given by $q_0 \equiv q(c_0)$– we can trace the equilibrium prices set by the importer to retailers and by the retailer to consumers. These are given, respectively, by $w_0 = \mu \cdot c_0$ and $p_0 = \mu^2 \cdot c_0$.

**Post-Tariff Equilibrium**

In the post-tariff equilibrium we may have either an interior solution or the retailer's PC binding. First, consider the results when we are still under an interior solution, which is captured in Panel B of Figure 1. The tariff creates a wedge between the producer's supply and the importer's marginal revenue. Due to the upward-sloping supply curve and downward-sloping demand, both the foreign producer receives a lower price, while the importer pays a higher (tariff-inclusive) price. The new equilibrium quantities are given by $q_1 = q_0 \cdot (1+\tau)^{\frac{-\sigma}{1+\sigma\eta}}$. Where we use the 1 subscript to denote the post-tariff equilibrium when the PC is slack. This determines the price the foreign producer perceives, $c_1 = c_0 \cdot (1+\tau)^{\frac{-\sigma\eta}{1+\sigma\eta}}$, and the tariff-inclusive (TI) price paid by the importer, $c_{1,TI} = c_1(1+\tau) < c_0(1+\tau)$. Meanwhile, the rest of the prices along the chain are given by $w_1 = (1+\tau)\mu \cdot c_1$, and $p_1 = (1+\tau)\mu^2 \cdot c_1$.

Despite the retailer's PC being non-binding, there is generally no full pass-through of tariff on consumer prices. This occurs because the exporter reduces its sales price to the importer. Meanwhile, both the importer and the retailer preserve their original gross markups and therefore consumers are likely to face significant price increases. The percentage change in the tariff-inclusive price paid by the importer is given by equation A11. For the rest of the chain we have full pass-through as $\Delta\%w_1 = \Delta\%p_1 = \Delta\%c_{1,TI}$. Note that in the special cases in which $\sigma \to \infty$ there is zero pass-through at the border, and therefore, the foreign producer absorbs all the cost. Additionally, if $\eta = 0$ we have full pass-through at the border and thus full pass-through at retail prices.

$$\Delta\%c_{1,TI} \equiv \frac{c_1(1+\tau) - c_0}{c_0} \cdot 100\% = \left([1+\tau]^{\frac{1}{1+\sigma\eta}} - 1\right) \cdot 100\% \leq \tau \cdot 100\% \tag{A11}$$

So far, the model cannot explain why there is imperfect pass-through from the importer to the distributor but full pass-through from the distributor/retailer to consumers. For this purpose, now consider the case where the tariff shock is large enough so that $\mu \cdot (1+\tau)c_1 > w^{max}$ (i.e. the PC of the retailer is binding).

The equilibrium quantity will be given by $q_2 = D\mu^{-\sigma} \times (w_{max})^{-\sigma} > q_1$ (and $q_2 < q_0$). Therefore, the price perceived by the importer will equal $c_2 = K\,(q_2)^{\eta}$, and hence the price paid by the importer is $c_{2,TI} = c_2(1+\tau) > c_1(1+\tau)$. Because the importer is forced to cap the price at which it sells the wine to the retailer, it will necessarily shrink its gross markup.

We now turn to determine the amount of pass-through at each stage of the supply chain. First, at the border, as total quantities are lower than in the initial equilibrium, but higher than in situation with non-binding PC, we have that the foreign producers take a smaller cut in prices: $|\Delta\%c_2| < |\Delta\%c_1|$. Then it follows directly that the importer is paying a higher tariff-inclusive price than in the non-binding PC equilibrium: $\Delta\%c_{1,TI} < \Delta\%c_{2,TI}$. Further along the chain, the importer is now having its gross markup reduced as there is a limit in the price it can set for the retailer: $\Delta\%w_2 < \Delta\%w_1$. However, note that the retailer has the same pricing rule and therefore passes along the entire cost increase it faces: $\Delta\%p_2 = \Delta\%w_2$ (even though it is a smaller increase than in the non-binding scenario, $\Delta\%p_1$).

**Do Consumers Pay More than the Tariff Collected?**

We are interested in determining the conditions under which consumers pay for at least the dollar amount collected in tariff revenue. First, consider the case where the PC is slack. It is clear that consumers will pay for the total amount of the tariffs if there is full pass-through at the border (i.e. there are no terms of trade effects). However, if the foreign producers absorb part of the tariffs it is ambiguous whether consumers pay the full amount of the tariff revenue collected. Mathematically, we are interested in characterizing the conditions under which $p_1 - p_0 > c_1\tau$. From the equilibrium prices derived above, this result depends on whether equation A12 holds. The expression has some interpretation: consumer prices increase more than the tariff paid in the case in which the tariff-inclusive percentage change in purchase price (term in brackets), once amplified by the two markup layers, is greater than the net tariff based on the initial price. The net tariff based on the initial price is equivalent to the initial tariff rate times the border pass-through (i.e. 1- the share of the tariff absorbed by the foreign producer). Note that as the tariff rate increases or the supply elasticity decreases, it becomes more likely for consumers to pay more than the tariff revenue collected.

$$p_1 - p_0 > c_1\tau \iff \mu^2\left[(1+\tau)^{\frac{1}{1+\sigma\eta}} - 1\right] > \tau(1+\tau)^{\frac{-\sigma\eta}{1+\sigma\eta}} \tag{A12}$$

When the PC is binding because of the tariffs, whether consumer pay more than the tariff revenue depends on the expression shown in A13. The expression is more complicated since it depends on more parameters: the initial border price, the supply and demand shifters, and the retailers' shelf cost. However, note that in this scenario, even if there is full border pass through ($\eta = 0$), it is no longer guaranteed that consumers will pay more than the cost of tariffs. It is also not necessarily more likely that consumers don't pay the full amount of the tariffs than if the PC was slack. While consumer prices rise by a lower amount ($p_2 < p_1$), we also have that foreign producers reduce their prices less ($c_2 > c_1$). These two have opposite forces in making it more or less likely for consumers to pay for the full tariff amount. Compared to when the PC is slack, it is ambiguous whether it becomes more likely that consumers pay for the tariff revenue and it is never guaranteed that they do.

$$p_2 - p_0 > c_2\tau \iff D^{\frac{1}{\sigma}}(q_2)^{\frac{-1}{\sigma}} - \mu^2 c_0 > \tau K(q_2)^{\eta} \tag{A13}$$
$$\text{where } q_2 = D\mu^{-\sigma}(w_{max})^{-\sigma}$$
$$c_0 = \left[KD^{\eta}\mu^{-2\sigma\eta}\right]^{\frac{1}{1+\sigma\eta}}$$

## A.2 Model with Importer Monopsony

In this section, we consider the case in which the importer also has market power over its purchase price to the exporter. The rest of the model remains the same. To distinguish variables from the model without monopsony, we distinguish equilibrium objects with a $\sim$ on top of the variables.

**Importer Problem**

By allowing the importer to have market power over its purchase price, its maximization problem (when the retailer's PC is non-binding) is now given by equation A14. The importer internalizes the supply curve of the foreign producers: $\tilde{c}(\tilde{q}) = K\tilde{q}^{\eta} = K(D(\mu\tilde{w})^{-\sigma})^{\eta}$. By doing so, the importer has an additional incentive to restrict quantities as this lowers the purchase price.

$$\max_{\tilde{w}} \Pi_i(\tilde{w};\tau)^{\text{int}} = \left(\tilde{w} - (1+\tau)\cdot K(D(\mu\tilde{w})^{-\sigma})^{\eta}\right) D(\mu\tilde{w})^{-\sigma} \tag{A14}$$

In this case, the optimal sales price of the importer is given by $\tilde{w}_1 = \left[(1+\tau)KD^{\eta}\mu^{1-\sigma\eta}(1+\eta)\right]^{\frac{1}{1+\sigma\eta}}$. This implies that the price paid by the importer, when the PC is slack, is $\tilde{c}_1 = KD^{\eta}\mu^{-\sigma\eta}(\tilde{w}_1)^{-\sigma\eta}$. Therefore, we can determine the percentage change in the tariff-inclusive price paid by the importer, shown in equation A15. Notice that we obtain the same percentage pass-through at the border as in the case of no monopsony. Further down the supply chain, the importer passes on the entire cost-shock as well as the retailer as $\Delta\%\tilde{c}_{1,TI} = \Delta\%\tilde{w}_1 = \Delta\%\tilde{p}_1$.

$$\Delta\%\tilde{c}_{1,TI} \equiv \frac{\tilde{c}_1(1+\tau) - \tilde{c}_0}{\tilde{c}_0} = \left([1+\tau]^{\frac{1}{1+\sigma\eta}} - 1\right)\cdot 100\% \tag{A15}$$

Now, consider the pass-through when the PC is binding. In this case the importer again has to set its sales price to $\tilde{w}_2 = w^{max}$ and therefore the equilibrium quantities are given by $\tilde{q}_2 = D\mu^{-\sigma}\cdot(w_{max})^{-\sigma} > \tilde{q}_1$. Notice that these are the same quantities under the model without monopsony. Therefore, as the quantities have been capped, this restricts the market power that the importer exerts over the foreign producer, and therefore, the price perceived by the foreign producer is $\tilde{c}_2 = K(\tilde{q}_2)^{\eta} = K(q_2)^{\eta} = c_2$.

In the model with monopsony compared to the model without monopsony, the border pass-through will be lower ($\Delta\%\tilde{c}_2 > \Delta\%c_2 > 0$) since the initial price is lower ($c_0 > \tilde{c}_0$) while the post-tariff border price is the same ($c_2 = \tilde{c}_2$). depends on the initial price. Further down the supply chain, the importer passes on a smaller price increase to the distributor than if there is no monopsony power ($\Delta\%\tilde{w}_2 < \Delta\%w_2$). The reason is that the final price is the same ($w_{max}$), but the initial importer sales price is higher if it has monopsony power ($w_0 < \tilde{w}_0$). At retail, the price increase will also be smaller than in the case of no monopoly as the retailer passes on the full cost-shock from the importer ($\Delta\%\tilde{w}_2 = \Delta\%\tilde{p}_2$). Overall, if the importer has monopsony power and the participation constraint binds, this creates an additional force to reduce the pass-through at the border and reduce the pass-through from the importer to the distributor.

# B Additional Results - Aggregate Effects

## B.1 Markup Representativeness to Broader Goods

To what extent do the lessons from this particular sector and tariff episode translate more broadly? We show how the presence of markups creates a wedge between percent pass-through and dollar pass-through, with implications for the cost of tariffs along the supply chain. For a broad picture of markups in the U.S. economy, we consult the detailed PCE Bridge table published by the Bureau of Economic Analysis in economic census years (the latest of which is 2017, conveniently just prior to the tariff episode we study). This table provides the detailed producers' value, transportation costs, wholesale and retail margins, and finally purchasers' value of a host of commodities linked to PCE categories.

Table B1 provides various statistics of the full producer-purchaser markup, including the overall weighted average across all goods, the BEA estimate of wine and relevant comparison in our data, and a select set of other consumer goods that are often referenced in tariff-related discussions. Crucially, the BEA assumes the valuation of imports at the equivalent of domestically produced goods at producer's prices. The estimates we present in this paper indicate that such treatment would miss the markup applied by the U.S. importer.[34] Hence the BEA estimate of markups for domestic wineries would correspond to our data after removing the importers markup; we show that in this case they are indeed quite comparable.

[34]It is unclear how pervasive this feature is among goods trade more generally. While one-quarter of U.S. imports are purchased through intermediaries (Ahn, Khandelwal and Wei (2011)), it is unclear whether the wholesale/retail margins specified in the PCE Bridge table are representative of domestic-only or all intermediation. That is, it may be that import-related wholesale/retail margins are higher than what is published in the PCE Bridge table.

**Table B1:** Producers' Value to Purchasers' Value Markup: BEA PCE Bridge Table, 2017

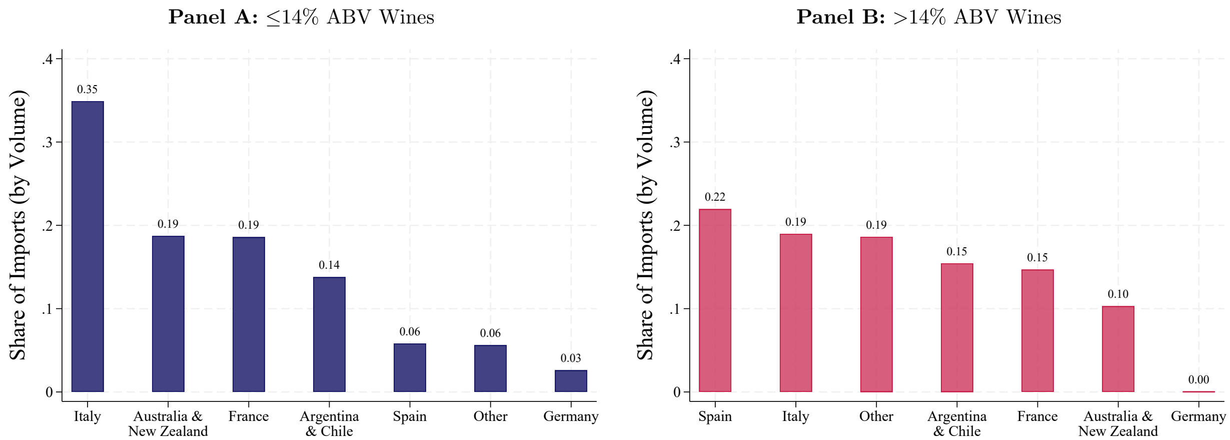
| NIPA Line | Commodity Description | Overall Markup PCE Bridge | This paper |
|---|---|---|---|
| | Overall Weighted Average Markup for Goods | 111% | |
| | *Selected Commodity Categories* | | |
| 101 | **Wineries** | **143%** | **155%** |
| 25 | Nonupholstered wood furniture | 141% | |
| 30 | Major household appliances | 92% | |
| 41 | Audio and video equipment manufacturing | 120% | |
| 52 | Sporting and athletic goods manufacturing | 156% | |
| 106 | Women/Girls apparel manufacturing | 213% | |
| 122 | Pharmaceuticals | 120% | |
| 127 | Doll, toy, and game manufacturing | 210% | |

*Notes:* The overall weighted average markup reflects the producer-value weighted markup across all goods categories (NIPA lines 7 through 141, after excluding scrap or used goods). The statistic pertaining to wines in this paper removes the importer stage, and thus reflects the representative statistic in Figure 9: (23-9)/9 = 155%.
*Source:* Authors' calculations based on Bureau of Economic Analysis PCE Bridge Table, 2017.

## B.2 Aggregate Imports

This appendix section shows some additional results related to aggregate effects of the tariffs. Figure B1 shows the distribution of quantity import shares by country for wines below and above 14% ABV in 2018. Relative to the value shares shown in Figure 2, France has a lower share of quantities as French products tend to be higher priced than those from other countries. Spain, on the other hand has a higher share of quantities than values for wines above 14% ABV. For other countries, the share of quantities is similar to the share of values.

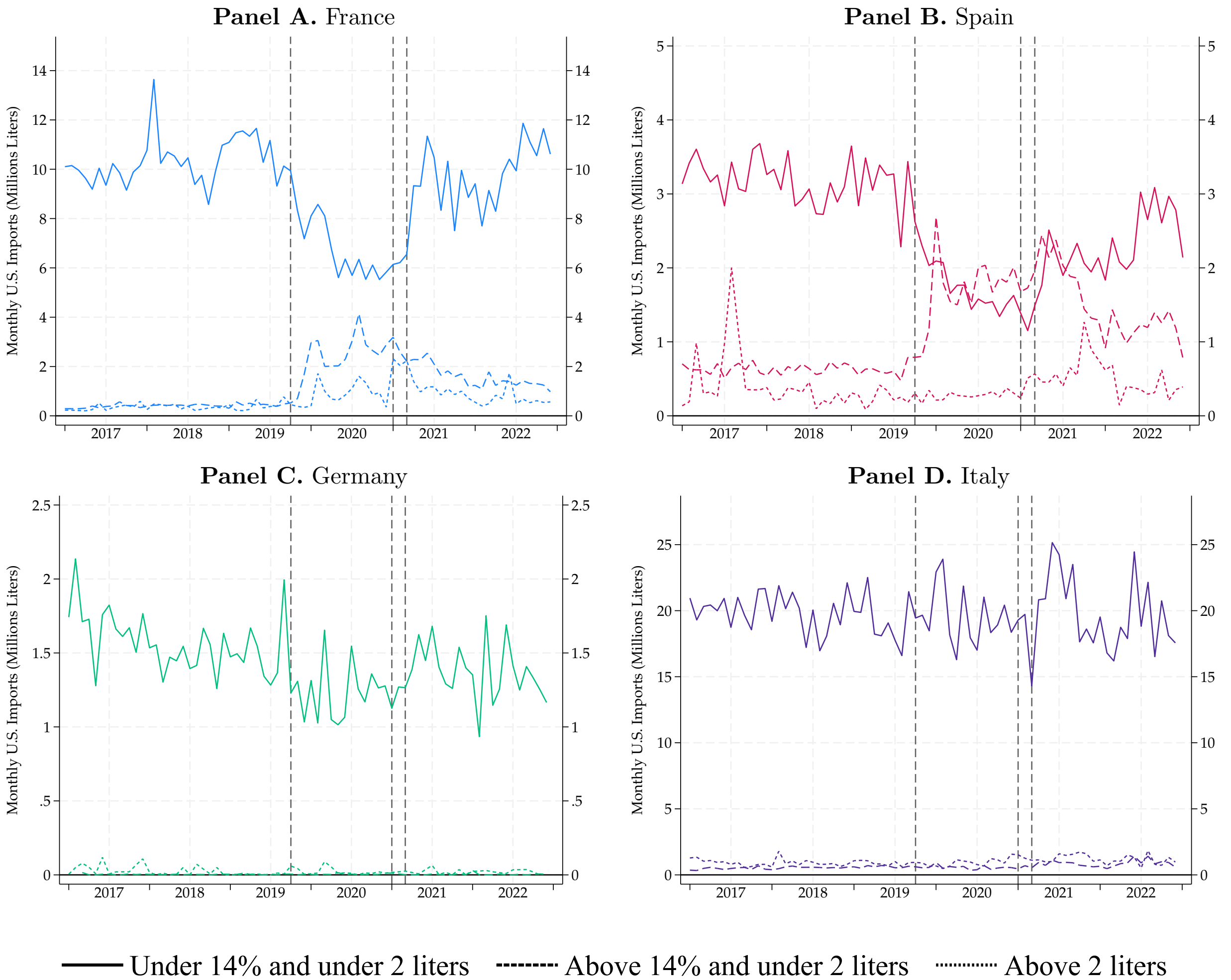
**Figure B1:** Source of U.S. Wine Import Quantities by Country, 2018




*Notes:* The figures exclude imports of wines in containers of over 2 liters.
*Source:* Authors' calculations for 2018, based on publicly available data from United States International Trade Commission (2010-2024).

Figure B2 presents evidence of the behavior of bulk wine imports, which were also exempted from tariffs (German and French bulk still wines were eventually tariffed during the first two months of 2021). We see that bulk wine imports from France (panel A) showed a relevant increase in 2020. However, such an increase was still significantly smaller than the increase in ≥14% ABV wines of under 2 liters. Meanwhile, bulk wine imports from Spain and Germany remained virtually at the same level while tariffs were imposed (Panels B and C).

**Figure B2:** U.S. Monthly Import Quantities, 2017–2022




*Notes:* Wines ≤14% Alcohol in bottles of under 2 liters are classified under HS2204.21.50, wines >14% alcohol in bottles of under 2 liters are classified under HS 2204.21.80, and wines of over 2 liters are classified under HS 2204.22 and 2204.29. Each series is seasonally adjusted using the X-13 ARIMA procedure.
*Source:* Authors' calculations based on publicly available data from United States International Trade Commission (2010-2024).

## B.3 Destination of European Wine Exports

We turn to data on the export destinations of still wine products produced by France, Spain, Germany, and Italy. The overall message of Table B2 is that while the U.S. is an important export market for these countries, it is far from the dominant one as the share of exports to the U.S. is below 20% for France, Spain, and Germany.

**Table B2:** European Export Markets for Still Wine (HS2204.21): 2018-2022

**Panel A: France**

| Destination | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Europe | 31 | 31 | 34 | 32 | 32 |
| China | 17 | 15 | 14 | 14 | 11 |
| USA | 18 | 19 | 15 | 17 | 18 |
| UK | 12 | 13 | 14 | 14 | 14 |
| ROW | 11 | 11 | 11 | 12 | 13 |
| Other Asia | 10 | 11 | 11 | 11 | 12 |

**Panel B: Spain**

| Destination | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Europe | 43 | 42 | 45 | 42 | 42 |
| ROW | 18 | 20 | 18 | 19 | 22 |
| UK | 14 | 14 | 16 | 16 | 13 |
| USA | 12 | 13 | 12 | 12 | 14 |
| China | 8 | 8 | 5 | 6 | 4 |
| Other Asia | 4 | 4 | 4 | 5 | 5 |

**Panel C: Germany**

| Destination | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Europe | 60 | 58 | 67 | 66 | 65 |
| USA | 11 | 10 | 9 | 10 | 10 |
| UK | 14 | 16 | 10 | 7 | 7 |
| ROW | 8 | 8 | 7 | 8 | 10 |
| China | 5 | 5 | 5 | 5 | 5 |
| Other Asia | 3 | 3 | 3 | 4 | 4 |

**Panel D: Italy**

| Destination | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Europe | 46 | 46 | 48 | 48 | 47 |
| USA | 26 | 26 | 24 | 24 | 25 |
| ROW | 12 | 13 | 13 | 13 | 13 |
| UK | 9 | 8 | 8 | 8 | 7 |
| Other Asia | 4 | 5 | 5 | 5 | 6 |
| China | 3 | 3 | 2 | 3 | 2 |

*Source:* Authors' calculations based on publicly available data from Eurostat.

# C Product Composition and Tariff Engineering

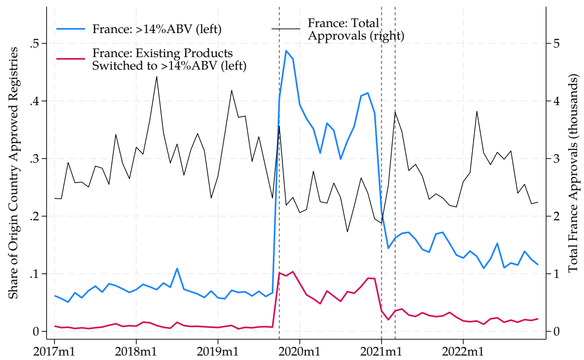
Product characteristics often shift in response to tariff schedules, a phenomenon well documented in the literature. One well-known example is the addition of fuzzy fabric to the soles of Converse shoes to reclassify them as 'textile-soled house slippers' (HS6405.20, 7.5 percent tariff) instead of 'sports footwear' (HS6404.11, 37.5 percent ad valorem tariff).[35] Here, we examine in greater detail how wine producers adjusted product composition around the 2019 tariffs using data from COLA applications to the U.S. TTB.[36]

[35] See Mangini (2023) for a discussion.

[36] An alternative measure of re-classification of products to avoid tariffs relies on comparing E.U. export reports and U.S. import reports as done in a different setting by Fisman and Wei (2004). However, HS codes for European exports have a different disaggregation for wine that does not have the 14% ABV cutoff distinction.

**Figure C3:** Certificate of Label Approval (COLA) Rates

**Panel A.** The Case of France




**Panel B.** Δ COLA Shares 2019 vs 2018

| | Overall Increase in > 14% ABV | Increase from Products Switching ABV |
|---|---|---|
| France | 39 p.p. | 9 p.p. |
| Spain | 37 p.p. | 4 p.p. |
| Italy | 3 p.p. | 1 p.p. |
| U.S. | -1 p.p. | 0 p.p. |

*Notes:* Panel A shows the share of COLA approvals of still wines for France by ABV level (blue and red lines; left axis) as well as the overall COLA approvals (black line; right axis). Panel B translates these movements into estimates of the overall tariff-induced change in COLA shares, presumably for tariff avoidance, and compares with Italian and U.S. wines.
*Source:* Authors' calculations based on data from U.S. TTB Certificates of Label Approval (COLA) provided by COLA Cloud.

Panel A of Figure C3 (already shown in the main text) plots the share of COLA approvals for still wine by month that are above 14% ABV for French originated products. The blue line shows that the share of label approvals for still wines above 14% ABV increased by nearly 40 percentage points immediately after the tariffs took effect, before declining once the tariffs were removed.[37]

We next match applications during the tariff period to earlier applications of the same product.[38] The red line in the left panel of Figure C3 plots the share of COLA approvals for still wine products with >14% ABV for which we observe a prior COLA approval with ≤14% ABV. For France, this share jumped by nearly 10 percentage points in the months directly following the 2019 tariffs, accounting for roughly 25 percent of the increase in >14% ABV wines. Panel B of Figure C3 documents these statistics for France and Spain (countries affected by tariffs that had some degree of >14% ABV wines) and two countries unaffected by tariffs (Italy and the U.S.).

Another way to assess the tariff's impact is to examine changes in the distribution of ABV across still wines approved by the U.S. TTB over different periods. Figure C4 presents histograms of the ABV values of still wine approvals for French, Spanish, German, and Italian products for three periods: January 2015 to September 2019 (before tariffs were implemented), October 2019 to February 2021 (after tariffs were imposed), and March 2021 to December 2023 (following the suspension of tariffs). To facilitate comparison, the bars in red indicate new wine approvals with ABV up to the 14% threshold and bars in blue indicate new wine approvals above the threshold. To further identify the role of wines submitted for new COLA approvals that reflect wines reclassifying to *cross* the threshold ABV value (in either direction)—what we term "threshold-switchers"— we use gray bars that stack on top.[39] There is a notable shift in the distribution towards >14% wines

[37] The fall occurs in January of 2021, when tariffs were imposed on all French still wines. Hence, there were no differential tariffs between ≤14% and >14% ABV still wines to exploit.

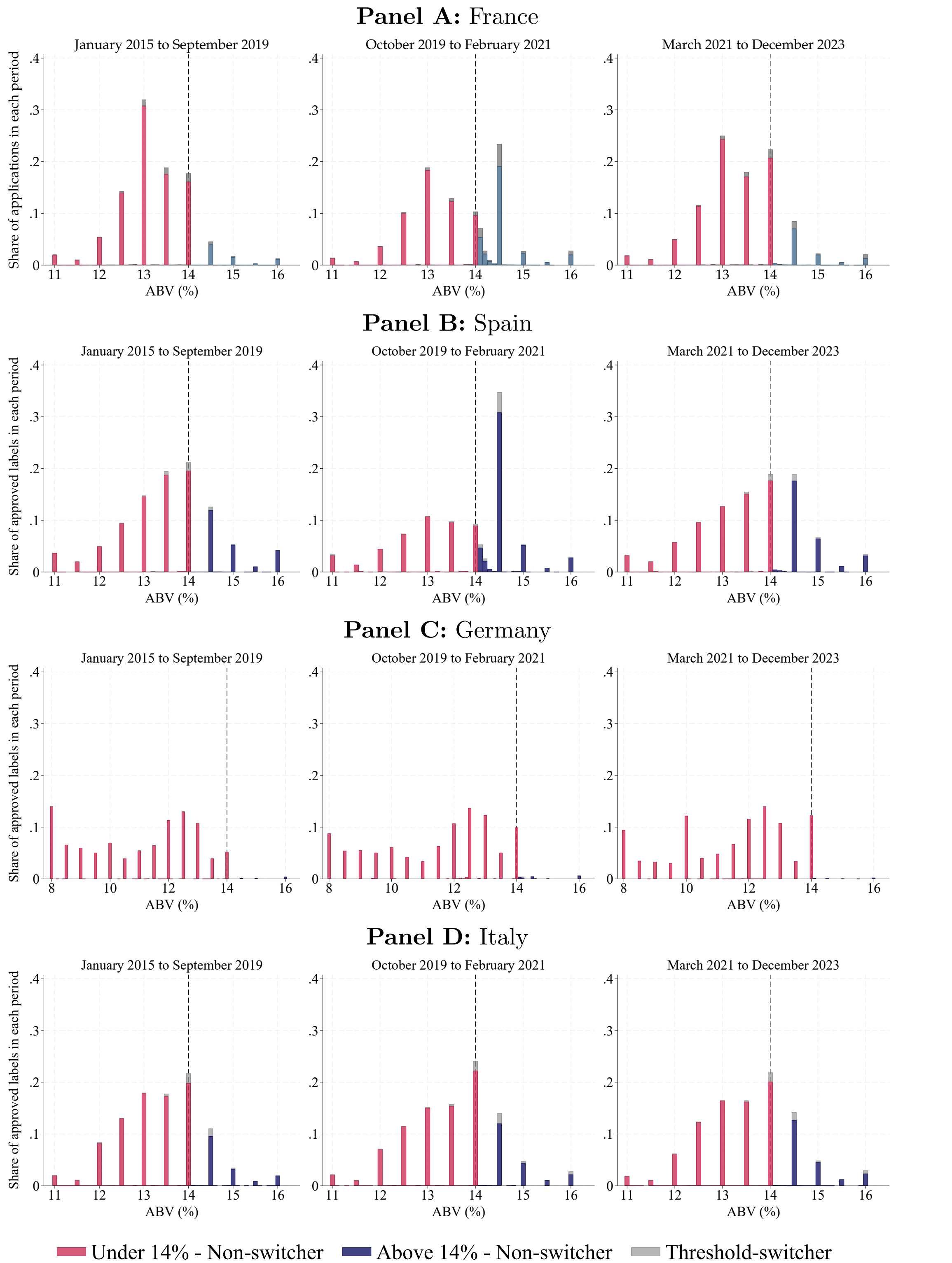
[38] We define a product by its unique combination of brand name, product name, country of origin, wine appellation, and barcode (the last one if available).

[39] The example wine in Figure 7 is part of the red bar at 13% in the first panel, then as a gray bar at 14.5% in the middle panel, and then as a gray bar at 13% in the right panel.

after tariffs were implemented for French and Spanish still wines, with many of the new approvals bunching right around the 14% threshold value. Because the tariffs applied only to wines ≤14% ABV, the bunching just above this threshold reflects deliberate tariff avoidance. The significant share of gray bars added to those in blue also highlight the role of tariff engineering via threshold switching wines. The right panels reveal that the distribution of ABV values has mostly returned to the pre-tariff state after tariffs were suspended.

There is no noticeable change in the distribution for German or Italian wines. The panel for Germany highlights how the concentration of Riesling wines at low ABV values limits the ability to avoid tariffs. Finally, because Italy was unaffected by the tariffs, there is no evident reclassification or shift in the ABV distribution from their wines.

**Figure C4:** Distribution of Alcohol Content in New COLA Registries for Still Wines




*Notes:* The distributions are winsorized at 11% for all countries on the lower end. At the upper end, the distributions are winsorized at 16%. Sparkling wines are excluded. 6.9% of the COLAs from these four countries do not have an ABV value in our data and are excluded from this figure.

*Source:* Authors' calculations based on data from U.S. TTB Certificates of Label Approval (COLA) provided by COLA Cloud.

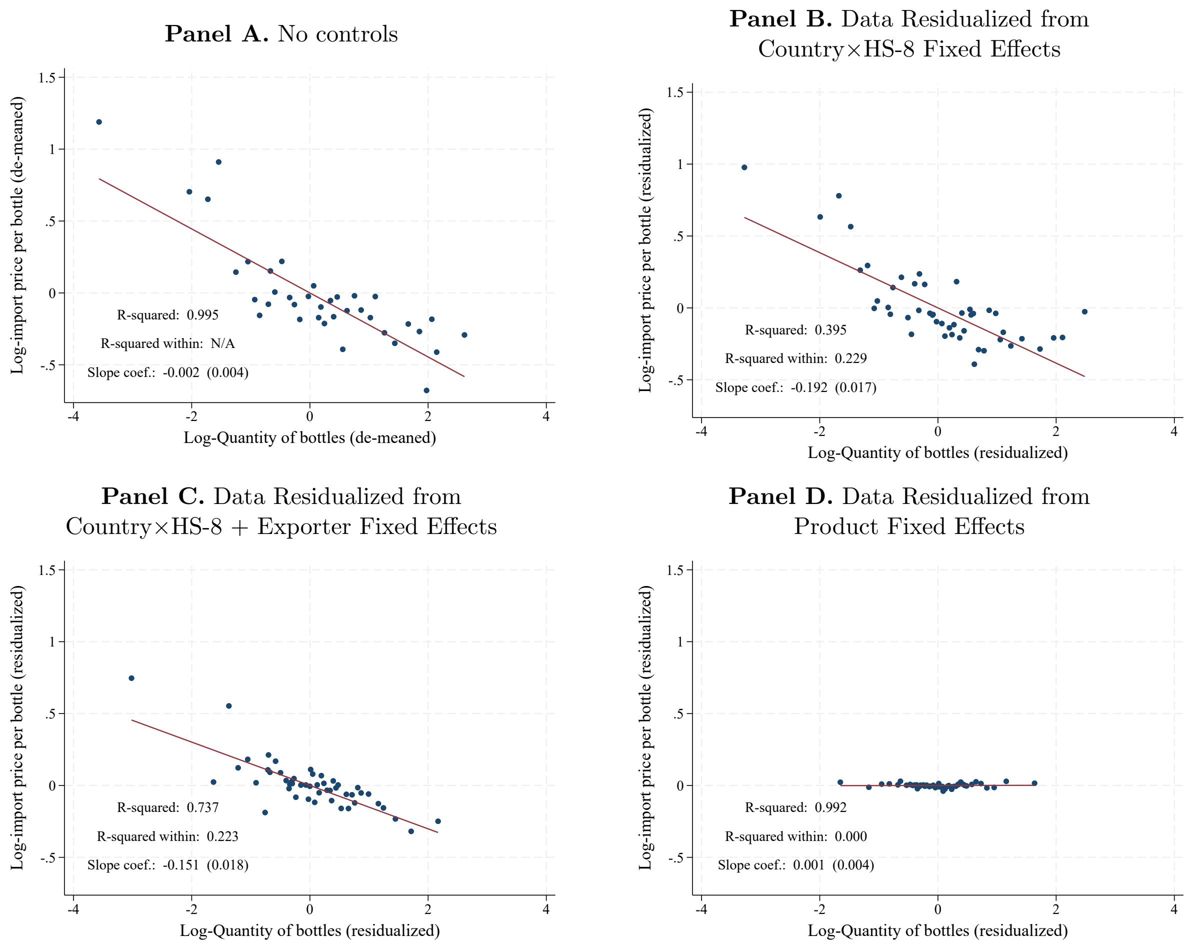
Overall, if we consider the speed with which we observe the tariff-engineering behavior documented in Figure C3 above, it seems unlikely that the wines changing threshold levels to avoid the higher tariff involved actual changes in alcohol content. Rather, these adjustments likely reflected changes in what was reported on wine labels. Using testing data from the Liquor Control Board of Ontario for 1992-2009, Alston, Fuller, Lapsley, Soleas and Tumber (2015) document that alcohol content was underreported on average, and that, conditional on underreporting, the true alcohol content was understated by 0.42 percentage points.

# D Additional Results - Pass-Through

## D.1 Shipment-Level Pricing

The transaction-level detail of the data in this paper allows an exploration of other patterns that may pertain to the interpretation of pass-through estimates. On such pattern is whether there exist discounts in price for greater quantities purchased. In Figure D1 we correlate prices paid at the product-shipment level with the quantity purchased by the importer. We report an increasingly rich specification from Panel A to Panel C to mimic a conventional unit value regression from micro-level trade data like the Longitudinal Foreign Trade Transactions Dataset (LFTTD). In Panel A we include no additional controls. We then use country by HS-8 fixed effects in Panel B and further add foreign exporter fixed effects in Panel C. These results consistently show that the log-import unit value per bottle is negatively correlated with the quantity of log-bottles purchased, consistent with quantity discounts in pricing. However, once we investigate this relationship using the exact product information we have, the negative correlation completely disappears. Panel D shows this result: once we residualize the log-import price per bottle with product fixed effects, none of the remaining variation is explained by the quantity purchased. This suggests, at least at the product-shipment level, that there aren't significant quantity discounts that that would complicate the interpretation of our pass-through estimates. Instead, this correlation seems to be driven completely by heterogeneity across products—products with lower prices are purchased in larger quantities.

**Figure D1:** Binscatter of Log-Price per Bottle on Log-Bottles Purchased

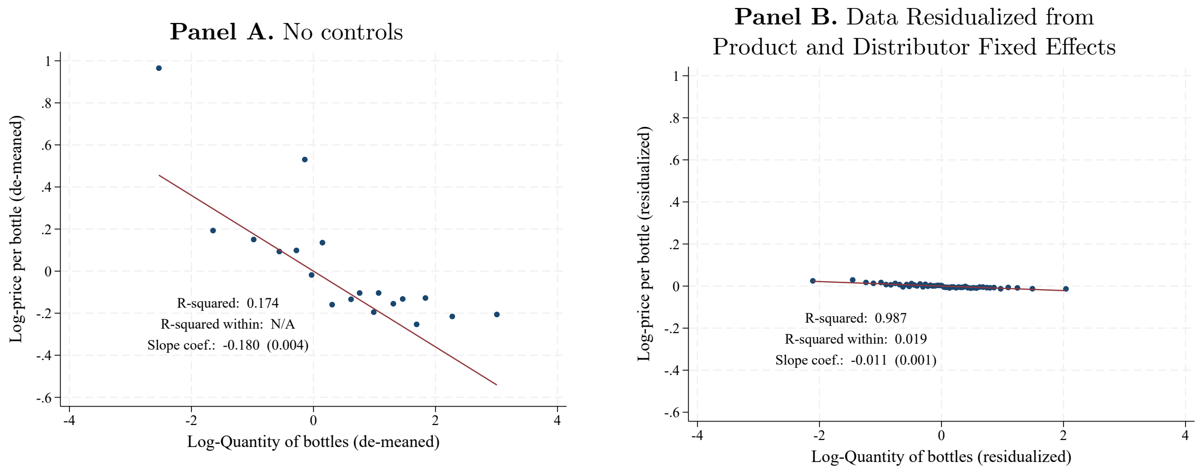



*Notes:* All scatter plots have the same sample. Robust standard errors in parenthesis next to coefficient. R-squared within corresponds to the R-squared of the slope variable after accounting for the fixed effects. The tariff period is excluded from the sample. Each observation is a different product-shipment.
*Source:* Authors' calculations based on data from a U.S. wine importer.

We also verify these same patterns hold at the next stage of the supply chain for shipment-product sales from the importer to distributors. Figure D2 illustrates that, just as with the import prices, the correlation of the log-price per bottle with quantities (Panel A) disappears when controlling for heterogeneity across products (Panel B).

In fact, the importer tends to set near-uniform prices across distributors. When running our regression of log-sales price per bottle on product fixed effects, we explain 98.4% of the sales price variation. If we also include distributor fixed effects, we explain 98.5% of the sales price variation.

**Figure D2:** Binscatter of Log-Price per Bottle on Log-Bottles Sold




*Notes:* The two set of scatter plots have the same sample. Both axis' in panel (A) have been de-meaned to protect the anonymity of the importer. Robust standard errors in parenthesis next to coefficient. R-squared within corresponds to the R-squared of the slope variable after accounting for the fixed effects. The tariff period is excluded from the sample.
*Source:* Authors' calculations based on data from a U.S. wine importer.

## D.2 Baseline Pass-Through Regression

In this section we present the baseline pass-through results discussed in the main text. We estimate differences-in-differences regressions in which we consider four periods: 1) the pre-tariff period, 2) a delay period before prices respond, 3) a treatment period when prices respond, and 4) a post-treatment period. We define these periods based on the timing response we document in the event study results. The equation we estimate, for the prices at the border, is shown in D1. For the importer's sales price and the retail price regressions we follow the same structure but with the respective fixed effects as shown in the main text. Naturally, our omitted period is the pre-tariff period (Oct. 2018-Sep. 2019). The delay period for the border regression and the importer's sales price is between Oct. 2019 and Dec. 2019, while at retail it is between Oct. 2019 and Oct. 2020. The treatment period at the border and for the importer sales price is between Jan. 2020 and Feb. 2021, at retail it is between Nov. 2020 and Oct. 2022. The post-treatment period have the remaining months in the sample: until March 2022 for the importer border and sales price regressions and December 2022 for the retail price regression. Our main coefficients of interest are $\alpha_2$ for the treated products and $\beta_2$ for the indirectly treated products.

$$
\begin{aligned}
\text{(D1)} \qquad \log(\text{Purchase price per bottle})_{it} = & \alpha_1 \text{ Delay period}_t \times \text{Below 14\% ABV}_i \\
& + \alpha_2 \text{ Treatment period}_t \times \text{Below 14\% ABV}_i \\
& + \alpha_3 \text{ Post-treatment period}_t \times \text{Below 14\% ABV}_i \\
& + \beta_1 \text{ Delay period}_t \times \text{Indirect treatment}_i \\
& + \beta_2 \text{ Treatment period}_t \times \text{Indirect treatment}_i \\
& + \beta_3 \text{ Post-treatment period}_t \times \text{Indirect treatment}_i \\
& + \omega_t + \delta_i + \varepsilon_{it}
\end{aligned}
$$

Table D1 below shows the differences-in-differences regression of the baseline results for each stage. The main coefficients that are discussed in the text are in the third row: "Treatment Period × Treated".

**Table D1:** Difference-in-Differences Pass-Through Results

| | Importer Purchase Log-Price (1) | Importer Sales Log-Price (2) | Retail Log-Price (3) |
|---|---|---|---|
| Delay Period × Treated | -0.002 | -0.029*** | 0.013 |
| | (0.007) | (0.007) | (0.016) |
| Delay Period × Indirectly Treated | 0.001 | -0.025*** | -0.008 |
| | (0.008) | (0.004) | (0.013) |
| Treatment Period × Treated | -0.051*** | 0.054*** | 0.069*** |
| | (0.010) | (0.014) | (0.024) |
| Treatment Period × Indirectly Treated | -0.041*** | -0.019 | 0.008 |
| | (0.008) | (0.019) | (0.019) |
| Post-Treatment Period × Treated | -0.047*** | 0.042** | 0.059** |
| | (0.010) | (0.018) | (0.029) |
| Post-Treatment Period × Indirectly Treated | -0.045*** | -0.010 | -0.011 |
| | (0.011) | (0.013) | (0.028) |
| $R^2$ | 0.995 | 0.977 | 0.985 |
| Product FE | Yes | Yes | – |
| Month FE | Yes | Yes | Yes |
| Distributor FE | N/A | Yes | N/A |
| Product-Retailer FE | N/A | N/A | Yes |
| Weighted | Yes | Yes | No |

* p<0.10, ** p<0.05, *** p<0.01. Standard errors clustered at the product level. The importer purchases regression is weighted by the total quantity purchased by the importer of each product between October 2018 and September 2019. The importer sales regression is weighted by the total quantity sold by the importer to each distributor between October 2018 and September 2019. For the three regressions the base period is October 2018–September 2019. For the importer purchases and sales to distributors regressions the delay period is between October 2019 and December 2019; the treatment period is between January 2020 and February 2021; the post-treatment period is between March 2021 and March 2022. For the retail prices regression the delay period is between October 2019 and October 2020; the treatment period is between November 2020 and October 2022; the post-treatment period is between November 2022 and December 2022.

Our results are robust to an alternative specification in which the prices are in dollars and not in logs. In Table D2 we estimate the same regressions as in Table D1 but with prices in dollars. Our estimates for the tariffed products (third row) are considerably close to our estimates of the changes in prices in dollars at each stage of the chain which are shown in Figure 15 and are computed based on the estimation with log-prices and with the prices from the representative bottle.

**Table D2:** Difference-in-Differences Pass-Through Results - Prices in levels

| | Importer Purchase Price (1) | Importer Sales Price (2) | Retail Price (3) |
|---|---|---|---|
| Delay Period × Treated | -0.014 | -0.220*** | 0.759 |
| | (0.045) | (0.055) | (0.623) |
| Delay Period × Indirectly Treated | 0.039 | -0.243*** | 0.058 |
| | (0.059) | (0.060) | (0.409) |
| Treatment Period × Treated | -0.232*** | 0.517*** | 1.777*** |
| | (0.048) | (0.105) | (0.581) |
| Treatment Period × Indirectly Treated | -0.134*** | -0.269 | 1.089 |
| | (0.040) | (0.222) | (0.791) |
| Post-Treatment Period × Treated | -0.169*** | 0.447** | 1.34* |
| | (0.052) | (0.140) | (0.797) |
| Post-Treatment Period × Indirectly Treated | -0.056 | -0.062 | 1.117 |
| | (0.096) | (0.083) | (1.418) |
| $R^2$ | 0.994 | 0.970 | 0.970 |
| Product FE | Yes | Yes | – |
| Month FE | Yes | Yes | Yes |
| Distributor FE | N/A | Yes | N/A |
| Product-Retailer FE | N/A | N/A | Yes |
| Weighted | Yes | Yes | No |

* p<0.10, ** p<0.05, *** p<0.01. Standard errors clustered at the product level. The importer purchases regression is weighted by the total quantity purchased by the importer of each product between October 2018 and September 2019. The importer sales regression is weighted by the total quantity sold by the importer to each distributor between October 2018 and September 2019. For the three regressions the base period is October 2018–September 2019. For the importer purchases and sales to distributors regressions the delay period is between October 2019 and December 2019; the treatment period is between January 2020 and February 2021; the post-treatment period is between March 2021 and March 2022. For the retail prices regression the delay period is between October 2019 and October 2020; the treatment period is between November 2020 and October 2022; the post-treatment period is between November 2022 and December 2022.

**Table D3:** Summary of Pass-Through Estimates Along the Supply Chain

| | Pass-Through of Tariff Cost (in percent) | Pass-Through of Tariff Cost (in dollars) | Pass-Through of Prior Stage Cost Increase (in percent) | Pass-Through of Prior Stage Cost Increase (in dollars) |
|---|---|---|---|---|
| Exporter →Importer | 78% $\frac{\tau(1+\Delta\%c)+\Delta\%c}{\tau(1+\Delta\%c)}$ | 78% $\frac{\tau(1+\Delta\%c)c_0+\Delta c}{\tau(1+\Delta\%c)c_0}$ | 78% $\frac{\tau(1+\Delta\%c)+\Delta\%c}{\tau(1+\Delta\%c)}$ | 78% $\frac{\tau(1+\Delta\%c)c_0+\Delta c}{\tau(1+\Delta\%c)c_0}$ |
| | [71%,89%] | [71%,89%] | [71%,89%] | [71%,89%] |
| Importer →Distributor | 23% $\frac{\Delta\%w}{\tau(1+\Delta\%c)}$ | 41% $\frac{\Delta w}{\tau(1+\Delta\%c)c_0}$ | 29% $\frac{\Delta\%w}{\frac{(1+\tau)c_1}{c_0}-1}$ | 53% $\frac{\Delta w}{(1+\tau)c_1-c_0}$ |
| | [14%,35%] | [25%,63%] | [18%,42%] | [33%,76%] |
| Dist./Retailer →Consumer | 29% $\frac{\Delta\%p}{\tau(1+\Delta\%c)}$ | 134% $\frac{\Delta p}{\tau(1+\Delta\%c)c_0}$ | 128% $\frac{\Delta\%p}{\Delta\%w}$ | 326% $\frac{\Delta p}{\Delta w}$ |
| | [11%,46%] | [49%,210%] | [50%,213%] | [128%,543%] |

*Notes:* The 90% Confidence intervals in brackets are computed from a bootstrap with 5000 iterations and clustered at the product level. Each repetition of the bootstrap draws a set of products from the purchases data (with replacement) and uses that sample to estimate the difference-in-differences coefficients in the three stages. he formula to compute the pass-through measures are provided in gray. In the expressions, $c$ is the foreign producer sales price, $w$ is the importer sales price, and $p$ is the retail sales price. $\Delta\%x \equiv \frac{x_1}{x_0} - 1$ and $\Delta x \equiv x_1 - x_0$ represent the percentage change and the dollar change in variable $x$ between before and after tariffs, respectively. $c_0$ is the foreign producer sales price before tariffs and $c_1$ is the sales price during the tariffs.
*Source:* Authors' calculations based on data from a U.S wine importer.

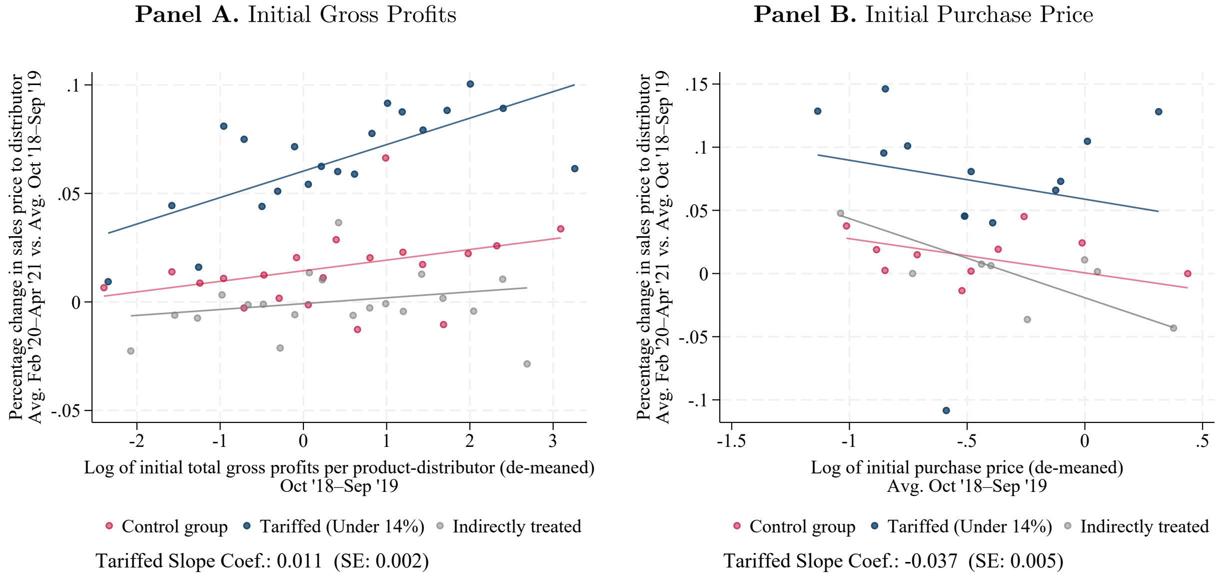
## D.3 Results on Heterogeneity in Pass-through

We explore two dimensions in heterogeneity in pass-through to test a prediction from our stylized model and evaluate the importance of additive costs. To do so, Figure D3 presents binscatter of changes in sales price (in percentage terms) to each distributor against the importer's initial gross profits (per distributor) and the product's initial purchase price. We separate the binscatter by our three product groups: control (red), treated (blue), and indirectly treated (grey). In addition to testing our model prediction, the Figure provides a visualization of our differences-in-differences estimates as the difference in the percentage change in sales price of the tariffed and control groups are comparable to the estimates shown in Table D1.

First, we use the data to assess whether the fixed shelf–cost mechanism in our stylized model can account for the imperfect pass-through from the importer to distributors. A key testable prediction of the model is that products that provide higher profits are less likely to face a binding participation constraint. Consequently, such products should exhibit higher pass-through. Panel A in Figure D3 confirms this pattern: products that yielded larger profits to the importer prior to the tariffs display higher pass-through rates.

Second, we explore heterogeneity in pass-through depending on the initial price of the wine. One potential source of heterogeneity could be that the importer faces handling costs such as transportation and storage, which are arguably more additive in nature rather than scaling multiplicatively with the value of the wine. If these costs were sizable, we would expect to see lower pass-through for cheaper wines, since these additive costs would represent a larger share of total costs. However, Panel B in Figure D3 suggests that this is not the case. If anything, pass-through appears to be somewhat higher for lower-priced wines. This finding suggests that the magnitude of other additive costs is not very large.

**Figure D3:** Binscatter of Heterogeneity in Percentage Changes in Sales Price




*Notes:* Coefficient below each figure corresponds to the slope of the linear fit of the under 14% ABV wines; robust standard error in parenthesis. In Panel A, gross profits are measured as the average gross markups to each distributor times the total quantity sold to the distributor. The x-axis in each figure is de-meaned from the average. The binscatter and linear fit are weighted by quantities purchased in the pre-period.
*Source:* Authors' calculations based on data from a U.S. wine importer.

## D.4 Speed of Price Adjustments

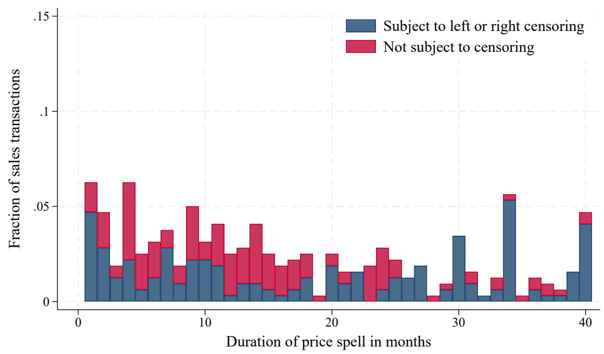
In this subsection, we explore the length of price spells at each stage of the supply chain—that is, for how many months prices remain the same. For each of the three stages we observe, a price spell measures the number of months from when a given product price is first observed until we observe a price that differs by more than 1%. When evaluating importer sales prices, we focus on prices charged to each distributor, and in the retail stage we focus on prices within each retailer.[40] For the analysis, we exclude products that were only sold or purchased in a single month.

As we move further down the supply chain, price spells become shorter. Figure D4 shows the full distribution of price spells for each stage of the supply chain. In the figure, we distinguish between price spells for which we can identify both the start and end, and those that are subject to censoring because they may have begun before our sample period or ended after it. Notably, the distributions shift to the left as we move down the supply chain as the median price spell is 14 months for importer purchases, 11 months for sales prices to distributors, and 5 months for retail prices (including both censored and non-censored price-spells).

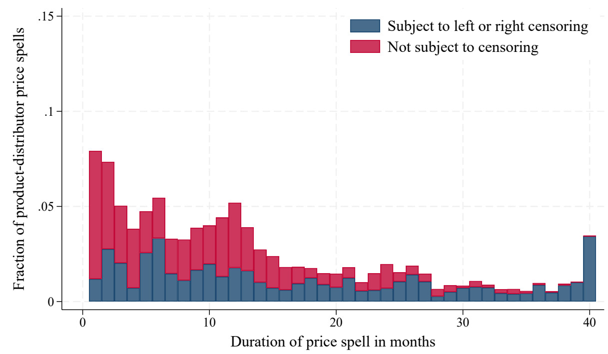
[40] In the retail data, there are some instances of temporary price discounts. If the price of a product changes for a single month and then returns to its original level, we ignore the price discount and maintain the period as a single price spell. Additionally, in retail we sometimes observe two vintages of the same product being sold in the same month; in these cases, we take the average price.

**Figure D4:** Distribution of Price Spells in Months

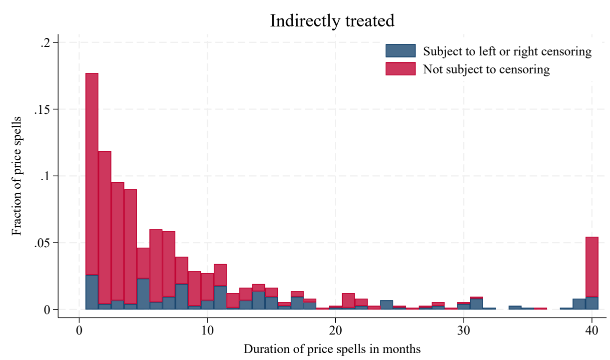
**Panel A:** Importer Purchase Prices




**Panel B:** Importer Sales Prices




**Panel C:** Retailer Prices




*Notes:* The histograms show the distribution of price spells. In Panel A, the unit of observation is a product, in Panel B it is a product-distributor, in Panel C it is a product-retailer. We censor the histograms at 40 months. Price spells subject to left or right censoring are those price spells for which we don't observe a different price before or after the spell.
*Source:* Authors' calculations based on data from a U.S. wine importer.

# E Additional Details

## E.1 Tax Exemptions and Duty Drawbacks

There are two forms of tax reductions relevant to the U.S. wine industry. The first is the Craft Beverage Modernization Act (CBMA), a regulation in effect since 2018. It provides a form of tax refund on federal excise taxes. A wine producer can allow its purchasers—either a distributor or importer, depending on whether the producer is domestic or foreign—to claim the refund. Each producer may authorize refunds for up to 750,000 gallons of wine per year.

To complicate matters, not all the 750,000 gallons receive the same refund. For wines with ABV below 16%, the federal excise tax rate is \$1.07 per gallon and the CBMA provides a refund of \$1.00 for the first 30,000 gallons, \$0.90 for the next 100,000 gallons (up to 130,000), and \$0.535 for the remaining eligible gallons. If a producer has multiple buyers, it has to decide how to allocate the CBMA credits across them.

CBMA refunds apply to all wines—regardless of country of origin or ABV level—up to the producer's quota. Therefore, it is unlikely that they were used to offset tariffs on French, Spanish, or German wines with ABV under 14%.

Second, there are duty drawbacks. This regulation is particularly relevant because it allows wine importers to claim a refund of the tariffs and federal taxes paid on wine imported into the U.S., provided they export U.S. wine abroad (excluding Canada and Mexico). To claim the drawback, the importer must provide evidence that they exported "interchangeable" wine to the one that was imported, within five years of the import date. An "interchangeable" wine is defined as one that has the same color (i.e., red, white, or rosé) and is priced within 50% of the import price per liter. Additionally, only still wines with up to 14% ABV are eligible for drawback. The drawback is equal to the amount of tariffs and federal excise taxes paid on the imported wine, up to a maximum of 99% of the taxed amount.

In principle, because the tariffs paid under the Airbus dispute were eligible for duty drawbacks, wine importers could have used duty drawbacks to avoid paying the tariffs on imported wine. However, in practice, this mechanism is not widely used and the amount of tariff revenue claimed for drawback did not increase during the 25% tariff period or in the subsequent two years after. The difficulty for importers to use the drawback mechanism has two reasons. First, it requires importers to already be exporters (or to become exporters within five years). Second, the wines that tend to be exported from the U.S. are mostly bulk wines which are considerably cheaper than the finer imported wines. Specifically, wines in containers under 2 liters account for 45% of U.S. exports (by volume) from 2018–2024 while wines in containers over 10 liters account for 52% of the exports. While wine imports in containers over 2 liters to the U.S. from France, Spain, and Germany are virtually zero, as shown in Figure B2. Therefore, it is difficult to meet the 50% price difference requirement. As evidence against the use of the drawback mechanism to avoid the 2019-2021 tariffs, Table E4 shows that the amount of duty drawback claimed remained both stable and low during the 2018–2023 period (with the exception of the dip in 2020).

**Table E4:** Value of Drawback Claims

| Year | Value of Drawback Claims (Millions of Dollars) | Fraction of Eligible Import Value Claimed |
|---|---|---|
| 2018 | 39.63 | 0.90% |
| 2019 | 30.42 | 0.70% |
| 2020 | 10.42 | 0.29% |
| 2021 | 31.82 | 0.73% |
| 2022 | 34.17 | 0.74% |
| 2023 | 36.39 | 0.83% |

Sources: U.S. Customs and Border Protection, obtained from Stuart Spencer (August 5, 2024)., USITC. Author's calculations.

## E.2 Wine HS Codes and Tariff Timeline

**Table E5:** Wine 8-digit HS Codes and Tariffs Timeline

| | |
|---|---|
| **Never covered** | |
| 2204.10.00 | Sparkling wine |
| **First round: October 2019 - March 2021. France, Germany, United Kingdom, and Spain** | |
| 2204.21.50 | Wine, not over 14% in containers not over 2 liters. |
| **Second round: Jan 2021 - March 2021. France and Germany** | |
| 2204.21.20 | Effervescent grape wine, in containers holding 2 liters or less. |
| 2204.21.30 | Tokay wine (not carbonated) not over 14% alcohol, in containers not over 2 liters. |
| 2204.21.60 | "Marsala" wine, over 14% vol. alcohol, in containers holding 2 liters or less. |
| 2204.21.80 | Grape wine, other than "Marsala", not sparkling or effervescent, over 14% vol. alcohol, in containers holding 2 liters or less. |
| 2204.22.20 | Wine of fresh grapes, other than sparkling wine, of an alcoholic strength by volume $\leq$14% in containers holding over 2 liters but not over 4 liters. |
| 2204.22.40 | Wine of fresh grapes, other than sparkling wine, of an alcoholic strength by volume $>$14% in containers holding over 2 liters but not over 4 liters |
| 2204.22.60 | Wine of fresh grapes, other than sparkling wine, of an alcoholic strength by volume $\leq$14% in containers holding over 4 liters but not over 10 liters |
| 2204.22.80 | Wine of fresh grapes, other than sparkling wine, of an alcoholic strength by volume $>$14% in containers holding over 4 liters but not over 10 liters |
| 2204.29.61 | Wine of fresh grapes, other than sparkling wine, of an alcoholic strength by volume $\leq$14% in containers holding $>$10 liters |
| 2204.29.81 | Wine of fresh grapes, other than sparkling wine, of an alcoholic strength by volume $>$14% in containers holding $>$10 liters |
| 2204.30.00 | Grape must, not elsewhere specified or indicated, in fermentation or with fermentation arrested otherwise than by addition of alcohol. |