**Trade liberalization in the presence of domestic regulations:**
**Impacts of the proposed EU-U.S. free trade agreement on wine markets**

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**Abstract**: The United States and the European Union have embarked on ambitious negotiations to create a comprehensive free trade agreement known as the Transatlantic Trade and Investment Partnership (TTIP). Agricultural markets receive relatively high levels of support and protection in both regions, and therefore are sensitive to the discussions surrounding the TTIP. Wine is the highest valued agricultural product traded between the United States and the EU, and any reduction in trade barriers resulting from the TTIP has the capacity to generate additional trade in this sector. We carefully develop parameters to characterize the effects of tariffs and domestic regulations that affect production and consumption of wine in these two regions. Results show that reductions in tariffs would have relatively small effects in these wine markets, whereas reductions in EU domestic policies that affect wine grape production would have much larger trade and welfare implications.

*Keywords*: Domestic regulations, EU-U.S. Free Trade Agreement, Non-tariff barriers, Simulation model, Trade policy, Wine.

*JEL classification*: Q13, Q17

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## Introduction

The United States and the European Union (EU) have embarked on ambitious negotiations to create a comprehensive free trade agreement known as the Transatlantic Trade and Investment Partnership (TTIP). The TTIP The agreement aims to promote trade between the two regions through three mechanisms: i) increasing market access, ii) enhancing regulatory coherence and cooperation, and iii) developing and updating trade rules. Many expect that the TTIP negotiations concerning market access and trade rules will progress without significant debate (Akhtar and Jones, 2013), while the discussions concerning issues over domestic regulations will continue to be highly contested.

Agricultural markets receive relatively high levels of support and protection in both regions, and therefore are sensitive to the discussions surrounding the TTIP. It is widely expected that the liberalization of trade barriers, including tariffs and other non-tariff barriers, as well as various domestic regulations will affect agricultural markets in both regions. Data that describe the value and the share of trade flows between the United States and the EU show that wine is the most valuable traded product between these regions (USDA-FAS, 2012). The United States imported $3.5 billion of wine from the EU in 2012, and this represented over 20% of the total value of U.S. agricultural imports from the EU. The EU members imported $470 million of wine from the United States in 2012, and wine was the fourth most important imported agricultural product that represented nearly 5% of total EU agricultural imports.

Overall, wine is the highest valued agricultural product traded between the United States and the EU, and any reduction in trade barriers as a result of the TTIP has the capacity to generate additional trade and will lead to changes in welfare among stakeholders in this sector.

Discussions concerning TTIP have focused on reducing tariffs as well as reforming EU and U.S. domestic policies that impact wine trade. The objective of this paper is to better understand how changes in trade barriers and domestic regulations will impact markets for wine in the United States, the EU, and elsewhere. We pay special attention to the domestic regulations as they apply to restrictions on grapes used to produce wine in the EU and as they apply to the consumption of differentiated products available in the United States.

Economists have devoted some attention to the global implications from potential reductions in subsidies and tariffs for agricultural commodities as both have been included on the negotiating agenda of the World Trade Organization (Bagwell and Staiger, 2001), but there is very little research that examines these issues for the key products that are expected to be impacted by the TTIP. Wine is an ideal product to study for three reasons. First, it is the most highly valued agricultural product traded between the United States and the EU. Second, unlike many other products, there continues to be non-trivial tariffs that are applied at different rates for bulk and the range of bottled wine products in both regions. Third, trade in wine is affected by a range of domestic support measures and regulations in both regions. The EU has had a long history of supporting wine grape production, while in the United States we see a highly regulated industry that governs the sales and distribution of wine (particularly in the eastern states that do not produce wine). In particular, the domestic regulations that exist create a class of non-tariff measures (NTMs), and issues surrounding this group of NTMs are central to the TTIP negotiations.

**A description of the policy environment**

Similar to other agricultural commodities, EU-U.S. trade in wine is affected by a range of trade barriers, including tariffs and domestic regulations. Quantifying the effects of changes in tariffs is relatively straightforward, but parameterizing the effects of domestic policies and then understanding how changes in the domestic policies affect trade and welfare is more difficult. Below we describe and develop parameters that carefully consider the effects of reform for key trade barriers to better understand the relative impact of each policy on welfare and trade flows between the United States and the EU.

Both regions apply tariffs, yet in both regions tariffs differ for bulk and bottled wine products[1]. Although tariffs for many products that are traded between the United States and the EU, including some agricultural commodities, are relatively small, the tariffs applied to certain wine products are non-trivial. As shown in Table 1, the ad valorem tariffs for non-premium (bulk) wine are higher than those for the bottled wine products; the ad valorem tariff rates for bottled wine range between 1.3% and 8.9% whereas tariffs for bulk wine range between 12.7% and 17.8%. Our simulation model will consider the economic effects of a 50% cut in these tariff rates. The analysis of reductions in tariffs may be complicated by additional provisions that allow for duty drawbacks on certain international shipments of wine (see Sumner et al. 2011); because we do not address duty drawback provisions in our analysis we consider our results to illustrate an upper bound on the effects of tariff liberalization.

In addition to tariffs, there is a wide range of domestic regulations that apply to wine and to various products and practices used to manufacture wine. Negotiations about international trade agreements often focus on the trade distorting effects from domestic policies and regulations, and it is expected that domestic regulations in EU and U.S. wine markets will continue to be scrutinized as part of the TTIP negotiations. In the EU, there are various domestic regulations that affect wine and grape production and production practices. EU agricultural policy has had a long history of regulating and supporting producers of wine grapes through various quantity and quality provisions (for a nice summary, see Meloni and Swinnen, 2013). In the United States there exists a complicated arrangement of rules that affect wine consumption via laws regulating distribution and sales (Riekhof and Sykuta, 2005; Rickard, 2012; Ellig and Wiseman, 2013). The ad valorem equivalents for selected domestic regulations are shown in Table 1 and explained in greater detail next.

The economic effects of EU policies applied to wine grape production have been reasonably well examined in the literature (e.g., Critz, Olmstead, and Rhode, 1999; Deconinck and Swinnen, 2015); in addition, indexes, such as the commonly used OECD Producer Support Estimate (PSE), have been created to quantify the economic effects of specific policies in selected countries including wine policies in the EU (Anderson et al., 2008; OECD, 2010). Meloni and Swinnen (2013) discuss the pattern of the PSE for wine in the EU between 1985 and 2011, and show that it has fallen to less than 1% since 2010 due to a significant decrease in market price supports by the European Commission (EC). However, Meloni and Swinnen (2013) also highlight that the total EC budget for wine has remained relatively constant over this timeframe at approximately $1 billion annually; this represents 7.5% of the total production value of wine in the period between 2008 and 2011. Between 1985 and 2011, the share of the budget allocated to the distillation activities decreased from 73% to 20%, whereas the share of the budget allocated to supply control activities (grubbing up premiums and vineyard restructuring subsidies) increased from approximately 3% to 51%.

In the analysis below we examine the economic effects of reform for the supply control policies in the EU. Between 2008 and 2011, the EC spent approximately €675 million (equivalently $875 million) on grubbing-up premiums and vineyard restructuring and conversion subsidies (Meloni and Swinnen, 2013). We convert this expenditure into an ad valorem subsidy using information about the total supply of wine grapes and the unit value of wine grapes in the EU. There are approximately 20.1 million tons of grapes used to produce wine in the EU and the unit value of wine grapes is approximately $379 per ton (Anderson and Nelgen, 2011). By dividing the total budget expenditure by the supply of grapes, we calculate that the supply control policies provided approximately $43 of support (equivalently €34) per ton of grapes. This per ton rate of support is converted to an ad valorem rate of 11.3% based on the unit value for wine grapes; we employ this value in a policy shock parameter in our simulation analysis.

In the United States there exist two types of domestic regulations that are widely considered to affect the demand for wine. The first is a set of state-specific regulations that affect the retail availability of wine. The second is another set of state-specific regulations that affect the distribution of wine and specifically affect interstate sales of wine. Because the regulations that govern retail availability of wine are expected to have far greater consequences for EU wine producers and exporters, we focus on this set of regulations in our analysis.[2] There are 17 states that restrict the retail availability of wine; all of the states that restrict wine sales in grocery stores are in the 47 states east of California, Oregon, and Washington (a region we refer to as the Eastern United States in our analysis).[3] Using state level data, Rickard, Costanigro, and Garg (2013) estimate that wine prices are 6.2% higher in the group of states with restrictions on the retail availability of wine. Applying this estimate to the share of the population living in these states in the Eastern U.S. region (34%), we define the price effect of restricted retail availability of wine in the Eastern U.S. region as 2.1%. This value is shown in Table 1 and we use it to develop a policy shock parameter in our simulation model.

Although we do not consider the rules concerning wine labeling in our analysis, there exist a plethora of rules that govern the information required on wine labels, as well as the information that is allowed on labels. The use of particular information related to geographical indications and the use of appellation names for wine has been a contentious trade issue between the United States and the European Union (Creditt, 2009). However, in 2006 the EU and the United States signed an agreement, enforced by the U.S. Department of the Treasury, Alcohol and Tobacco Tax and Trade Bureau that prohibits wine producers in the United States and in the EU from using selected appellation names on their labels (TTB, 2006).

**Simulation model**

The collective economic effects of wine policies in the United States and in the EU have not been studied closely, in part, because the policies are complicated and are not easily modeled. Here we adopt a two-step framework to examine the effects of policy reform in wine markets in the EU, U.S., and a rest-of-the-world (ROW) region. The U.S. region is further disaggregated into a Western U.S. region (that produces and consumes wine) and an Eastern U.S. region (that consumes wine)[4]. First, we carefully develop parameters to characterize the effects of tariffs for bulk wine and three bottled wine products, domestic policies in the EU that affect wine grape production, and domestic regulations in the United States that impact retail availability of wine in selected states in the Eastern U.S. In the second step of our framework, we employ these parameters in a partial equilibrium model to simulate how changes in EU and U.S. trade barriers will affect wine markets. Results from the simulation analyses are subsequently used to calculate welfare measures for the key stakeholders.

Following Alston, Norton, and Pardey (1995), a set of equations is used to describe the supply, demand, and international market clearing conditions for twelve differentiated wine products and the related input markets for grapes and marketing services in each region. The model includes four regions (Europe, Eastern U.S., Western U.S., and ROW) of which three regions produce wine; in each production region we include four wine products: non-premium (bulk), commercial-premium, super-premium, and sparkling wine. The multi-market model facilitates a comparison of the effects of changes in domestic regulations and tariffs when they apply at different stages within an industry. Adding additional regions and allowing for more product variety would shed light on the impacts across a wider range of stakeholders; however, this would require much further parameterization of the model and many of the additional parameters that would be needed are not known with any degree of certainty. Wine is treated as a separable group in the analysis and substitution effects between wine and other alcoholic beverages are assumed to be negligible (Ogwang and Cho, 2009).

The model solves proportional changes in quantities and prices given a set of parameters that describe market conditions in the wine sectors in each region. The model is used to simulate changes by employing parameters that introduce exogenous shocks that characterize changes in the policies identified above. Muth (1964) provided the derivations for the one-output, two-input model, and applied it to a case in housing and urban land economics. Gardner (1987); Piggott (1992); Alston, Norton, and Pardey (1995); and Alston and James (2002) review the derivations of various equilibrium displacement models, and agricultural economists have adapted them to study a wide range of research topics. The basic structure of the model includes demand for the wine products, supply of grapes, derived demand for grapes, derived supply of wine, and market clearing conditions. Parameters include the elasticity of supply for each input, the elasticity of demand for each output, input shares, initial equilibrium quantities, cost shares, and policy shocks driven by changes in prices of grapes or wines.

Our model considers four regions; each region consumes twelve differentiated products where each producing regions produces four wine products using two inputs. In equation (1) through (8), the term $Q$ is used to denote a quantity in an output market, $X$ denotes a quantity in an input market, $P$ denotes a price in an output market, and $W$ denotes a price in an input market. For prices in input markets and quantities in input and output markets, the suffix $D$ denotes a variable on the demand side, and the suffix $S$ denotes a variable on the supply side. In the notation below we use subscript $h$ to denote an input market, subscript $j$ to denote an output market, and superscript $y$ to denote a region**.** Assuming that each production function in this industry exhibits constant returns to scale, the industry total cost function $(TC_j^y)$ is the product of the unit cost function of product $j$ in region $y$, namely $c_j^y$, and the quantity supplied of processed product $j$ in region $y$, namely $QS_j^y$. We assume that the unit cost functions are independent across products.

| | | |
|---|---|---|
| (1) | $QD_j^y = f_j^y(\boldsymbol{P}^y, \boldsymbol{v}^y)$ | Output demand |
| (2) | $XD_{hj}^y = (\partial c_j^y(\cdot) / \partial WD_h^y) QS_j^y$ | Factor demand |
| (3) | $XS_h^y = f_h^y(WS_h^y, \boldsymbol{u}^y)$ | Factor supply |
| (4) | $P_j^y = \partial TC_j^y(\cdot) / \partial QS_j^y$ | Marginal cost equals domestic price |
| (5) | $P_j^y = P_j^w(1+\beta_j^y)$ | Internal arbitrage conditions |
| (6) | $WD_h^y = WS_h^y(1+\delta_h^y)$ | Factor price market clearing condition |
| (7) | $QD_j^y = QS_j^y + \sum_{z \neq y}(QS_j^z - QD_j^z)$ | International market clearing condition |
| (8) | $XS_h^y = \sum_j XD_{hj}^y$ | Factor quantity market clearing condition |

Equation (1) represents demand for wine product $j$ in region $y$. Demand for the wine product is a function of all output prices $(\boldsymbol{P}_j^y)$ and a vector of exogenous variables $(\boldsymbol{v}^y)$. Equation (2) represents the derived demand for input $h$, as it is used in the production of product $j$ in region $y$. Equation (3) represents the supply of input $h$ in region $y$; it is a function of input prices and a vector of exogenous variables $(\boldsymbol{u}^y)$. Linkages between agriculture and the rest of the economy are represented by $f_h^y(\cdot)$, an upward sloping supply function for input $h$. Equation (4) represents the long-run condition that the price of a wine product equals the marginal cost for product $j$ in region $y$.

Market equilibrium conditions begin with equation (4), which determines the price of product $j$ in region $y$. There are thousands of growers of wine grapes in all three production regions in our model and also many wineries processing those grapes, and both prices and market information for grapes and wines in many regions are widely available. For these reasons, and to simplify our model, we assume that the wine industry operates under perfect competition. Equation (5) represents the relationship between price of the traded output and the world price $(P_j^w)$ where $\beta_j^y$ represents the ad valorem price wedge created by a trade barrier (tariffs) or internal barriers that affect the prices of wines applied to product $j$ in region $y$. Equation (4) is used to represent the price of product $j$ from the exporting region, and equation (5) is used to represent the prices of products in the importing regions. Equation (6) represents the relationship between the price paid for grapes by wineries and the price received by grape growers; $\delta_h^y$ represents the ad valorem price wedge created by a domestic support policy for input $h$ in region $y$. In cases where domestic support does not apply to a specific input, $\delta_h^y$ is set equal to zero, and the price paid by processors is equivalent to the price received by growers.

Equation (7) is the international market clearing condition for the quantities of wine products. Equation (8) is the equilibrium condition in the input markets.

Totally differentiating equations (1) to (8), and converting to elasticity form yields the linear elasticity model in equations (9) to (16). Equilibrium adjustments can be simulated by exogenously specifying changes in the policy parameters. In the following equations, for any variable $A$, $E(A)$ represents the relative change in $A$, that is, $E(A)$ represents $dA/A$ where $d$ refers to a total differential.

(9) $$E(QD_j^y) = \eta_{jj}^y E(P_j^y) + \sum_{k \neq j} \eta_{jk}^y E(P_k^y)$$

(10) $$E(XD_{hj}^y) = E(QS_j^y) + \sum_{i \neq h} \kappa_{ij}^y \sigma_{hij}^y \left[ E(WD_j^y) - E(WD_h^y) \right]$$

(11) $$E(XS_h^y) = \varepsilon_h^y E(WS_h^y)$$

(12) $$E(P_j^y) = \sum_h \kappa_{hj}^y E(WD_h^y)$$

(13) $$E(P_j^y) = E(P_j^w) + E(1 + \beta_j^y)$$

(14) $$E(WD_h^y) = E(WS_h^y) + E(1 + \delta_h^y)$$

(15) $$E(QD_j^y) = (QS_j^y / QD_j^y) E(QS_j^y) + \sum_{z \neq y} \left[ (QS_j^z / QD_j^y) QS_j^z - (QD_j^z / QD_j^y) QD_j^z \right]$$

(16) $$E(XS_h^y) = \sum_j \lambda_{hj}^y E(XD_{hj}^y)$$

The price elasticity of demand for wine product $j$ with respect to the price of another wine product $k$ in region $y$ is represented by $\eta_{jk}^y$. The own-price elasticity of supply of input $h$ in region $y$ is represented by $\varepsilon_h^y$. The cost share of input $h$ in the production of $j$ in region $y$ is denoted as $\kappa_{hj}^y$. The industry share of input $h$ used in the production of $j$ in region $y$ is $\lambda_{hj}^y$.

The term $E(1+\beta_j^y)$ represents a change in the ad valorem rate of the trade barrier applied to product $j$ by region $y$, and the term $E(1+\delta_h^y)$ represents a change in the ad valorem rate of domestic support applied to input $h$ by region $y$. In equation (15), $(QD_j^z / QD_j^y)$ is the quantity consumed in region *z* (quantities imported from region $y$ to region $z$) relative to consumption in region *y*, for product *j*.

The results from the simulation model also yield changes in measures of economic welfare. The changes in economic welfare accruing to consumers of product $j$ in region $y$ $(\Delta CS_j^y)$ and to the suppliers of production factors $h$ in region $y$ $(\Delta PS_h^y)$ are measured in terms of changes in factor and product prices and quantities in equation (17) and (18).

(17) $$\Delta CS_j^y = -P_j^y QD_j^y E(P_j^y)\left[1+0.5E(QD_j^y)\right]$$

(18) $$\Delta PS_h^y = WS_h^y XS_h^y E(WS_h^y)\left[1+0.5E(XS_h^y)\right]$$

The change in total producer surplus in region $y$ is the sum of the producer surplus from each factor market, $\Delta PS^y = \sum_h (\Delta PS_h^y)$, and the change in the total consumer surplus in region $y$ is the sum of the consumer surplus across output markets, $\Delta CS^y = \sum_j (\Delta CS_j^y)$.

Using the linear elasticity model outlined in equations (9) to (16), equilibrium adjustments can be simulated by specifying an exogenous change in: i) tariffs via parameter $\beta_j^y$, ii) internal barriers affecting availability (and prices) of wine via parameter $\beta_j^y$, and iii) policies that provide domestic support for an input via parameter $\delta_h^y$. The model will be used to solve for proportional changes in prices and quantities in all markets. To calculate the effects of partial reform (e.g., reducing domestic support or border measures), only the relevant terms are included in the simulation model which simplifies the equations.  The effects of reducing import tariff rates and reducing EU and U.S. domestic regulations are simulated separately, as are the effects of reducing border measures and domestic regulations simultaneously.  The results from the simulation model will describe the changes in prices, quantities, and welfare measures across the various output products, factors of production, and regions.

**Model Parameters**

The simulation model requires parameters for various demand and supply elasticities of wine and wine grapes.  We do not estimate demand and supply elasticities here but rather use estimates from the literature.  Elasticity estimates for the specific wines that we include in our analysis are not available; however, we use the available estimates for more aggregate categories of wine in select regions (for a nice summary see Fogarty, 2008) to calculate a matrix of demand elasticities following the Armington (1969) approach.  The Armington approach requires an overall demand elasticity for wine in each region, consumption shares for wines by region, and a measure of the substitutability between wines by region.  Using results from Carew, Florkowski, and He (2004) and Trolldal (2005) we specify the overall own-price elasticity of demand for wine at -0.5 and use data from Anderson and Nelgen (2011) to identify the consumption shares and substitution parameters needed in the elasticity calculations.[5]

Elasticites estimated by Volpe, Green, and Heien (2008) are used to set supply parameters in the simulation model. The supply of bulk wine is expected to be more elastic (even in the short run) and is set higher that the elasticities for the bottled wine categories in the baseline model.  We assume that there are very few cross product impacts on the supply side and therefore set cross price elasticities of supply equal to zero in all of the simulations.  A summary of the key parameters used in the simulation model are shown in Table 2.

The model is used to consider three types of policy experiments: i) the effects of reductions in tariffs (for both bulk and bottled wines), ii) the effects of reductions in domestic regulations in the United States that limit the retail availability of wine in the eastern U.S. region, and iii) reductions in EU supply control policies applied to wine grapes. We examine the effects of reductions that apply to a specific type of policy as a way to compare the relative effects of reform to the various policies. Then, because reductions in one policy parameter may have unintended consequences in the application of other policies (e.g., a reduction in tariffs for wine may impact grape production and then affect the application of EU domestic support to grapes), we examine the effects of reductions in multiple policy tools.

**Results**

We simulate the effects of a 50% reduction in EU tariffs on U.S. wine and on U.S. tariffs on EU wine, as well as 50% reductions in selected domestic regulations applied to EU and U.S. wine markets. The exogenous policy changes used in our simulations are reductions in the ad valorem rates presented in Table 1 and discussed above. We present our baseline simulation results and also consider a range of plausible parameters to check the robustness of our baseline simulation results.[6] Our simulation model generates results for changes in prices and quantities, and we use these changes to calculate changes in welfare associated with reductions in each of these policies, and from reductions across all policies. In the discussion below we focus on the welfare effects in each of the four regions for the simulated policy changes.

In Table 3 we show the consumer welfare results for the three simulations. Region-specific results are shown (in the rows) across the various wine products (in the columns); we also highlight the total consumer welfare effects by region and across regions in the final column. Here we see that a 50% reduction in EU and U.S. tariffs will increase consumer welfare in Europe and in the ROW, and will decrease consumer welfare in the United States (largely due to higher prices for bottled wine products produced, and consumed, in the Western U.S.). The net effect to consumers across all regions is negligible. However, we see much larger changes in consumer surplus for the other two simulations reported in Table 3. A 50% reduction in U.S. regulations that limit the retail availability of wine in selected Eastern U.S. markets would lead to a $85 million increase in consumer surplus in the Eastern U.S., and a net increase to all regions of $92 million. The final set of results show the consumer welfare effects for a 50% reduction in the supply control measures used in the EU, and here we see a substantial increase in EU consumer surplus and a notable increase in consumer surplus in the United States and ROW; the net change in consumer surplus across regions is $345 million.

Table 4 outlines the welfare changes to producers of grapes and marketing services for each policy scenario considered in Table 3; Table 3 also serves as a summary of welfare results showing the total welfare effects for producers, consumers, and the net effect for consumers and producers.[7] The first simulation that focuses on tariff reductions shows a negative welfare change for EU producers and a positive change for U.S. producers. The net effect for producers and consumers is positive in the EU and in the United States; it is $25 million in the EU and $9 million in the United States, and approximately $33 million across all regions. The second simulation indicates that reducing regulations on the retail availability of wine in the Eastern U.S. region will generate small welfare gains for producers of grapes in all regions but larger welfare losses for suppliers of marketing services in all regions, most notably in the Western U.S. region. It seems plausible that an expansion in the number of retailers that are procuring wine in the Eastern U.S. will increase competition (and decrease margins) for firms that distribute wine. Overall, the net effects from the second simulation show a net welfare gain of

$80 million, and it is driven largely by the increase in consumer surplus in the Eastern U.S. region. The full welfare results from the third simulation indicate that reductions in EU supply controls would lead to substantial welfare losses for EU producers of grapes, and smaller welfare losses for EU suppliers of marketing services. Input suppliers in other regions would also see welfare losses as the relaxation of EU supply controls would increase the supply of wine from the EU that would further increase competition with wines (and the inputs used to manufacture wines) produced in the non-EU regions. The net welfare effects in the third simulation are $143 million; of the three policy scenarios studied, this one would generate the largest net welfare effect across all regions.

In addition to examining the effects of reform for isolated policies, we also simulate the effects when reform is introduced for multiple policies as part of trade discussions and negotiations. We consider scenarios with cuts to tariffs and domestic regulations, cuts to both sets of domestic regulations, and cuts to all policy parameters. Results for these four additional simulations are shown in Table 5 and follow a similar presentation as those in Table 4. In Table 5 we first show results from a simulation that reduces EU and U.S. tariffs by 50% and reduces U.S. regulations on retail availability of wine. Here the producer welfare effects are similar to the simulation that focuses only on tariff reductions, but the U.S. consumer welfare effects are positive and substantial; the net welfare effect across regions is $113 million. The second simulation shown in Table 5 considers tariff reductions and reductions in EU domestic support; the net welfare result here of $176 million is similar to that from the simulation that focused only on reductions in EU domestic support but with positive welfare changes for U.S. producers. The third simulation examined the effects of reductions to EU and U.S. domestic support and regulations; here we see clear welfare losses for producers in all regions and welfare gains to consumers in all regions, and a net welfare change of $223 million. The final simulation in Table 5 considers reductions in tariffs, EU domestic support, and U.S. regulations on retail availability of wine, and here we find an overall negative, yet mixed result for producers, welfare gains for consumers, and a net welfare effect of $256 million.

**Conclusion and Policy Implications**

This research is motivated by the discussions surrounding the TTIP between the EU and the United States. It is also motivated by the amount of trade that already occurs between these two regions in wine, and by the recent agreement between the two regions concerning the labelling of wine. For all of these reasons, we expect that the TTIP has the capacity to be an important consideration for stakeholders in the wine sector in both regions.

It is important for policy makers to understand the likely trade and welfare effects for various policy changes that are being, or that might be, considered as part of the TTIP negotiations or in future trade negotiations. It is equally important for producers and exporters of wine to understand the key factors that influence their welfare as a result of expanded wine trade between the United States and the EU. The simulation experiments analyzed in this research shed some light on how different TTIP outcomes may influence wine markets; furthermore, the analysis provides a useful platform for examining the role of TTIP on food and agricultural markets that include differentiated products and that face a host of border measures and domestic regulations.

Our findings suggest that tariffs are not the most important trade barrier in the TTIP negotiations for wine trade between the EU and the United States. This is due, in part, to the fact that tariffs are already quite low for the bottled wine products and only remain important for trade in bulk wine. Reductions in EU domestic support that control the supply of wine grapes and U.S. regulations that limit the retail availability of wine in selected Eastern states would generate much larger welfare gains. However, changes in domestic regulations are often difficult to include in trade agreements as these regulations often provide substantial support to key stakeholders making reform politically difficult. At the same time, trade negotiations do provide an opportunity to closely examine all trade barriers and to consider the economic effects of reform to various trade barriers. It also presents an avenue for international stakeholders to engage with each if they have aligned interests on policy issues. For example, U.S. wineries advocating for change in U.S. regulations that restrict the retail availability of wine might find additional support for legislative change from wine grape producers in outside markets as part of the trade discussions.

**Endnotes**

[1] Trade data are widely available for three broad wine product categories: wine that is less than 14% alcohol and in packages less than 1.5 liters (often referred to as bottled wine), wine that is less than 14% alcohol and in packages greater than 1.5 liters (often referred to as bulk wine), and sparkling wine. Anderson and Nelgen (2011) provide more detailed data that describe markets for four wine products: Non-premium (bulk wine), Commercial premium (low value bottled product), Super premium (high value bottled product), and sparkling. We use data from Anderson and Nelgen (2011) to parameterize our model and consider four markets for wine in our policy simulations.

[2] Restrictions on the interstate sales of wine are not expected to have the same level of impact on demand for wine; however, these restrictions are considerably stricter in the eastern United States, and in some capacity they further increase prices for selected wine products in the Eastern United States.

[3] The seventeen states with laws that ban or restrict wine sales in grocery stores include Alaska, Arkansas, Colorado, Connecticut, Delaware, Kansas, Kentucky, Massachusetts, Minnesota, Mississippi, New Jersey, New York, Oklahoma, Pennsylvania, Rhode Island, Tennessee, Utah, and Wyoming (Wine Institute, 2009).

[4] We acknowledge that wine is produced in many, if not all, states; however, the vast majority of wine is produced in the three western states (California, Oregon, and Washington). Furthermore, there is widespread retail availability of wine in these three states. For these reasons concerning wine production and similarity in wine consumption laws, and for simplicity, we separate these states in our model.

[5] The data used to calculate the own- and cross-price elasticities are available from the authors upon request. We also consider a range of plausible values for the substitution parameters (substitution in consumption across the twelve products per region), and found that this change did not change the general thrust of our results.

[6] A more complete set of simulation results for scenarios employing a wider range of parameters has been completed and is available from the authors. Overall, the results are not sensitive to small changes in the assignment of parameter values. The results are most sensitive to changes in parameter that define substitution possibilities (substitution across wines among consumers and substitution between inputs in the production of wines); changes in these parameters affect the numerical results but do not change the rank order of net welfare effects across the policy scenarios that we simulate.

[7] Changes in tariff rates and changes in the EU supply control mechanisms will also lead to changes in taxpayer surplus; U.S. domestic regulations considered here do not involve significant public outlays and changes in this policy are not expected to affect taxpayer welfare. For simplicity, in our results, the net welfare effect is simply the sum of producer and consumer welfare. Including taxpayer surplus will only slightly increase the total welfare effect in the first simulation and more substantially increase the total welfare effect in the third simulation. Overall, including taxpayer surplus will not change the general thrust of our results or the relative ranking of net effects of the three policy scenarios.

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**Table 1. Parameterization of policy variables**

| | | Region | | |
|---|---|---|---|---|
| Policy | Product | Europe | Western U.S. | Eastern U.S. |
| | | *Ad valorem rates of support* | | |
| Tariffs[a] | Non-premium (bulk) | 12.7 | 17.8 | 17.8 |
| | Commercial-premium | 5.6 | 2.5 | 2.5 |
| | Super-premium | 2.8 | 1.3 | 1.3 |
| | Sparkling | 8.9 | 1.8 | 1.8 |
| U.S. domestic regulation[b] | Non-premium & Commercial-premium | | | 2.1 |
| EU domestic regulation[c] | Grapes | 11.3 | | |

[a] Ad valorem tariffs were calculated using information about volumetric tariff rates (US tariff: USITC, 2014; Europe tariff: TARIC, 2014) and unit values for specific wine products (COMTRADE, 2014). Non-premium wine refers to HTS code 22042920, 22042940, 22042960, 22042980; commercial- and super premium wine refers to HTS code 22042120, 22042130, 22042150, 22042160, 22042180; sparkling wine refers to HTS code 22041000.

[b] This parameter represents the price effect in the Eastern U.S. region from restricting the retail availability of wine in selected states. In the simulation, we assume that the relaxation of this policy would only affect the two major markets for wine in the Eastern U.S. region: non-premium and commercial-premium wines.

[c] Between 2008 and 2011, the EC spent approximately €675 million on supply control policies (grubbing-up premiums and vineyard restructuring and conversion subsidies). This parameter represents the ad valorem rate of support from these supply control policies using information about the total production of wine grapes and the per ton value of wine grapes in the EU in 2009.

**Table 2. Baseline parameter values**

| Description | | | Baseline parameter value | Source |
|---|---|---|---|---|
| overall price elasticity of demand for wines | $\eta^y$ | | $E=-0.75, U=-0.55, R=-0.55, V=-0.48$ | Fogarty (2010) |
| consumption share of product $j$ | $\zeta_j^E$ | | $J1=0.412, J2=0.3, J3=0.072, J4=0.074, J5=0.015, J6=0.007, J7=0.001, J8=0.0002, J9=0.054, J10=0.053, J11=0.007, J12=0.002$ | COMTRADE (2014); Anderson and Nelgen (2011) |
| | $\zeta_j^U$ | | $J1=0.008, J2=0.111, J3=0.015, J4=0.017, J5=0.182, J6=0.288, J7=0.162, J8=0.028, J9=0.078, J10=0.097, J11=0.013, J12=0.001$ | |
| | $\zeta_j^R$ | | $J1=0.008, J2=0.111, J3=0.015, J4=0.017, J5=0.182, J6=0.288, J7=0.162, J8=0.028, J9=0.078, J10=0.097, J11=0.013, J12=0.001$ | |
| | $\zeta_j^W$ | | $J1=0.052, J2=0.088, J3=0.014, J4=0.016, J5=0.006, J6=0.009, J7=0.001, J8=0.001, J9=0.421, J10=0.262, J11=0.076, J12=0.054$ | |
| elasticity of substitution between wines | $\sigma^y$ | | $E=3, U=3, R=3, V=3$ | Assumed |
| price elasticity of supply for input $h$ | $\varepsilon_{h1}^y$ | | $E=0.5, U=0.5, V=0.5$ | Fuller and Alston(2012); Assumed |
| | $\varepsilon_{h2}^y$ | | $E=1, U=1, V=1$ | Assumed |
| cost share of input $h$ in production of $j$ | $\kappa_{hj}^E$ | Grape | $J1=0.3, J2=0.25, J3=0.25, J4=0.25$ | Anderson et al., (2003) |
| | | Marketing | $J1=0.7, J2=0.75, J3=0.75, J4=0.75$ | |
| | $\kappa_{hj}^U$ | Grape | $J5=0.3, J6=0.25, J7=0.25, J8=0.25$ | |
| | | Marketing | $J5=0.7, J6=0.75, J7=0.75, J8=0.75$ | |
| | $\kappa_{hj}^W$ | Grape | $J9=0.3, J10=0.25, J11=0.25, J12=0.25$ | |
| | | Marketing | $J9=0.7, J10=0.75, J11=0.75, J12=0.75$ | |
| Industry share of inputs $h$ used in production of product $j$ | $\lambda_{hj}^E$ | Grape | $J1=0.45, J2=0.37, J3=0.10, J4=0.07$ | Calculated (grapes); Assumed (marketing) |
| | | Marketing | $J1=0.25, J2=0.25, J3=0.25, J4=0.25$ | |
| | $\lambda_{hj}^U$ | Grape | $J5=0.31, J6=0.45, J7=0.21, J8=0.03$ | |
| | | Marketing | $J5=0.25, J6=0.25, J7=0.25, J8=0.25$ | |
| | $\lambda_{hj}^W$ | Grape | $J9=0.48, J10=0.41, J11=0.06, J12=0.05$ | |
| | | Marketing | $J9=0.25, J10=0.25, J11=0.25, J12=0.25$ | |
| elasticity of substitution between inputs for $j$ | $\sigma_{h1h2j}^y$ | | 1 (for the production of all types of wine in all the region) | Assumed |

**Table 2. Baseline parameter values (continued)**

| Description | | Baseline parameter value | Source |
|---|---|---|---|
| initial equilibrium quantity supplied of product $j$ (million liters), 2009 | $QS_j^E$ | $J1 = 6865, J2 = 5587, J3 = 1159, J4 = 1109$ | |
| | $QS_j^U$ | $J1 = 832, J2 = 1204, J3 = 556, J4 = 84$ | Anderson and Nelgen (2011) |
| | $QS_j^W$ | $J1 = 4517, J2 = 3819, J3 = 566, J4 = 470$ | |
| initial equilibrium quantity demanded for product $j$ (million liters), 2009 | $QD_j^E$ | $J1 = 4953, J2 = 3610, J3 = 871, J4 = 888, J5 = 206, J6 = 86,$<br>$J7 = 11, J8 = 2, J9 = 654, J10 = 637, J11 = 79, J12 = 18$ | |
| | $QD_j^U$ | $J1 = 3, J2 = 45, J3 = 6, J4 = 7, J5 = 74, J6 = 118,$<br>$J7 = 66, J8 = 11, J9 = 32, J10 = 40, J11 = 5, J12 = 0.3$ | COMTRADE (2014); Anderson and Nelgen (2011) |
| | $QD_j^R$ | $J1 = 19, J2 = 258, J3 = 35, J4 = 39, J5 = 420, J6 = 667,$<br>$J7 = 376, J8 = 65, J9 = 280, J10 = 225, J11 = 31, J12 = 2$ | |
| | $QD_j^W$ | $J1 = 406, J2 = 684, J3 = 111, J4 = 127, J5 = 45, J6 = 69,$<br>$J7 = 11, J8 = 4, J9 = 3724, J10 = 2034, J11 = 589, J12 = 418$ | |
| Consumption value of product $j$ (million \$), 2009 | $P_j^E QD_j^E$ | $J1 = 7472, J2 = 16478, J3 = 11426, J4 = 7632, J5 = 222, J6 = 236,$<br>$J7 = 58, J8 = 9, J9 = 724, J10 = 2095, J11 = 517, J12 = 84$ | |
| | $P_j^E QD_j^E$ | $J1 = 7, J2 = 256, J3 = 70, J4 = 77, J5 = 178, J6 = 579,$<br>$J7 = 1474, J8 = 101, J9 = 22, J10 = 153, J11 = 42, J12 = 1$ | COMTRADE (2014); Anderson and Nelgen (2011) |
| | $P_j^E QD_j^E$ | $J1 = 40, J2 = 1453, J3 = 398, J4 = 434, J5 = 1010, J6 = 3280,$<br>$J7 = 8354, J8 = 575, J9 = 126, J10 = 865, J11 = 237, J12 = 8$ | |
| | $P_j^E QD_j^E$ | $J1 = 414, J2 = 3043, J3 = 963, J4 = 1054, J5 = 55, J6 = 323,$<br>$J7 = 102, J8 = 20, J9 = 4759, J10 = 8925, J11 = 8767, J12 = 2898$ | |
| Supply (million tons), and unit value (\$/ton) for input $h$, 2009 | $XS_{h1}^y$ | $E = 20.06, U = 3.57, V = 12.40$ | Anderson and Nelgen (2011) |
| | $WS_{h1}^y$ | $E = 379, U = 675, V = 524$ | |
| | $XS_{h2}^y WS_{h2}^y$ | $E = 22784, U = 7225, V = 19511$ | Calculated |

Notes: We use the notation *E*, *U*, *R*, and *V* to describe regions, where *E* denotes Europe, *U* denotes the Western U.S., *R* denotes the Eastern U.S., and *V* denotes the rest-of-the-world region. We also use notation to describe the twelve differentiated wine products; for the non-premium, commercial premium, super premium, and sparkling wines, we use *J1* through *J4* to denote EU products, *J5* through *J8* to denote products produced in the Western U.S., and *J9* through *J12* to denote products produced in the rest of the world.

Table 3. Changes in consumer welfare for three policy simulations (million $)

| | Europe | | | | United States | | | | Rest of the World | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Non-premium | Commercial-premium | Super-premium | Sparkling | Non-premium | Commercial-premium | Super-premium | Sparkling | Non-premium | Commercial-premium | Super-premium | Sparkling | |
| *50% cut in EU and U.S. tariffs* | | | | | | | | | | | | | |
| Europe | 2.16 | 4.78 | 3.31 | 2.21 | 14.03 | 5.69 | 0.55 | 0.37 | 0.10 | 0.28 | 0.07 | 0.01 | 33.57 |
| Western US | 0.72 | 3.48 | 0.45 | 0.72 | -0.86 | -2.68 | -6.83 | -0.47 | 0.003 | 0.02 | 0.01 | 0.0002 | -5.44 |
| Eastern US | 4.09 | 19.71 | 2.53 | 4.09 | -4.86 | -15.19 | -38.68 | -2.66 | 0.02 | 0.12 | 0.03 | 0.001 | -30.80 |
| US | 4.81 | 23.18 | 2.98 | 4.81 | -5.71 | -17.87 | -45.50 | -3.13 | 0.02 | 0.14 | 0.04 | 0.001 | -36.24 |
| ROW | 0.12 | 0.88 | 0.28 | 0.31 | -0.26 | -1.49 | -0.47 | -0.09 | 0.67 | 1.21 | 1.19 | 0.39 | 2.73 |
| All regions | 7.09 | 28.85 | 6.57 | 7.33 | 8.05 | -13.67 | -45.42 | -2.85 | 0.79 | 1.63 | 1.30 | 0.41 | 0.07 |
| *50% cut in U.S. regulations affecting wine availability in the Eastern U.S.* | | | | | | | | | | | | | |
| Europe | 0.51 | 1.25 | 0.87 | 0.58 | 0.19 | 0.24 | 0.06 | 0.01 | -0.005 | 0.01 | 0.003 | 0.001 | 3.73 |
| Western US | 0.0005 | 0.02 | 0.01 | 0.01 | 0.16 | 0.59 | 1.51 | 0.10 | -0.0001 | 0.001 | 0.0003 | 0.00001 | 2.40 |
| Eastern US | 0.43 | 15.44 | 0.03 | 0.03 | 11.56 | 38.06 | 8.50 | 0.58 | 1.33 | 9.14 | 0.001 | 0.00005 | 85.11 |
| US | 0.43 | 15.46 | 0.04 | 0.04 | 11.72 | 38.66 | 10.01 | 0.69 | 1.33 | 9.14 | 0.002 | 0.0001 | 87.51 |
| ROW | 0.03 | 0.23 | 0.07 | 0.08 | 0.05 | 0.33 | 0.11 | 0.02 | -0.03 | 0.05 | 0.05 | 0.02 | 1.01 |
| All regions | 0.97 | 16.94 | 0.98 | 0.70 | 11.96 | 39.23 | 10.18 | 0.72 | 1.29 | 9.20 | 0.06 | 0.02 | 92.25 |
| *50% cut in EU supply control measures* | | | | | | | | | | | | | |
| Europe | 45.38 | 84.41 | 58.53 | 39.10 | 0.33 | 0.34 | 0.08 | 0.01 | 1.23 | 3.50 | 0.86 | 0.14 | 233.90 |
| Western US | 0.04 | 1.32 | 0.36 | 0.39 | 0.26 | 0.84 | 2.14 | 0.15 | 0.04 | 0.26 | 0.07 | 0.002 | 5.87 |
| Eastern US | 0.25 | 7.46 | 2.05 | 2.23 | 1.49 | 4.77 | 12.14 | 0.83 | 0.21 | 1.45 | 0.40 | 0.01 | 33.29 |
| US | 0.29 | 8.78 | 2.41 | 2.62 | 1.76 | 5.61 | 14.28 | 0.98 | 0.25 | 1.70 | 0.47 | 0.02 | 39.16 |
| ROW | 2.52 | 15.63 | 4.95 | 5.42 | 0.08 | 0.47 | 0.15 | 0.03 | 8.09 | 14.93 | 14.67 | 4.85 | 71.78 |
| All regions | 48.19 | 108.81 | 65.88 | 47.13 | 2.17 | 6.42 | 14.51 | 1.02 | 9.57 | 20.13 | 16.00 | 5.00 | 344.84 |

Table 4. Changes in producer, consumer, and net welfare for three policy simulations (million $)

| | Change in surplus of input suppliers | | Total change in producer surplus | Total change in consumer surplus | Total change in net surplus |
|---|---|---|---|---|---|
| | grape | marketing | | | |
| *50% cut in EU and U.S. tariffs* | | | | | |
| Europe | -2.10 | -6.72 | -8.82 | 33.57 | 24.75 |
| Western US | 17.81 | 27.15 | 44.96 | -5.44 | 39.53 |
| Eastern US | —not applicable— | | | -30.80 | -30.80 |
| US | 17.81 | 27.15 | 44.96 | -36.24 | 8.72 |
| ROW | -1.32 | -2.21 | -3.53 | 2.73 | -0.80 |
| All regions | 14.39 | 18.23 | 32.61 | 0.07 | 32.68 |
| *50% cut in U.S. regulations affecting wine availability in the Eastern U.S.* | | | | | |
| Europe | 0.23 | -2.53 | -2.30 | 3.73 | 1.42 |
| Western US | 3.07 | -12.95 | -9.88 | 2.40 | -7.48 |
| Eastern US | —not applicable— | | | 85.11 | 85.11 |
| US | 3.07 | -12.95 | -9.88 | 87.51 | 77.64 |
| ROW | 1.21 | -1.37 | -0.16 | 1.01 | 0.85 |
| All regions | 4.50 | -16.85 | -12.34 | 92.25 | 79.91 |
| *50% cut in EU supply control measures* | | | | | |
| Europe | -134.68 | -9.36 | -144.04 | 233.90 | 89.86 |
| Western US | -4.43 | -9.56 | -13.99 | 5.87 | -8.12 |
| Eastern US | —not applicable— | | | 33.29 | 33.29 |
| US | -4.43 | -9.56 | -13.99 | 39.16 | 25.17 |
| ROW | -13.54 | -29.97 | -43.51 | 71.78 | 28.27 |
| All regions | -152.65 | -48.89 | -201.54 | 344.84 | 143.30 |

Table 5. Changes in producer, consumer, and net welfare for additional simulations (million $)

| | Change in surplus of input suppliers | | Total change in producer surplus | Total change in consumer surplus | Total change in net surplus |
|---|---|---|---|---|---|
| | grape | marketing | | | |
| *50% cut in EU and U.S. tariffs & 50% in U.S. wine availability regulations* | | | | | |
| Europe | -1.88 | -9.25 | -11.12 | 37.35 | 26.23 |
| Western US | 20.89 | 14.15 | 35.05 | -3.06 | 31.99 |
| Eastern US | —not applicable— | | | 54.63 | 54.63 |
| US | 20.89 | 14.15 | 35.05 | 51.57 | 86.62 |
| ROW | -0.11 | -3.58 | -3.69 | 3.73 | 0.05 |
| All regions | 18.90 | 1.33 | 20.23 | 92.65 | 112.89 |
| *50% cut in EU and U.S. tariffs & 50% cut in EU supply control measures* | | | | | |
| Europe | -136.89 | -16.08 | -152.97 | 267.20 | 114.23 |
| Western US | 13.36 | 17.55 | 30.92 | 0.49 | 31.41 |
| Eastern US | —not applicable— | | | 2.79 | 2.79 |
| US | 13.36 | 17.55 | 30.92 | 3.28 | 34.20 |
| ROW | -14.86 | -32.18 | -47.04 | 74.53 | 27.49 |
| All regions | -138.39 | -30.70 | -169.09 | 345.01 | 175.92 |
| *50% cut in EU supply control measures & 50% cut in U.S. wine availability regulations* | | | | | |
| Europe | -134.44 | -11.89 | -146.33 | 237.64 | 91.31 |
| Western US | -1.37 | -22.49 | -23.85 | 8.28 | -15.58 |
| Eastern US | —not applicable— | | | 118.38 | 118.38 |
| US | -1.37 | -22.49 | -23.85 | 126.66 | 102.81 |
| ROW | -12.33 | -31.34 | -43.67 | 72.80 | 29.13 |
| All regions | -148.14 | -65.72 | -213.86 | 437.09 | 223.24 |
| *50% cut in tariffs, U.S. wine availability regulations, and EU supply control measures* | | | | | |
| Europe | -136.65 | -18.60 | -155.26 | 270.99 | 115.73 |
| Western US | 16.44 | 4.58 | 21.02 | 2.87 | 23.89 |
| Eastern US | —not applicable— | | | 88.20 | 88.20 |
| US | 16.44 | 4.58 | 21.02 | 91.07 | 112.09 |
| ROW | -13.65 | -33.54 | -47.20 | 75.54 | 28.34 |
| All regions | -133.87 | -47.57 | -181.44 | 437.59 | 256.15 |