
Mexican Tomatoes: TSA-Tariff Analysis Report

Timothy J. Richards *Arizona State University and Badger Metrics, LLC*

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Summary

In 2019, the US Department of Commerce entered into a new Suspension Agreement with Mexican tomato growers with an agreement that sought to protect US tomato growers, treat Mexican exporters fairly, and still provide US consumers with a continuous supply of high-quality tomatoes year-round. The 2019 Tomato Suspension Agreement (TSA), is the 5th agreement in place since 1996. The 2019 TSA places minimum reference prices on tomatoes from Mexico. The purpose of the Agreement is to ensure that tomato imports from Mexico do not substantially injure sales of tomatoes produced by fresh tomato growers in Florida, as the Florida production and Mexican import seasons overlap to a large extent. In 2019, the TSA was updated to specify new reference prices for Round and Roma, Stem On, Tomatoes on the Vine (TOV), Specialty - Loose, and Specialty - Packed items.

In the summer of 2023, Florida growers renewed calls for termination of the Tomato Suspension Agreement (TSA), arguing that Mexican growers were exploiting "loopholes" in the agreement to sell tomatoes in the US at lower prices. In this analysis, we examine the economic impact to the US economy of terminating the TSA, and removing Mexican tomato imports from the US market.

Our analysis consists of two complementary parts, the first focusing on the impact on consumers and the second on the U.S. economy more generally. In the first part, we consider a range of potential scenarios regarding the extent of import-reduction from Mexico, and combine data from the USDA (import amounts by variety and month) and [

]. We differentiate Mexican imports by type of tomato (i.e., Cherry, Grape, Greenhouse, Roma, TOV and Vineripe) corresponding to variety-level data available from USDA, and estimate the impact on consumer prices from reducing supply.

In our base-scenario, defined as a complete removal of Mexican imports from the U.S. market, we find that the prices of retail tomatoes remaining on the market rise by an average of 52.0% across all affected varieties. Further, the lost retail revenue from removing Mexican imports, [

], is some \$2.19 billion, or 31.6% of total tomato revenue at our sample retailers. We recognize, however, that our retail data does not capture all tomatoes imported into the U.S. but believe that our sample provides price-increases and revenue-reductions that are likely to be representative of results to be expected for the entire U.S. retail sector.¹

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In the second part, we use data on tomato imports from the Agricultural Marketing Service of the USDA, and input-output modeling software from IMPLAN to estimate the potential loss in economic output from excluding Mexican tomatoes from the U.S. market.² IO models capture the "multiplier effect" associated with removing a dollar in value from a particular supply chain, capturing lost profit, owner-income, employee compensation, and the value of all of the services necessary in selling retail tomatoes. In our IO analysis, we focus on the states of Arizona and Texas, because these two states account for the majority of Mexican tomato imports into the U.S. We find that removing Mexican tomatoes from these two markets is likely to cause a reduction in economic activity of \$3.39 billion in Arizona, and 22,712 jobs, and \$4.53 in Texas with a loss in employment of 32,011. In the description below, we provide more detail on how these effects derive from direct, indirect, and "feedback" or induced effects that follow from changes in consumer spending and employee income.

Analysis Objectives

The objective of our analysis is to use microeconomic and econometric methods, supplemented with macroeconomic (input-output, IO) models based on private and publicly-available data, to estimate the economic cost of eliminating Mexican tomato imports from the US market. We use two complementary modeling approaches to first determine the cost to consumers of increasing tomato prices, and then to estimate the broader cost to the U.S. economy of losing value generated through the tomato supply chain.

Methods and Data

In this section, we provide an overview of the economic modeling techniques that we use to analyze the data. These models are intended to examine

²Input-output (IO) models capture the interrelationships between different sectors of an economy by tabulating the amount of input from one sector used to produce output in another sector, and calculates the value-added and employment at each stage of every supply chain in the economy. In our case, tomato imports are an input to the food distribution sector, so a reduction in imports affect all industries involved in the wholesaling, distribution, retailing and support services associated with selling tomatoes to consumers.

two different parts of the problem, namely the effect of raising tariffs on Mexican tomatoes on tomato prices in the U.S., and then the costs to the U.S. economy of removing an important value chain from U.S. retailers, importers, distributors and end-users.

Price Impact

Tariffs raise the price of the dutied item in the domestic market, and reduce the quantity demanded from importers. As such, the primary impact of levying the proposed tariff on tomatoes from Mexico is to raise the U.S. consumer price, and reduce the amount of tomatoes sold in the market. This effect will be particularly important during the winter season, when Mexican producers account for a large share of the U.S. tomato supply. The extent of the increase in prices, however, depends on the elasticity of demand for tomatoes in the U.S. retail market. Elasticity is essentially the degree to which consumers change their buying habits when prices rise in the market. If consumers are relatively insensitive to changes in price, demand is said to be "inelastic," but if their purchases change substantially in response to a change in price, then demand is "elastic." We model the impact of imposing tariffs on Mexican tomatoes as a shift, or reduction, in supply in the tomato market. If demand is elastic, then market prices will not change much. On the other hand, if demand is inelastic, then prices will rise considerably when the supply of tomatoes on the market is reduced. We simulate the resulting change in prices using an "equilibrium displacement model," which is well accepted for this purpose and commonly used to model trade policy impacts.

Economic Impact

Removing Mexican imports from the U.S. market implies lost value throughout the tomato value chain. We use IO analysis to estimate the total amount of potentially-lost economic welfare (economic output, value added, employment, and tax revenue at the federal, state and county levels) from reducing tomato sales in the U.S. market. The macroeconomic impacts of removing Mexican tomatoes from the U.S. market have direct effects, defined as lost sales from importers and retailers that are direct-handlers of the lost tomatoes, indirect effects, which are defined as lost sales by firms that provide services to the tomato first-handlers, and induced effects, which consist of lost economic activity due to reduced spending by firms and employees in the tomato supply chain. For

this purpose, we use IMPLAN modeling software, which is widely accepted as the standard in this area, and is based on input-output data gathered by the U.S. Bureau of Economic Analysis. As such, IMPLAN is the gold standard for conducting IO analysis for the U.S. economy.

Rationale for Quantitative Modeling

We intend to estimate the impact of imposing tariffs on Mexican tomatoes using econometric (statistical) methods, simulation, and input-output analysis. Econometric analysis is necessary because there are a number of factors that influence demand and pricing patterns for tomatoes in the U.S. winter tomato market: Changes in population, income, prices for both the focal and alternative products, and unobserved factors unique to each market and time period. Econometric analysis is required in order to hold each of these other factors constant in estimating the independent effect of changing the import volumes for each tomato variety and production-type on consumer prices. Using the parameters we estimate, we then simulate the impact of removing Mexican tomatoes from the U.S. market using our estimated parameters.

We use IO analysis to estimate the broader, macroeconomic impact of removing Mexican imports. IO models allow us to estimate the "multiplier," or the ripple effect of removing one dollar of retail value on all of the other activities involved in moving imported tomatoes through distribution, transportation, and to the consumer through retail stores. For imported food products, the supply chain involves not only the firms that directly handle the tomatoes, but all of other firms that supply services to the firms that do. IO analysis considers the value of all jobs related to the task of importing and selling tomatoes, for instance, removing imports obviates the need for truckers, distributors, packers, and all of the suppliers that support these firms. Losing their income also costs all government agencies lost tax revenue on both the sales generated by the imports, and income taxes on the workers employed by firms in the supply chain.

Data

We use data from three sources. First, the Economic Research Service (ERS) and the Agricultural Marketing Service (AMS) of the United States Department of Agriculture (USDA) collects and reports detailed data on tomato imports, both volume and prices, to

the U.S. from every source. The data are sufficiently granular to describe import value, quantity, and price for items of very specific description. For example, the USDA reports import volumes and values (from which we can infer an average price, or a "unit value index") for some 67 different product descriptions, including Cherry, Grape, Roma, TOV, and other varieties of direct interest to our analysis. USDA-AMS reports tomato import data for each port of entry, so we are able to estimate the share of tomato imports that move through wholesale markets in Texas and Arizona, the two primary entry points for Mexican tomatoes into the U.S. USDA data allows us to compare the relative variation in prices and shipments between imported, specialty products, and domestic US commodity tomatoes.

Second, we use [

]. We use the variation in prices and volumes in this data to estimate the elasticity of demand for several different varieties of tomato, both Mexican and U.S. in origin. We use these elasticity estimates to calculate the change in retail prices under a range of assumed supply-reduction scenarios associated with the imposition of tariffs on imported Mexican tomatoes.

Third, we use IO data for the states of Arizona and Texas from IMPLAN to estimate the aggregate, macroeconomic impact of losing tomato sales from Mexico.³ We use the IMPLAN data, and modeling framework, to estimate the multiplier effect of lost tomato sales on jobs in the U.S., wages, value added throughout the tomato supply chain in the U.S., and tax revenue at the state and federal levels. The IMPLAN modeling framework consists of hundreds of coefficients that measure the extent of the relationship between markets for production inputs (i.e., labor, materials, energy, capital and other items used to generate goods and services) and outputs across nearly everything produced in the U.S. economy. Because the data includes measures of how much each input costs when it enters a production process, and its value after transformation into a good or service of value, the IMPLAN software is able to measure

³For purposes of our analysis, we include imports into California, which are approximately 10% of the total, in the Arizona model. Therefore, the impacts for Arizona reflect an approximately 10% larger tomato-import economy than the data suggest. The larger Arizona impacts, however, should be roughly the size of the excluded California effects if we assume firms in the import-distribution-retail supply chain use approximately the same production technology in the two states.

the value added to the US economy of every commodity that enters into the production process. By removing a commodity from the economy, therefore, we are able to calculate, or back out, the lost value throughout the entire supply chain.

Results

In this section, we report the findings from each part of our analysis, first reporting the econometric analysis of the expected price, and retail sales, impact of removing Mexican tomato imports from the U.S., and then the macroeconomic impact of removing tomato imports on the economies of Arizona and Texas. In each case, we explain the assumptions involved in arriving at our findings, and their sensitivity to changing our base assumptions.

Impact on Consumer Prices: Base Assumption

In the first stage of our analysis, we calculate the expected change in consumer prices under a "Base Scenario" in which we assume the removal of all Mexican supplies from the U.S. market over the entire marketing year. Although this is an extreme scenario, we consider variations of our base assumptions in which we calculate the change in retail prices for a removal of only 50% of supplies from the U.S. market, and 25%. We show our findings from each variation of the Base Scenario in Figure 1 below.

This data in this figure shows that we expect the price of Roma tomatoes to be the most adversely affected by the loss in Mexican imports. Not only is the Mexican share of the U.S. market relatively large (85%, USDA-AMS), but Roma tomatoes are inelastic in demand so any shock to supply can be expected to produce relatively large changes in the market price. In Figure 1, we show that a complete loss of Mexican imports (Scenario 1) is expected to cause Roma prices to rise by 149.8%, or well over double, while Grape tomato prices are expected to rise by 42.9% and Cherry tomato prices by 39.4%. Over all of the varieties in our retail sample, we found an average price increase of some 52.0%. In general, our findings suggest that imposing tariffs on Mexican tomatoes will contribute to retail food price inflation, or at least cause consumers who are concerned with food price inflation to substitute away from tomatoes to other items.

In Figure 1, we also examine the sensitivity of our Base Scenario findings to other, less extreme, assumptions regarding the loss of Mexican tomato

imports. If the imposition of tariffs leads to only a 50% reduction in supply (Scenario 2), we expect Roma prices to rise by 74.9%, Grape tomato prices to rise by 21.4%, and Cherry tomato prices to rise by 19.7%. Over all retail tomatoes, we expect an average price increase of 26.0%. In Figure 1, we also show the expected increase in price for an "optimistic scenario" in which Mexican tomato supplies fall by only 25% (Scenario 3). In this case, we expect Roma tomato prices to rise by 37.5%, and all variety-prices are expected to rise by an average of 13.0%. Clearly, even in the most optimistic scenario, tomato prices will rise substantially relative to what they would have been otherwise.

Impact on Retail Sales: Base Assumption

We also use our econometric model of the retail tomato market to estimate the impact on retail sales of each supply-reduction scenario considered in Figure 1 above. We report these results in Figure 2. In this figure, we show that in the most extreme case in which all Mexican tomatoes are removed from the U.S. market (Scenario 1), we expect total retail sales of Roma tomatoes to fall by over \$1.3 billion per year, Grape tomato prices by \$394.0 million per year, and TOVs by \$225.0 million per year. In total, we expect a loss of some \$2.2 billion in retail tomato sales for just our sample of retailers.⁴ In Scenario 1, therefore, the loss of Mexican tomato sales represents a fully 31.7% loss in retail tomato-category revenue. Although Roma tomatoes are the lowest-priced variety in our retail data, the import volume from Mexico more than makes up for the difference in price, so Roma tomatoes represent the majority of lost retail sales under a worst-case scenario.

Our estimates in Figure 2 also show the less drastic 50% in supply in Scenario 2, and the most optimistic 25% reduction in Scenario 3. In each case, Roma tomato sales again fall by the most among all tomato varieties, with a \$664.0 million reduction in Scenario 2 and \$338.0 million in Scenario 3. Total retail tomato sales are expected to fall by \$1.1 billion in Scenario 2, and by \$548.0 million in Scenario 3, which represent sales reductions of 15.8% and 7.9%, respectively. Under the full range of assumptions in our analysis, therefore, retail sales are substantially lower after the imposition of tariffs.

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Figure 1. Expected Retail Price Increase

Source: Estimates from [], 100%, 50%, 25% Reduction in Mexican Tomato Supply

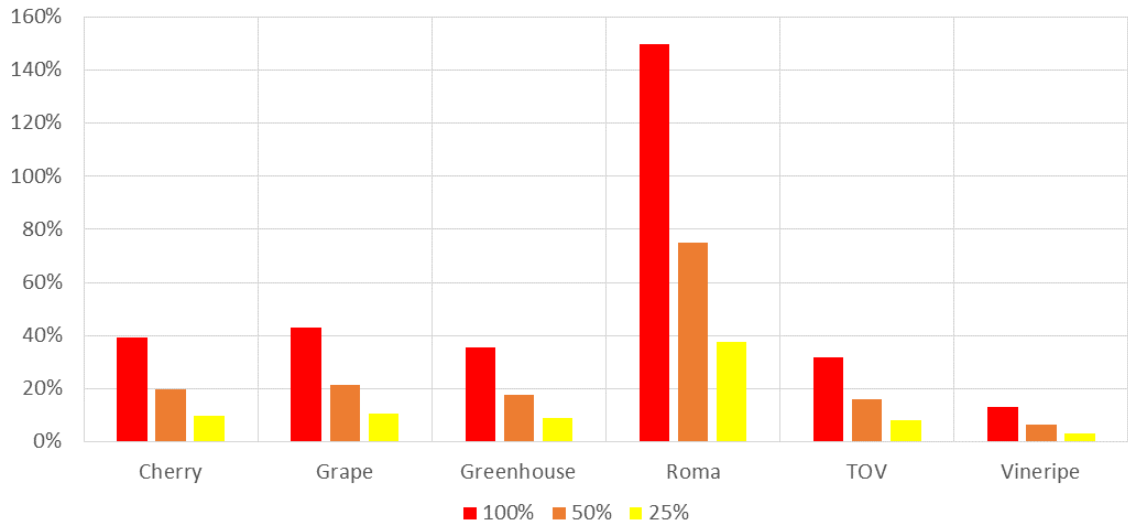
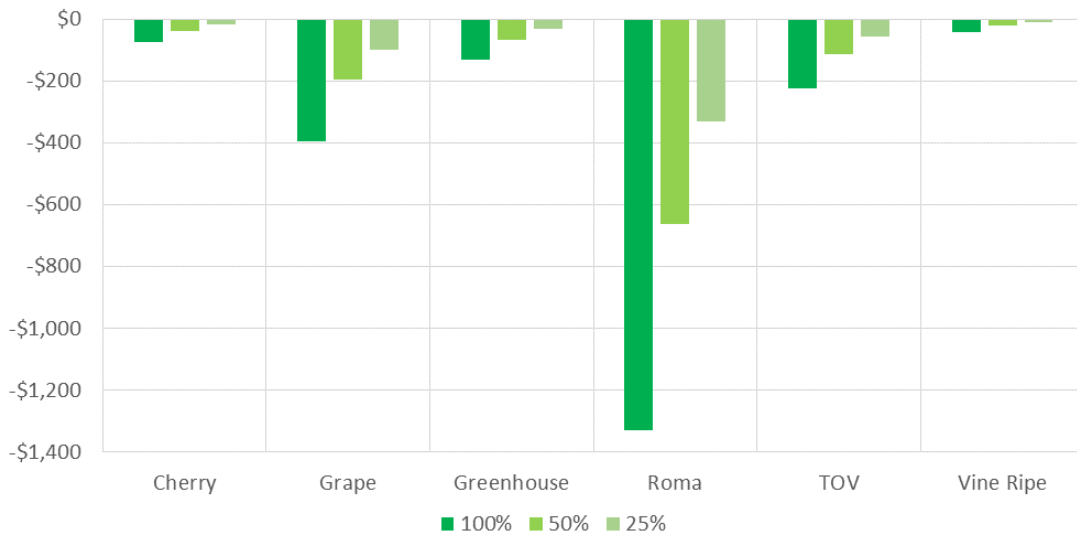


Figure 2. Expected Loss in Retail Revenue

Source: Estimates from [], 100%, 50%, 25% Reduction in Mexican Imports, M \$ per year



Impact on Consumer Prices: Seasonal Assumption

Our Base Assumption considers different levels of supply reduction on an annual level. Imports from Mexico, however, tend to be seasonal in nature and are generally higher during the spring (January - April) and fall (September - December) seasons. In Figure 3, therefore, we show our expected price increases during the spring and fall seasons for the Scenario 1 (100%) supply reduction case considered above. In the spring season, we expect Roma prices to again rise by the highest percentage, at 152.0%, followed by Grape (44.5%), Greenhouse (42.4%) and Cherry tomato prices (34.7%). On average, prices during the spring season are expected to rise by an average of 54.8% after the imposition of tariffs on tomatoes from Mexico. In the fall season, the pattern is similar with Roma prices rising by 146.4%, Cherry tomato prices by 46.5%, Grape prices by 44.0%, and Greenhouse prices by 35.7%. On average, we expect retail tomato prices to rise by 50.9% during the fall season, which is slightly lower than the expected increase during the spring due to the smaller presence of Mexican tomatoes in the U.S. retail market during this time.

Impact on Retail Sales: Seasonal Assumption

In Figure 4, we repeat our retail-sales loss calculations for the two seasonal scenarios considered in Figure 3 above. That is, we calculate the implied loss in retail sales during the spring and fall seasons, by variety and in total. In the spring season, a 100% reduction in Mexican tomato imports implies a loss of \$449.0 million in retail revenue from Roma tomatoes over the four-month period, while retail sales of Grape tomatoes are expected to fall by \$136.0 million, TOV by \$91.0 million, and Greenhouse tomatoes by \$52.0 million. Over the January - April production season, total retail sales are expected to fall by \$768.0 million. In the fall season, a similar reduction in supply is expected to lead to \$433.0 million in lost retail sales from Roma tomatoes, \$135.0 million less in Grape tomato sales, \$77.0 million lower TOV sales, and \$44.0 million less in retail Greenhouse tomato sales. Overall, we expect some \$717.0 million less in retail tomato sales during the fall season if Mexican imports are removed. In either seasonal scenario, therefore, the potential loss of tomato sales represents a substantial loss to the retail supermarket sector, and the tomato supply

chain as a whole.

Economic Impact

In this section, we explain the broader economic impacts of removing Mexican tomatoes from the U.S. economy, and specifically the two state economies that are likely to be most directly impacted: Arizona and Texas. In each case, we use USDA-AMS tomato-import data to estimate the total value of tomatoes imported to the U.S. for the last full marketing year (2022), and then compare USDA-AMS wholesale prices to [

] to calculate the implied retail value of lost tomato imports. We then apportion the lost retail value between Arizona and Texas according to the shares of Mexican imports arriving at each port of entry, and use this value as an estimate of the lost retail value from missing Mexican tomato sales. IMPLAN then calculates how much each dollar of lost retail value means in terms of lost jobs, sales of inputs to the transportation and distribution system, and taxes to each of the relevant government entities.

For the 2022 marketing year, the total value of tomatoes imported from Mexico was \$2.43 billion. [

], we find a markup percentage of 310.2%.⁵ Applying this markup value to the wholesale value of tomato imports, we find a total implied retail value of imported tomatoes of \$7.54 billion in 2022. We then allocate this retail value between Texas (61.2%) and Arizona (38.8%) in calculating the lost value of retail sales in each jurisdiction.

Arizona

We provide a summary of our findings regarding the macroeconomic impact of removing imports of Mexican tomatoes on the state of Arizona in Figure 5 below. In total, the economic impact of a 100% reduction in Mexican tomato imports represents a \$3.40 billion loss to the Arizona economy, and a loss of some 22,712 jobs. In this figure, we show that the \$3.40 billion loss is comprised of \$596.9 million in lost retail output, \$504.1 million in the wholesale or distribution sector, \$162.6 million in transportation,

⁵Note that this markup value is a gross markup, and includes simply differences in retail and wholesale prices and does not account for any intermediate handling transactions, cost of handling, taxes, or freight charges. For this reason, our markup estimate is not intended to represent an attempt to calculate the profitability of firms in the wholesale sector.

Figure 3. Expected Retail Price Increase

Source: Estimates from [], 100% Reduction in Volume, Jan – April and Sept – Dec

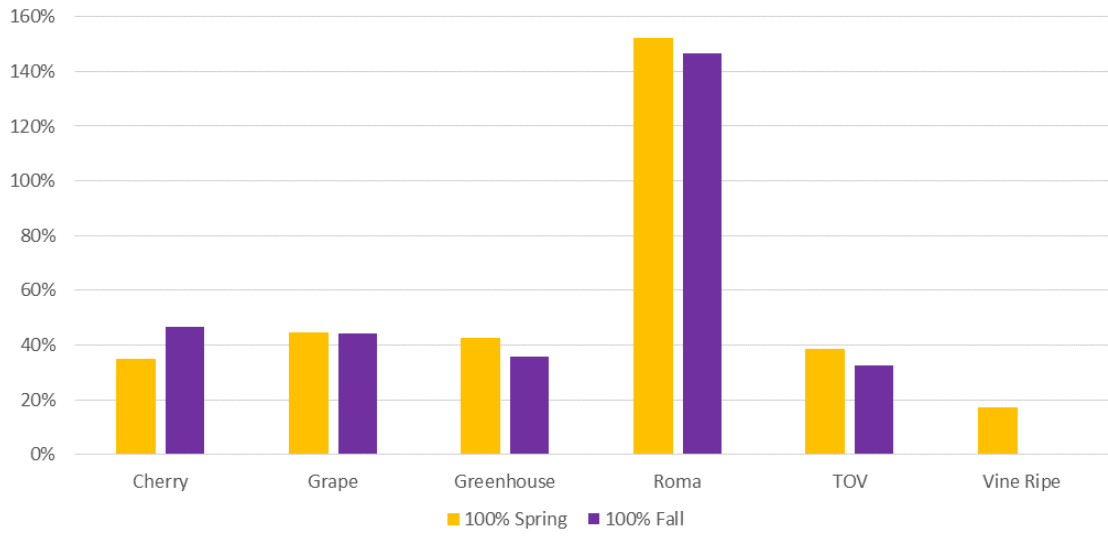
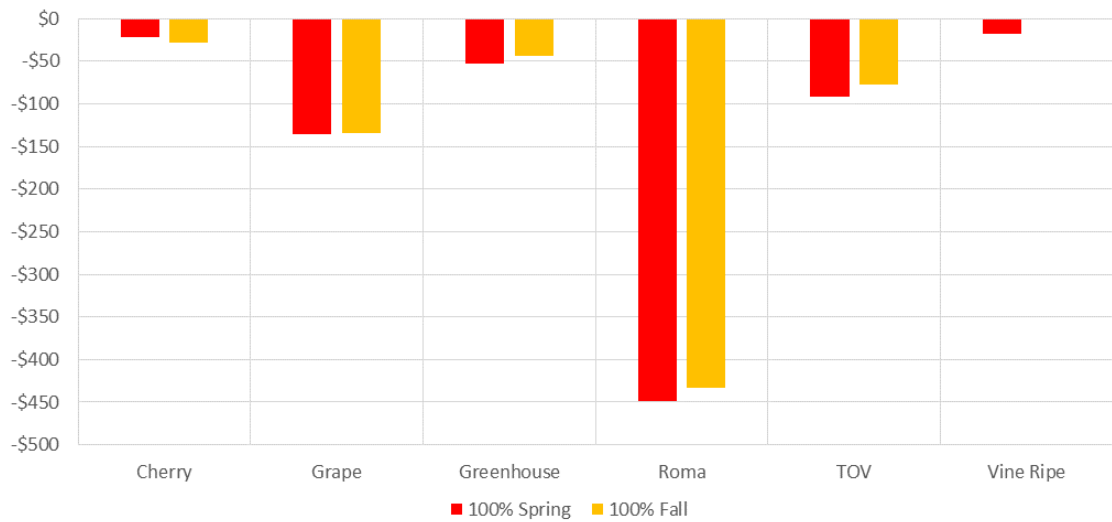


Figure 4. Expected Reduction in Retail Revenue

Source: Estimates from [], 100% Loss of Mexican Imports, Jan - Apr and Sept - Dec, \$ M / year



and the rest is dispersed among dozens of different industries that supply services to the retail and wholesale food distribution sector. Further, of the jobs potentially lost to the removal of Mexican imports, fully 6,797 of the jobs are in the retail food sector, and a further 2,037 in wholesale distribution.

The economic impacts in Figure 5 are either "direct" loss, or reductions in the output of the sector directly, "indirect" through service or input provision to a directly-impacted sector, or "induced" through changes in income and spending by individuals employed in the direct or indirect sectors. In this regard, we find that some \$1.24 billion of the economic impact in Arizona is direct, \$986.0 million is indirect, and a further \$1.18 billion is induced. Most of the macroeconomic impact felt by tomato imports, therefore, come from the "multiplier effects" described above, or the tendency of dollars created somewhere in the economy to generate further economic value elsewhere in the supply chain.

Reducing imports also lowers the amount of "value added" in the importing economy. Value added is defined as the difference between the value of the final output and all of the costs incurred in producing and transporting it to the final retail user. In a competitive economy, like the U.S. economy, it is generally calculated as the sum of the income earned by employees involved in producing and transporting the product before it is used. In this sense, removing Mexican tomato imports is expected to cost the Arizona economy some \$660.8 million in value added.

Taxes are another important consideration when measuring the macroeconomic contribution of an industry to a state, or national, economy. In our case, we measure the value of forgone taxes to the Arizona and federal coffers if Mexican tomatoes, and their associated supply-chain values, are excluded from the economy. If we reduce the value of Mexican imports to zero, we find that federal taxes are lower by some \$293.8 million, state of Arizona taxes fall by \$123.3 million, and county taxes throughout the state of Arizona fall by \$15.8 million. We recognize that some of the loss in federal taxes will be recouped, in theory, but the amount of tariff revenue raised, but if imports truly fall to zero there will also be no tariff revenue as they will be exclusionary.

Texas

We conduct the same macroeconomic analysis for the state of Texas. In general, the pattern of results are the same as for the state of Arizona, but Texas accounts for a larger share of Mexican tomato imports,

so the values are correspondingly larger. Because the structure of the tomato supply chain differs slightly between the two states, however, the relative values of each component of the analysis can be quite a bit different. The IO results for the state of Texas are in Figure 6 below.

In this figure, we show that the total macroeconomic loss to the state of Texas from removing Mexican tomato exports is \$4.53 billion, consisting of \$989.7 million loss to the retail food industry, \$816.3 million to the food wholesaling sector, \$266.5 to the trucking industry, and the remainder spread among many other industries that serve the retail food supply chain.

Like Arizona, the number of people employed, directly and indirectly, in the movement and handling of tomatoes from Mexico is substantial. We show the employment impacts for both Texas and Arizona in Figure 7 below. If we reduce all Mexican tomato imports to Texas to zero, the number of lost jobs is expected to be 32,011, with 11,117 in food retailing, 3,205 in wholesaling, 1,466 in trucking, and the others in occupations like real estate, insurance, fuel and other industries that provide goods and services to food supply chain activities.

The state of Texas stands to lose some \$2.68 billion in value added, which consists of almost \$1.44 billion in employee compensation. Employee compensation, in turn, generates employee spending, which fuels the induced losses in economic activity shown in Figure 6 above. Similar to Arizona, the lost economic activity in Texas also implies significant losses in tax revenue. Based on the lost tomato sales in Texas, the federal government stands to levy \$301.7 million less in taxes, the state of Texas \$112.9 million less, and counties in Texas will earn \$24.6 million less than otherwise. In real terms, lower tax revenue at the state and local levels in Texas and Arizona mean less money for schools, roads, local police and fire departments, among the many other activities funded by non-federal entities.

Conclusion

In conclusion, our economic analysis of the proposed tariffs on tomatoes imported from Mexico stand to impose real costs on the U.S. economy. Consumers can expect to pay prices that average some 50.0% higher than they currently are, and grocery retailers, extrapolating from the sample of retailers in our sample, will earn almost \$7.53 billion less in revenue. In the two states that we expect to be impacted

Figure 5. Economic Impact of Mexican Tomato Imports: Arizona
 Source: Estimates from IMPLAN Input / Output Modeling Software, ERS-USDA Tomato Market Data

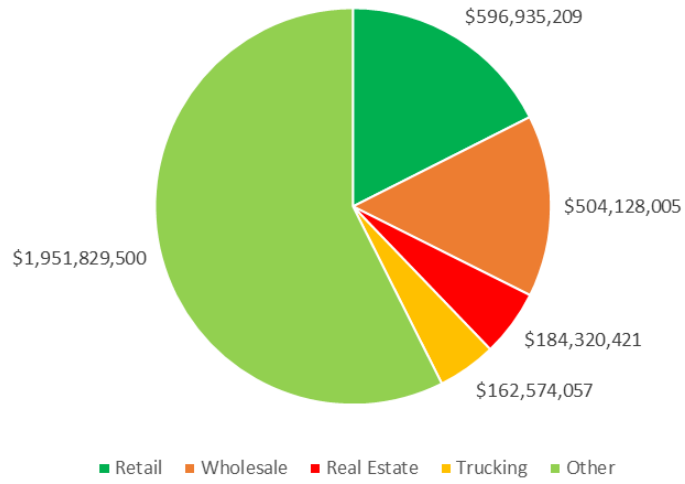


Figure 6. Economic Impact of Mexican Tomato Imports: Texas
 Source: Estimates from IMPLAN Input / Output Modeling Software, ERS-USDA Tomato Market Data

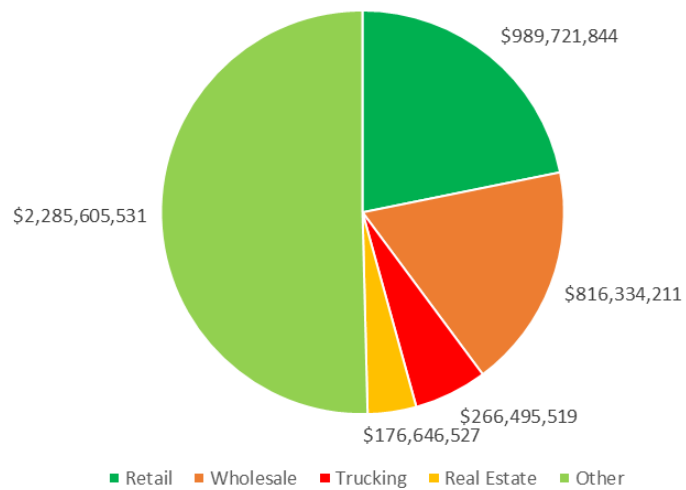
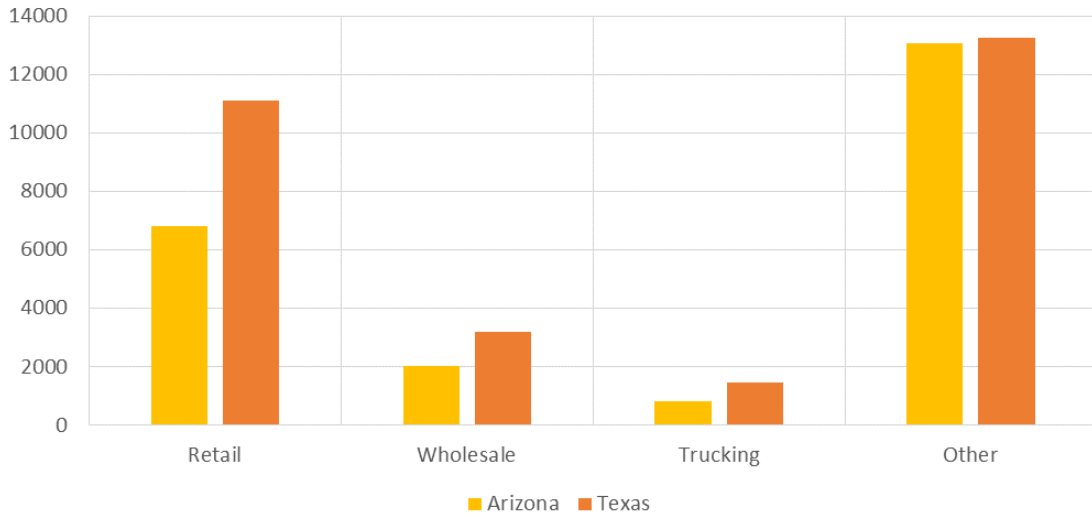


Figure 7. Employment Impact of Mexican Tomato Imports: Arizona and Texas

Source: Estimates from IMPLAN Input / Output Modeling Software, ERS-USDA Tomato Market Data



directly by the loss in Mexican tomato imports, we find that economic activity in Arizona will fall by almost \$3.40 billion, while economic losses in Texas are over \$4.53 billion. Further, the total number of jobs supported by Mexican tomato imports number 22,712 in Arizona and over 32,000 in Texas. In short, tomatoes imported from Mexico generate economic value far beyond their retail value, and support jobs, businesses, and tax revenue in local communities throughout the U.S.