

## Trade, Taxes, and Terroir

Raphaël Franck<sup>a</sup>, Noel D. Johnson<sup>b</sup>, and John V.C. Nye<sup>c</sup>

This study discusses how the growth of the modern state promoted greater trade and a more integrated market at the national level. It uses data on wine production in France, whose consumers are still known to prefer local goods produced by small and traditional producers, and focuses on a policy change which lowered wine tax rates throughout the country. It is found that the existence of high internal taxes protected local producers and delayed the integration of the French market. Once these taxes were removed, French consumers abandoned their local producers for other winemakers who produced cheaper wine.

JEL Classifications: H71, L51, K23, N43, R12

Keywords: Regulation, State and Local Taxation, Market Integration.

---

<sup>a</sup> Department of Economics, Bar Ilan University, 52900 Ramat Gan, Israel. [Raphael.Franck@biu.ac.il](mailto:Raphael.Franck@biu.ac.il). Tel: 972-3-531-8935. Fax: 972-3-738-4034.

<sup>b</sup> Corresponding Author. Department of Economics, George Mason University, Fairfax, VA. [njohnsoL@gmu.edu](mailto:njohnsoL@gmu.edu). Tel: 1-703-993-1138. Fax: 1-703-993-1133.

<sup>c</sup> Department of Economics, George Mason University, Fairfax, VA. [jnye@gmu.edu](mailto:jnye@gmu.edu). Tel: 1-703-993-4272. Fax: 1-703-993-1133.

We would like to thank seminar participants at the 2011 Cliometric Society Meetings, ISNIE 2011, the 2011 ASSA Meetings, the 2010 AAWE Meetings, George Mason University, the State University of New York at Buffalo, and the Mercatus Center, as well as conference participants at the Israeli Economic Association Meeting for reading and commenting on earlier versions of the paper. We also benefited from helpful conversations with Greg Clark, Samia Costa, Price Fishback, Robin Hanson, Garrett Jones, Joel Mokyr, Gilles Postel-Vinay, James Simpson, Alex Tabbarok, Jean-Laurent Rosenthal, and John Wallis. We received able research assistance from William Bruntrager and Harry David. All remaining mistakes are the fault of the authors.

## 1. Introduction

Beliefs and ideology about the economy are often used to explain the differences between the U.S.A., where the majority of the population favors free market economics, to attitudes in continental Europe, and particularly in France, where preferences for a large government are widespread (see Benabou, 2008 and Saint-Paul, 2010 among others for a discussion). In turn, these preferences are called upon to explain the current superior economic performance of the U.S.A. over France, the slower rate of growth in France during the 19<sup>th</sup> and 20<sup>th</sup> centuries, its lack of market integration until (at least) World War I and the resilience of small French producers in the food and wine industry.<sup>1</sup> In this respect, the well-known preference of French consumers for local wine is often referred to as *terroir*, which, according to one pithy definition, is a “taste for place”.<sup>2</sup>

However upon closer examination, both countries have many similar regulations which were first instituted at the turn of the twentieth century. For instance, when the U.S. adopted the Pure Food and Drug Act in 1906 (Coppin and High, 1999, Temin, 1980, Wood, 1986), the French government introduced between August 1905 and June 1907 a series of regulations outlawing the production of “adulterated” wine (Warner, 1975).<sup>3</sup>

Of course the economic theory of regulation would suggest that regulation is captured by producers who either weaken rules to make them irrelevant or subvert them for their own benefits, such as deterring new competitors and/or raising prices. It is however unclear whether

---

<sup>1</sup> On the French economy, see among others Caron (1979), Grantham (1997) and Levy-Leboyer and Bourguignon (1990). See also Nye (2007) on the importance of wine in French exports.

<sup>2</sup> This definition is often attributed to Slate columnist Jay McInerney. On French wine, see Colman (2008) and Steinberger (2009) for recent studies.

<sup>3</sup> On the rise of regulation in the U.S.A. during the Progressive Era, see among others Law and Kim (2005) Glaeser and Shleifer (2003) and Masten (2010) and the citations therein.

regulations can explain the lack of concentration in the French wine industry, which already existed in the late 19<sup>th</sup> century, before the introduction of the first regulations on wine.<sup>4</sup> Still, France had at that time high internal taxes which might have generated protection for local producers of wine.<sup>5</sup>

This study examines whether the existence of small producers which already characterized the French economy by the late 19<sup>th</sup> century can be explained by consumer preferences or by internal taxes and regulations. For this purpose, it focuses on the wine industry and creates a department<sup>6</sup> level panel data set on wine tax rates, wine consumption, number of wine farmers (called *récoltants* in French), the value of wine production, the proportion of tax exempt wine consumed on farms (*en franchise*) as opposed to purchased on formal markets, and total output between 1896 and 1905.

It is of course difficult to test whether high internal taxes protected local wine producers because the tax rate chosen by the locality may be endogenous to the factor endowments or the concentration of wine production in that region. Our strategy to overcome this endogeneity is to use a difference-in-difference framework which takes advantage of the decrease in local tax rates due to a law adopted on 29 December 1897 by the French parliament which came into effect on

---

<sup>4</sup> By the end of the 18<sup>th</sup> century, Arthur Young (1792) had already pointed to the prevalence, and “great evil”, of the small farmer in France relative to Britain. The argument that during the nineteenth century small family farms impeded French economic growth by starving the industrial sector of the labor it needed to expand was advanced by scholars such as Boserup (1965) and Lévy-Leboyer (1978). Later work, like that exemplified by Grantham (1975) and Siscic (1992), however, argued that there was little evidence for this labor scarcity. Instead, as Heywood (1981) suggests, other likely explanations for the disproportionate French reliance on agriculture in the nineteenth century exist.

<sup>5</sup> 18<sup>th</sup> century France already had very high internal taxes. See for example Boshier (1964) on the Single Duty Project.

<sup>6</sup> Departments are administrative divisions of the French territory which were created in 1790.

1 January 1901. Since there was significant variation in wine tax rates across regions before 1901, the policy change generated by the binding tax rate ceiling varied across regions as well.

As such this study focuses on the development of the modern state but tries to provide a different perspective. It does not investigate the efforts of the national government to extend its reach over local authorities or the causes for the increase in public spending, most notably in relation to the extension of the voting franchise (see among others Hettich and Winer, 1988, Husted and Kenny, 1997, Lott and Kenny, 1999, Persson and Tabellini, 2003, Aidt et al., 2006, 2010, and Aidt and Jensen, 2009). Rather it emphasizes how the national state strove to weaken the autarkic tendencies of regional laws. In so doing, the growing state often promoted greater trade and a more integrated national market but it also acquired a capacity for regulation which made it vulnerable to rent-seeking and protectionist pressure. Thus this study is also related to new economic geography models, which use a political-economy framework to analyze how industries relocate under increased economic integration when different groups influence political decisions, notably in matters of tax competition, e.g., Baldwin and Krugman (2004), Baldwin et al. (2003), Kind et al. (2000), Ludema and Wooton (2000).

Our results suggest that internal taxes, and the regulations which were introduced afterwards, explain the continued existence of small producers who produce local wine. Indeed, when local taxes decreased after 1901, more wine was traded on markets while the number of wine farmers decreased in regions which previously had high taxes. Besides, wine production increased in departments producing cheap wine and decreased in those producing expensive wine after 1901. Overall, these results suggest that internal taxes slowed down the integration of the French market. They also provide a contrarian view against the long tradition of explaining

French institutions and economic performance as a result of an innate preference for small producers and local products.

The rest of this article is organized as follows. Section 2 provides some institutional background on wine production and taxation in nineteenth century France. Section 3 presents the data and the empirical methodology. Section 4 analyzes the results. Section 5 concludes.

## **2. Wine Production and Taxation in Nineteenth Century France**

### *2.1. Wine Production in nineteenth century France*

Present-day France still remains a country of relatively small wine producers. In the United States, approximately 70% of wine is produced by the five largest estates. In France, the comparable number is only 10% (Simpson, 2010, p. 2). Despite some advances in scale and specialization, the overall picture has not changed greatly since the nineteenth century. As Figure 1 shows, between 1896 and 1900 most of the departments in France were producing wine. During that period, the amount of wine produced by an average *vigneron* was about 21 hectoliters.<sup>7</sup> This compares to the average annual (taxed) consumption of wine of about .9 hectoliters per person during the same period. This means that each farm was producing enough wine for about 23 people.

The large number of small wine producers meant that there was an overreliance on locally produced wine to satisfy consumption needs. Local wine was not traded in distant

---

<sup>7</sup> In French, the word *vigneron* is used to describe a farmer who cultivates grapes for the purpose of wine production. *Viticulteur* refers to someone who uses grapes to produce wine. During the period of our study it was common for one to be both a *vigneron* and a *viticulteur* (indeed, this is a significant part of our argument about “on the farm production”, i.e., which was exempt from taxes).

markets, but rather was produced for consumption “on the farm” and was exempt from taxation (*en franchise* in French). According to official government data from the *Annuaire Statistique de la France* (Statistical Yearbook of France - henceforth, *Annuaire*), between 1896 and 1900 fully 20% of the wine consumed in the average wine-producing department was not transacted on formal markets (std. dev. = 0.15). In some departments that produced very cheap wine, like Hérault in the south, the proportion of off-market consumption was closer to 50%.

It would be an understatement to say that this was an inefficient situation. Imperfect competition due to high transactions costs is consistent with the highly variable production costs observed across regions. Figure 2 shows the market value per hectoliter of wine across departments between 1896 and 1900. The range goes from 17 francs per hectoliter in the South (known in France as the *Midi*) where cheap wine was produced using industrial technologies, all the way to 86 francs per hectoliter in northern regions producing champagne (*e.g.* Marne). Of course, some of the variation in cost was due to differences in quality, but not all. As we will discuss below, not every department had soil and weather suited to the production of cheap wine using the new technologies that were introduced during the second half of the century.

These observations suggest that a lack of market integration and the persistence of inefficiencies allowed too many French peasants to be involved in the wine business. If markets were more integrated as a result of a decrease in the costs of internal trade, we would expect the number of wine producers in high cost regions to fall while the wine production would increase in low cost regions and decrease in high cost areas.

However measuring the lack of market integration is difficult because most of the factors that determine the costs of trade co-evolve relatively slowly. As James Simpson (2010) argued, before the full development of the European railway network, the wine trade was marked by high

transport costs and high taxes and most wine was produced for domestic consumption. Besides, urban growth and income *per capita* were increasing throughout the nineteenth century, which is significant as demand for wine is elastic with respect to income (cf. Simpson Ch. 1, 2010 and the citations therein). Finally, a major influence on the organization of wine production during the second half of the nineteenth century was the phylloxera epidemic and the consequent adoption of technologies conducive to an increase in the economies of scale of grape cultivation and wine making.<sup>8</sup>

During the second half of the nineteenth century, new sources of scale economies were introduced in both viticulture (grape growing) and viniculture (wine making) (Simpson, 2010, p. 85). In viticulture, new, high yielding, grape varieties, such as the Aramon, were introduced in the South of France and Algeria. More artificial fertilizer was necessary to keep the newly grafted, phylloxera resistant, vines healthy and deep soil, steam operated, plows were introduced to facilitate the planting of the new vines.<sup>9</sup> All of these substituted labor for capital at a time

---

<sup>8</sup> The phylloxera, which was first noticed in 1863, was caused by an aphid which attacked the roots of the common wine root stock *vinis vinifera*. Between 1863 and 1890 the disease accounted for the destruction of close to 40% of vineyards in France. Between 1868 and 1900 it cost close to 35 billion Francs to uproot damaged vines and replant with resistant strains (Galet 1988).

<sup>9</sup> In viniculture the main advances occurred in fermentation technology that allowed large scale producers in the South of France and in Algeria to flourish. The high yield Aramon grape used in the South produced a thin and watery wine with good acidity but low alcohol content. Nonetheless, the resulting product was excellent for blending with high alcohol wine from Spain and, after the tariff of 1892 closed that market, from Algeria. Algeria is hot, however, and fermentation there occurs too fast. This problem was addressed by Paul Brame's 1887 invention of a system to pump fermenting wine must through tubes immersed in cold water. Another method that was introduced pumped sulphur anhydroxide through the must. Both of these techniques were expensive, but allowed for large scale, low cost, production of a consistent quality wine. In this respect, Simpson (2010, p 89 footnote 64) claims that in 1903 the cost of building a 200 hectoliter wine cellar was about 6 francs per square meter. By contrast, the cost of a 20,000 hectoliter cellar was about 4 francs per square meter.

when wages were increasing and the price of wine was decreasing (Bayet 1997, *Annuaire*, 1933, pp. 62-3; Simpson, 2010, p. 76).

One consequence of these scale economies was that the share of large scale, “industrially” produced wine from Southern France came to increasingly dominate wine production towards the end of the nineteenth century. In 1852 wine from the *Midi* was about 21% of French production. In the 1870’s it was about 30%, and during the first decade of the twentieth century, it was 40% (Lachiver 1988 pp. 606-9; *Annuaire Statistique de la France*, 1934 pp. 179-80). A key issue, however, is that economies of scale cannot be exploited unless there is a large integrated market in which to sell the increased output. In fact, if the internal tax system acted as a constraint on the exploitation of these economies of scale, we would expect production in the low cost *Midi* departments to increase and production in the more expensive departments to decrease once taxes were lowered.

## 2.2. *Wine Taxation in Nineteenth Century France*

We focus on two types of local wine taxes, the *octrois*, whose rates were set by individual cities, and other indirect taxes whose rates were determined by the national government.<sup>10</sup> By the

---

<sup>10</sup> The *octrois* taxes originated during the reign of Louis XI (r. 1461-1483) who, by fifteenth century standards, was a free market advocate. Louis XI promoted trade fairs in Lyon, exempted towns from the onerous *tailles* taxes, and generally issued decrees in favor of the wealthy bourgeoisie (Wolfe, *Fiscal System of Renaissance France*, p. 57-8). He also forced loans from the towns, however, and when they could no longer lend him money, he granted (fr. *octroyés*) them the right to collect *octrois* taxes on goods moving through their gates. Like many Old Regime taxes, these eventually morphed from temporary to permanent status and grew in importance as a vital source of local public finance for the towns. The *octrois* were roundly criticized before the 1789 French Revolution and the National Assembly had them abolished in 1791. When cities started running out of money for education and police, however, there were petitions for the reinstatement of the taxes. By Year VII (1798-99) new levies were introduced which, eventually, survived the Revolution and came to be called *octrois* once more (Cohen, 1998, p. 44). In 1818



early nineteenth century, there was a list of five different categories of consumer items on which the *octrois* could be collected (Block, 1898, “*Octrois*”, p. 1333-1349). For most cities, the most important category was alcoholic beverages.<sup>11</sup> They were given broad authority to set rates according to their needs, provided the taxes were collected on the quantity of a good being traded. Thus, these were *unit* taxes as opposed to *ad valorem* taxes on the price of a good (Block, 1898, “*Octrois*”, p. 1333-1349). Originally, cities were also allowed to set the rates on the *octrois*. They could discriminate on the point of origin of a product so that the octrois acted as traditional internal tariffs. However, by a decree of 1870 this practice was forbidden and the *octrois* were technically consumption excises (Block, 1898, “*Octrois*”, p. 1333-1349). Still, it is significant that until the last third of the nineteenth century, the French wine market suffered from internal protection serious that led to a fragmentation of the wine industry.

In addition, three other indirect taxes had an impact on the price of wine. They differed from the *octrois* because the national government set the rules under which they were collected. However, they retained two vital similarities. First, their rates varied a great deal across departments; Second they were levied on quantity as opposed to price (volumetric vs. *ad valorem*). Before 1901, the three taxes were the *droit de circulation*, the *droit d'entrée*, and the *droit en détail*. The *droit de circulation* (circulation tax) was collected on wine traded between cities which were obligated to pay a certain amount per hectoliter. There was a schedule of per hectoliter tax rates for cities set by the national government that depended on the value of wine produced in the department in which the city was located. According to the regulations, wine traders had to pay the tax rate in the city to which it was destined to be sold (Block, 1898,

---

the *octrois* comprised 68% of the revenues for Bordeaux, 91% for St. Etienne, 85% for Toulouse, and close to 100% for Lyon (Cohen, 1998, p. 45).

<sup>11</sup> The other four categories were “food”, “fuel”, “building materials”, and “miscellaneous”.

“*Boissons*”, p. 242). The *droit d’entrée* (entry tax) was paid when bringing wine through a city or town’s gates. The rate per hectoliter varied according to the population of the city and the average value of wine in the department in which the city was located (Block, 1898, “*Boissons*”, p. 243). Finally, the *droit en détail* (retail tax) was an *ad valorem* tax of 15% on the price of wine sold which was collected from merchants at the point of sale (Block, 1898, “*Boissons*”, p. 243).<sup>12</sup>

Figure 3a shows the sum of the *octrois* and other indirect tax rates for every department in France between 1896 and 1900.<sup>13</sup> These combined tax rates on wine, which were assessed per volume and not *ad valorem*, were very high, with a national average tax rate around 7 francs per hectoliter of wine. However there was a great deal of variation in wine tax rate across departments.<sup>14</sup> Figure 3a suggests that this variation followed a roughly North-South axis, with the highest tax departments in the North and the lowest in the South. For example, in most Northern departments the combined wine tax rate was between 10 and 20 francs per hectoliter. In Paris, by far the greatest consumer center, the tax rate was 19 francs per hectoliter. Taking the average price for a hectoliter of wine at 17 francs after taxes were lowered during the 1901-1905 period following Pech (1975), this implies a tax rate of over 50% in the capital. By contrast, in the South, tax rates ranged between 2 and 5 francs per hectoliter, thereby implying a tax rate of

---

<sup>12</sup> These were the three main indirect taxes, however, any town with a population between 4,000 and 10,000 persons had the option to convert the *droit d’entrée* and the *droit en détail* into a single tax, known as the *droit de taxe unique* (single tax), which would be collected at the city gates along with the *droit de circulation*. Importantly for our story, the *droit de taxe unique* had a per hectoliter rate (as opposed to an *ad valorem* rate) that depended on the average value of the *droit d’entrée* and the *droit en détail* for the previous three years before its implementation. Finally, the conversion to the *droit de taxe unique* was obligatory for any town with a population greater than 10,000 (Block, 1898, “*Boissons*”, pp. 243-244).

<sup>13</sup> We exclude Corsica and the overseas departments from the analysis since some data are missing.

<sup>14</sup> The combined tax rate equals the sum of the rates on the (*octrois + droit de circulation + droit d’entrée + droit en détail*). The actual way this number is calculated is explained in Section 3.1.2. For our analysis below we will simply call this number the “tax rate”.

between 10% and 20%.<sup>15</sup> This local variation in tax rates is a vital component of our strategy to identify the effect of internal taxes on wine market integration because it allows us to compare the features of the wine market before and after the implementation of the 29 December 1897 law on 1 January 1901.

### 2.3. *The 29 December 1897 law and its implementation on 1 January 1901*

The 29 December 1897 law required that the *octrois* on all *boissons hygiéniques* be lowered according to the type of drink. For wine, depending on the population of the city, the *octrois* rate could not exceed a value between 0.55 and 4.00 francs per hectoliter. For cider and mead the maximum tax was between 0.35 and 1.50 francs per hectoliter, and for beer 5 francs (Marion, vol. 6, p 210). Furthermore, towns and cities were forbidden from introducing new taxes on alcoholic drinks and were obliged to create new taxes to make up revenues equal to the anticipated reduction due to the reforms. Finally, consistent with the progressive intent of the legislation, the tax on hard alcohol was increased significantly to 109 francs per hectoliter.<sup>16</sup>

As written into the original legislation, none of the tax rate ceilings were binding on municipalities for two years. However, as is wont to happen in democratically elected legislative bodies, the unpopular decisions embodied in the legislation of 29 December 1897 were duly avoided for longer than that. It was not until the first semester of 1899, under the leadership of the radical republican minister Charles Dupuy, that the *octrois* taxes were finally lowered, the *droit d'entrée* and the *droit en détail* were both suppressed entirely and, the *droit de circulation*

---

<sup>15</sup> These examples are meant to emphasize the tremendous variation in local tax rates across the country. It is important to keep in mind that the true rate of taxation on *locally produced* wine (as opposed to an *average* bottle imported from another department) depended on the price of local wine, not on the national average.

<sup>16</sup> The full text of the 29 December 1897 law is reproduced in Veber and Millerand (1899) .

was lowered to 1.5 francs per hectoliter of wine regardless of the location or size of the city of destination (Marion, 1927, vol. 6, p. 237; Cointet, 1901). Finally, as a concession to the mayors who would have to create new taxes to replace the old *octrois*, the lower house of parliament postponed the implementation of the 29 December 1897 law until 1 January 1901.

Our empirical strategy is illustrated by a comparison of the tax rates in Figure 3a for the 1896-1900 period to the tax rates in Figure 3b for 1901-1905. As these Figures make clear, there was a dramatic decrease in the departmental wine tax rates such that virtually all departments had rates below 5 francs per hectoliter after 1900. Given the wide disparity in rates prior to the law, this means the change affected regions very differentially. We interpret the change in local tax rates between 1896-1900 and 1901-1905 as a treatment that changed the degree to which local producers were insulated from competition. The size of this treatment varied from department to department according to how high its taxes were during the 1896-1900 period. If this treatment was unrelated to other factors affecting wine production and consumption in a department, then we can be confident that changes in the number of wine producers or market participation between the two periods were also caused by the change in the tax rate.

In fact, the decrease in rates was even more sudden than what is conveyed by Figures 3a and 3b. As Figure 4 shows, almost all of the decrease occurred between 1900 and 1901. The reason why rates went down so suddenly is the same reason we believe we can interpret the decrease as exogenous to local conditions in the departments. There was a change in tax policy initiated at the national level that went into effect on 1 January 1901. This policy reform was initiated by the Radical party which came to power in 1897 and whose members were influenced by “progressive” voices who wanted Frenchmen to stop consuming “harmful” drinks, such as

brandy and other forms of distilled alcohol, in favor of wine, which they referred to as “*boissons hygiéniques*” (Marion, 1927, vol. 6, p. 209 and Veber and Millerand, 1899).

The effect on wine tax rates of the binding ceiling introduced on 1 January 1901 across French departments is clear from Figure 4. In what follows, we examine whether the elimination of these taxes had an effect on internal trade and wine production.

### **3. Data and Empirical Methodology**

#### *3.1 Data*

Our data were collected from various issues of the *Annuaire* and, where necessary, from the *Bulletin de Statistique et de Legislation Comparée* (Bulletin of Statistics and Comparative Legislation - henceforth, *Bulletin*).<sup>17</sup> We create a department level panel spanning 1896 to 1905 that will allow us to test whether high internal wine tax rates impeded competition and specialization and trade at the end of the nineteenth century in France.

We construct two samples, one in which all wine producers are included (76 out of 87 departments). We also construct a restricted sample in which the lowest ten percent of wine producers (as measured by departmental production between 1896 and 1900) are dropped. This restricted sample has 69 instead of 87 departments.

Descriptive statistics for the variables used in both the full and restricted samples are given in Table 1. In the full sample, we note that on average, tax rates decreased across the departments by about 92% as a result of the government’s reform (the *DiffWineTaxRate* variable has a mean of -0.92). The average number of wine producers decreased by 3.6% and the amount

---

<sup>17</sup> The *Bulletins* were published by the Treasury and contain many of the series upon which the *Annuaire*s are based.

of wine transacted on informal markets decreased by 7% (mean  $DiffRecoltants = -0.036$  and mean  $DiffPropEnFranchise = -0.07$ ). Thus the implementation of the 29 December 1897 law on 1 January 1901 had potentially large effects.

### 3.2 The French wine market

Our empirical analysis focuses on three dependent variables which capture the main features of the French wine market and as such which should have been affected by the reduction in internal taxes. The first variable measures the degree to which markets were used to transact wine. The *Annuaire*s report data on the estimated consumption of "taxed" wine and of wine "*en franchise*", i.e., which was untaxed. Technically, wine was only exempt from taxation if it was consumed "on the farm" and not sold. In this case, winemakers reported to the Treasury agents that their production would be for their personal consumption. We generate the *Propenfranchise* variable which is the proportion of wine consumed *en franchise* to measure non-market transactions as

$$\left( \text{propenfranchise} = \frac{\text{wine consumed "on farm"}}{\text{total wine consumption}} \right)$$

Our second dependent variable, called *Recoltants*, is an estimate from the *Bulletins* of the number of wine farmers, or *récoltants* in French, in a given department each year. We use this to measure whether there was entry or exit from the wine sector after the tax rate was lowered. Exit from a given department's wine sector would imply that the wine taxes were protecting those farmers from competition.<sup>18</sup>

---

<sup>18</sup> We should note that one potential problem with our measures of *propenfranchise* and *recoltants* is that they are both based on estimates government officials working for the Third Republic. That said, we did check to make sure each variable was not a simple function of another, directly observed, variable. For example, consumption *en franchise* is not simply 20% of taxed consumption (as implied by Rémy Pech, 1975). There is plenty of variation

Our third dependent variable, called Production, is simply a measure of the total annual production of wine, in hectoliters, for each department from the *Annuaire*s. Since internal taxes were collected on the quantity of wine consumed, then we would expect any distortions to affect consumption of cheap wine more than expensive wine (Alchian and Allen, 1972). Thus, when the taxes are lowered, we would expect output to increase in departments that produce cheap wine and decrease in departments producing expensive wine. In other words, after the costs of trade declined in 1901, departments should specialize more according to their comparative advantages.

### 3.3 Wine tax rates

In our study, the most important explanatory variable is the department level wine tax rate (called WineTaxRate). It required the construction of two separate rates, one for the wine *octrois* and another for the other indirect taxes (*droit de circulation*, *droit d'entrée*, and the *droit en détail*). There are no consistent records of any of these rates in the government data. However, for the *octrois*, the *Annuaire*s contains data on tax receipts for each department in every year. The *Annuaire*s also contain data on wine consumption that was subject to taxation (*consommations imposées*) and wine consumption that took place “on the farm” (*en franchise*) so that it was not taxed. Assuming the data on taxed wine consumption in a department corresponds to the tax base for the *octrois*, we then backed out the *octrois* wine tax rate as

$$\left( \text{octrois tax rate} = \frac{\text{octrois tax revenues}}{\text{quantity of wine taxed}} \right)$$

---

across time and space in both estimated variables. Furthermore, we collapse the variables into 5 year averages, which should smooth out year to year errors in the estimates.

Calculating the tax rate for the indirect taxes was easier in that the *Annuaire*s include data on both aggregate revenues and consumption specifically for those taxes, at the departmental level before 1901.<sup>19</sup> Afterwards, the legislation which went into effect on 1 January 1901 eliminated all indirect taxes but the *droit de circulation*, which was lowered to 1.5 francs per hectoliter for all towns and cities. Hence we use this figure as the rate for indirect taxes after 1901. Thus, the indirect tax rate for the period 1896-1900 is calculated as

$$\left( \text{indirect tax rate} = \frac{\text{indirect tax revenues}}{\text{quantity of wine taxed}} \right) \text{ until 1901 and}$$

1.5 francs per hectoliter                      after 1901.

Since the tax rates are measured as nominal francs per hectoliter, we convert them to real variables using the agricultural price level series in Levy-Léboyer and Bourguignon (1985).<sup>20</sup> We use the sum of the *octrois* and indirect tax rates as our primary independent variable (WineTaxRate).

We proxy the value of wine in each department using annual data in the *Annuaire*s on the value of wine output per hectare. We thus build the CostWine variable which is the estimated average sale price (after taxes) of the wine produced in the department.

In addition, we generate two control variables. From the *Annuaire*s we collect yearly data on total departmental railroad mileage in order to control for the change in transportation costs during the sample period (the Railways variable). We also collect yearly data on wheat production from the same source in order to control for department level agricultural shocks that affect wine production and consumption (the ProdWheat variable).

---

<sup>19</sup> We cannot back out the tax rates for the individual components of the indirect taxes since the data in both the *Bulletins* and the *Annuaire*s simply refers to *taxes indirectes: vins*.

<sup>20</sup> We also undertook our analysis without adjusting for the price level with hardly any affect on the results.



### *3.4 The provision of local public goods*

To account for the possibility that the size of the tax rate change is correlated with some unobserved, department level, variable that varies with time and is related to the treatment we rely upon instrumental variables for the tax rate. We base our choice of instruments on the observation that departments with higher initial tax rates in the before period, will also experience larger decrease after the policy change. We sought to find variables that are correlated with the initial tax rate of the department, but uncorrelated with other factors that would potentially affect the number of wine producers or the ratio of market to non-market transactions.

The most obvious candidates relate to the cost of providing public goods for the cities in the department. Following this logic, our first instrument is the CostSchool variable, which is a measure of the average cost of building a secondary school in 1894. The higher the cost of school construction, the higher tax rates should have been in a department. Our second instrumental variable is related to the politics confronting the department when choosing what kind of taxes to collect. Regions with a comparative advantage in wine production would be unlikely to have a very high initial wine tax rate since wine producers would object. Instead, they taxed beer, hard alcohol, or other consumption goods (like wood or cooking oil). We can proxy for the comparative advantage of a department by using the InitialValueProd variable which provides the average price of the wine each department produced before taxes.

### *3.5 Empirical methodology*

The counter-factual scenario, “How much more specialization and trade would there have been in the absence of high internal tax rates?” is difficult to construct. This is precisely why

most studies of market integration have difficulty in pinning down causality. We avoid this problem by investigating whether departments which experienced a decrease in wine tax rates (the 'treatment group') also experienced an increase in market participation or a decrease in the number of wine producers compared to the departments whose taxes were not lowered (the 'control group'). Since the lowering of local wine taxes on 1 January 1901 was initiated at the national level, we argue that its timing was exogenous to local conditions determining market participation, entry and exit, and production.

This reinterpretation of the market integration question leads naturally to a relatively clean empirical design allowing estimation of the effect of the tax treatment on differences in the dependent variables. This differences-in-differences approach is immune to bias due stemming from time-invariant omitted variables (e.g., geography, cultural characteristics of the departments, or, ingrained political and economic institutions). It also controls for unobserved variables that vary with time, but that affect all wine producing departments identically (e.g., recovery from phylloxera, or, nation-wide business cycles/crop failures).

It has been shown that difference-in-difference models using data with more than two time periods run a substantial risk of generating biased standard errors (Bertrand et al., 2004). Furthermore, theory offers very little guidance on the predicted lag structure of our independent variable. For example, we do not know how many years it takes for a change in the local tax rate to result in producers exiting from the wine sector. Indeed, it is likely that these effects would be spread over several years.

Thus we choose to follow the advice of Bertrand et al. (2004) and collapse our panel into two time periods corresponding to pre and post-treatment years (1896-1900 and 1901-1905). Five years should be long enough for the effects of the tax rate decrease to show up in our

dependent variables and to smooth over year-to-year agricultural shocks unique to individual departments. But it is a short enough time period that we minimize the impact of unobserved variables which change relatively slowly over time that may affect market integration for a specific department (*e.g.* a new road being built through a region).

The underlying model we wish to estimate is

$$y_{it} = \alpha + \beta t + \delta \tau_{it} + X'_{it} \Lambda + \phi_i + \varepsilon_{it}, \quad t = 1, 2 \quad (1)$$

where  $y_{it}$  is one of our three dependent variables,  $t$  is a time indicator,  $\phi_i$  is a vector of department fixed effects,  $X'$  is a vector of control variables, and  $\varepsilon_{it}$  is an *i.i.d.* error term. The control variables we include are the total amount of railway mileage and output of wheat in each department. The first controls for time variant department level transportation costs and the second for time department level agricultural supply shocks which affect all crops in a similar way (*e.g.* the weather). The variable of interest is the inflation adjusted departmental wine tax rate,  $\tau_{it}$  and the coefficient  $\delta$  is the differences-in-differences estimate.

We choose to estimate (1) as a cross section in differences specified as

$$\Delta y_i = \beta + \delta \Delta \tau_i + \Delta X'_i \Lambda + \Delta \varepsilon_i \quad (2)$$

If  $E(\Delta \tau_i, \Delta \varepsilon_i) = 0$ , then our OLS estimates of (4) will be consistent. However, our estimates of  $\delta$  will be biased if the size of the tax rate change is correlated with some unobserved, department level, variable that varies with time and is related to the treatment. To minimize this possibility, we also estimate (4) using limited information maximum likelihood methods along with the instrumental variables described in Section 3.1.3.<sup>21</sup>

---

<sup>21</sup> We also run all the instrumental variables regressions using 2SLS, but report only the LIML results since first stage F-stats suggest the possibility that our instruments are weak. As expected, the more efficient 2SLS estimates are similar to the unbiased LIML results, but more significant.

Since these were unit taxes, we expect the size of the treatment effect to vary according to the value of wine produced in a department. As such, we also estimate a series of models in which we allow the initial value of wine from a department to interact with the tax treatment. According to equation (2), the effect of a decrease in the unit tax on the relative demands for expensive local wine and cheap imported wine should be greater in departments producing more expensive wine initially. We model this as

$$y_{it} = \alpha + \beta t + \pi v_{it} t + \delta \tau_{it} + \gamma(v_{it} \cdot \tau_{it}) + X'_{it} \Lambda + \phi_i + u_{it}, \quad t = 1, 2 \quad (3)$$

where  $v_{it}$  represents the initial value of wine production for department  $i$ . We explicitly allow the initial value of wine production to have a time varying direct effect on the dependent variable in addition to its indirect influence through the tax treatment. Again, we choose to estimate (3) as a cross section in differences

$$\Delta y_i = \beta + \pi v_{it} + \delta \Delta \tau_i + \gamma(v_{it} \cdot \Delta \tau_i) + \Delta X' \Lambda_i + \Delta u_i \quad (4)$$

## 4. Results

### 4.1 The effect of high internal taxes on market integration and small-scale producers

In Table 2 we report the results of estimating (2) using the proportion of “on the farm” transactions as our dependent variable. We predicted that high local taxes may have forced local producers of relatively expensive wine to avoid formal markets, an option importers of cheaper wine would not have had. In specification (1) we report the coefficient on the difference in the wine tax rate from estimating equation (2) on the full sample without any controls. As expected, the sign is positive indicating that a decrease in the wine tax rate leads to a decrease in “off market” consumption. The reported coefficient, 0.42, is also statistically significant at the 1%

level and economically significant. According to the estimate, a one standard deviation change in the tax rate would lead on average to a third of a standard deviation decrease in the amount of wine transacted on informal markets. In columns (2) and (3) we introduce the control variables and restrict the sample so that departments with relatively little wine production are excluded. The estimated coefficient on the change in the tax rate decreases slightly but remains significant at the 1% level.

Furthermore, the LIML estimates of equation (2) are presented in columns (4) and (5) of Table 2. In the preferred specification reported in Column 5 where we include control variables and restrict the sample to exclude the smallest producers of wine, the coefficient estimate on the change in tax rate just about doubles compared to the OLS estimates and continues to be significant at the 1% level. Furthermore, in the (unreported) first stage regression the coefficients on education spending and before tax value of production enter with the correct signs (negative) and are significant. The shea-partial r-squared indicates that the instruments jointly explain about 28% of the variation in the change in the tax rate. We also report the p-value associated with the Hansen-J statistic from the overidentification test of the validity of our instruments. We fail to reject the null hypothesis that the instruments are valid. Finally, we perform a Hausman test of the exogeneity of the variable of interest in order to establish whether IV methods are appropriate in the first place. This test fails to reject the null that the change in the tax rate is exogenous, suggesting that our original OLS estimates were unbiased.

In Table 3 we estimate specification (2) using the difference in the number of wine farmers (Recoltants) as our dependent variable. It might be hypothesized that if *récoltants* were protected from market forces by high local tax rates, then there should be an exit of the marginal producers once tax rates were lowered (the coefficient on the difference in the tax rate should be

positive). This is precisely what we see in columns (1), (2), and (3) of Table 3 where all estimates of  $\delta$  have a positive sign and are significant at the 1% level. According to the estimates in column (3), which includes control variables and uses the restricted sample, a one standard deviation decrease in the department's tax rate results in a decrease in the number of wine farmers by about a quarter of a standard deviation.

We also report LIML estimates for the coefficient on change in tax rate using the change in wine producers (Recoltants) as the dependent variable in Table 3. Again, focusing on specification (5) which includes controls and throws out small producers or wine, we find that the coefficient of interest increases in size and is significant at the 5% level. The p-value associated with the Hansen-J statistic indicates we cannot reject the null that the instruments are valid. Furthermore, as with the regressions on *PropEnFranchise*, the Hausman test indicates that the variable of interest is exogenous so that time varying, department level, unobserved variables do not bias our estimates.

We also run specifications in Tables in 2 and 3 in which we transform the continuous difference in tax rate variable into a dichotomous variable that is equal to one if the change in the department's tax rate was less than (decreased by more than) the mean decrease across all the departments (the Dichotomous Tax Rate Treatment variable). This should, again, minimize any potential endogeneity arising from departments with extremely high initial tax rates driving the results. We report these results in column (6) in both tables. The estimates are consistent with the other specifications, although the sign flips because larger decreases in the tax rate are now represented by an *increase* rather than a *decrease* in the variable of interest.

As an additional robustness check on the results in Tables 2 and 3, we perform a falsification test to verify that the timing of the 1901 reform is not correlated with unobserved

variables which may bias our coefficient estimates (see Bertrand et al. 2004). The procedure assigns placebo reforms to random departments in random years and then re-estimates Equation (2). We repeat these steps a thousand times. If we find that the coefficient associated with these randomly-generated reforms is significant at the 5% level in roughly 50 out of the 1000 iterations, we can conclude that our results are unlikely to stem from pure coincidence. In other words, our results would validate the exogeneity of the reform implemented on 1 January 1901.

The results of the falsification test on the specifications from Columns (1) to (3) in Tables 2 and 3 are shown in Table 4 where we report the percentage of times our randomly-generated reforms were significant at the 5% level, as well as its standard error in parentheses. The tests of the OLS regressions in Columns (1) to (3) in Table 2 show that the randomly-generated reforms are respectively significant 2.3%, 1.9% and 2.1% of the times (with standard errors of 0.0047, 0.0043 and 0.0045). Moreover, the randomly-generated reforms in the falsification test for the OLS regressions in Columns (1) to (3) in Table 3 are significant 0.2%, 10.3% and 1.8% of the times (with standard errors of 0.0014, 0.0096 and 0.0042). Hence, five out of six results in this falsification test suggest that there is less than a 5% chance that the results which we obtain stem from pure coincidence. This provides additional support for our contention that the 1901 reform had a causal impact on the increase in wine consumption and the exit of wine producers.

#### *4.2 The effects of internal trade liberalization on production and consumption*

In Table 5, we report results from estimating equation (4) in which we allow the initial value of wine production to have a time varying direct effect on the dependent variables in addition to its indirect influence through the tax treatment. Thus, in columns (1) and (2) of Table 5, we present the interaction results using the decrease in off-market consumption as the

dependent variable. The results are consistent with the prediction that departments which produced more expensive wine experienced a larger marginal effect on market use from the reduction in the tax rate. To illustrate, consider the size of the predicted overall effect in three departments with different initial values of output. *Hérault*, located along the Mediterranean Sea in the South of France (the Midi) produced cheap wine worth about 18 francs per hectare. In the middle is *Gironde*, located on the west coast and where many *haut cru* (high quality) wines come from today. This department had an average value of production of about 28 francs per hectare. Finally, *Marne* in the North of France is where Champagne is made. Its average value of production was a whopping 82 francs per hectare. In low-value *Hérault*, the lowering of tax rates had, in effect, no predicted statistical or economic impact on the use of formal markets. In the *Gironde*, a one standard deviation decrease in the tax rate is predicted to lead to a decrease in the use of informal markets close 0.60 of a standard deviation. In high value producers like *Marne*, this number increases to over 3 standard deviations.

Furthermore, Columns (3) and (4) of Table 5 present the interaction results using the change in number of wine producers as the dependent variable. As we hypothesized in Section 2, more wine producers went out of business in departments with higher initial values of production. For a low value department like *Hérault*, the number of producers is actually predicted to increase such that a one standard deviation decrease in the tax rate would lead to a 0.84 standard deviation *increase* in wine producers. In higher value departments like *Gironde* and *Marne*, however, the comparable numbers are a 0.67 and 3.50 standard deviation *decrease* in wine producers respectively.

In the last two columns of Table 5 we estimate equation (6) using the total production of wine as the dependent variable. The results are roughly in line with the theoretical prediction that



low value/cost departments should increasingly specialize in wine production as trade barriers are lowered. In low cost *Hérault*, a one standard deviation decrease in the wine tax rate leads to about a 0.67 increase in output. By contrast, in *Gironde* and *Marne* the same one standard deviation decrease in tax rates is predicted to lower output by 0.56 and 2.9 standard deviations respectively.

Overall, our formal analysis strongly supports the hypothesis that high internal taxes on wine impeded market development and prevented internal specialization and trade within France during the nineteenth century.

#### *4.3. How lobbying shapes production and consumption patterns*

After internal taxes were lowered, France did not whole-heartedly embrace free market competition. Indeed, the shocked (and often violent) response of wine farmers confronted by market forces -- red in tooth and nail as it were -- was sufficient to convince politicians to impose a new set of restrictions on internal trade. No sooner had France shed its old system of high internal *taxes* on wine, than it imposed new wine *regulations* restricting adulteration and fraud.

There can be little doubt that the citizens of France had benefited from lower wine prices. As Figure 4 makes clear, consumption skyrocketed after the lowering of the *octrois* and other internal wine taxes. Opposition came from producers rather than consumers.

It is likely that the various departmental wine taxes had served to delay the integration of the French wine market, thus insulating the small vigneron from both domestic and international market forces. For example, St. Amour and Chevet (1991) suggest that the market for grain had been well integrated by the third quarter of the nineteenth century. However, wine is both a less homogenous good whose integration was hampered by these added taxes. Thus, when the impact

of market integration began to be felt they were especially severe in combination with the unfortunate turn of events at century's end. The joint impact of market integration, globalization of French commerce, lower transport costs, the vicissitudes of coping with phylloxera, and the changes in the tax laws would have served as unusually severe shocks to the growers used to a relatively stable existence.

But the response was not directly targeted at market integration.<sup>22</sup> The rhetoric of this opposition was framed in terms of fraud and adulteration by new entrants, as opposed to the “traditional” production techniques of those wine makers who had trouble competing in the newly opened markets. High end producers with strong reputations in regions like Burgundy and *Gironde* were not very troubled by the flood of cheap wines. Instead, it was the small, traditional producers of table wine in these regions and, more importantly, producers in the south who felt their livelihoods being threatened (Simpson, 2005, p. 538). In the southern departments of *Aude* and *Hérault* there were a series of strikes by wine workers beginning in 1902 which culminated in the extreme violence of 1907, when the government of Georges Clémenceau sent in troops to suppress rioting in Marseille resulting in the deaths of hundreds (Harvey, 1978).

There were two institutional innovations which emerged as a response to producer pressures after 1901. First, regulations were passed in August 1905 and June 1907 making it illegal to produce “adulterated” wine (Warner, pp. 41-42).<sup>23</sup> Among the requirements imposed by these regulations were rules on the types of additives which could be used in wine production

---

<sup>22</sup> The response was also not targeted at foreign competitors. This was probably because the tariff policy initiated by Prime Minister Meline in 1892 had substantially shielded French farmers from foreign producers. On the Meline tariff, and more generally, on the consequences of the rise in world average tariffs from the 1870s onwards, see among others Clemens and Williamson (2004), Jacks et al, (2010) and O'Rourke and Williamson (1999).

<sup>23</sup> The focus was on “sugar wine”, which was an extremely popular way in which to transform the weak second, third, or even fourth, pressings of wine must into a drinkable product with an acceptable (to the consumer) alcohol content. See among others Stanziani (2003) on this issue.

and requirements that wine producers report their production, the weight of harvested grapes as well as the quantity of musts (unfermented wine) which they shipped. There were also vague prohibitions against the production of wine that was "artificial" not "natural". Which wines were "artificial" and which "natural" was open to the interpretation of whoever enforced the laws. This leads to the second, and equally important, development after the collapse in wine prices: the rise of wine trade associations. Organizations like the *Confédération Générale des Vignerons du Midi* (CGV – General Confederation of Midi Winemakers), were largely responsible for actually enforcing the laws against adulteration and fraud being created by the National Government. A telling indication of the CGV's relentlessness in pursuing those it considered guilty of fraud is that in 1912 it spent 412,000 francs in the South of France alone on the identification and prosecution of "artificial" wine, whereas the entire government budget for enforcing anti-fraud legislation was 1,143,000 francs for the whole of France (Warner, 1975, p. 47). In addition to the CGV in the South, unions arose across all of the wine producing regions of France in the years before World War I.<sup>24</sup>

The effect of these new regulations, largely enforced by syndicates of small "traditional" wine producers, coincided with a gradual increase in the price of wine across France that began after 1907. As a result, the relative price of cheap southern wine to the wine produced in the rest of France gradually rose and returned to its pre-tax reform levels as can be seen in Figure 5. It would thus appear that the modern regulatory state did not emerge as an outcome of changing technology or preferences but as a result of the competitive pressures which were triggered by increased market integration.

---

<sup>24</sup> In 1909, there were the Confédération des Vignerons du Sud-Est, the Confédération des Associations Viticoles de Bourgogne, the Fédération des Syndicats de la Champagne Viticole, the Ligue des Viticulteurs de la Gironde, and the Fédération des Associations Viticoles Régionales de France (Warner, 1975, p. 48).

## **5. Conclusion**

This study investigates the resilience of small-sized wine producers in France, which has often been explained the so-called preference of French consumers for local goods. For this purpose, it takes advantage of a policy change initiated by the French government which lowered and made uniform the previously dissimilar tax rates on wine throughout the country.

Our results provide evidence that the existence of high internal taxes slowed down the integration of the French market. They protected local producers and discouraged the use of formal markets. But once these taxes were removed, French consumers abandoned local winemakers for other producers who offered cheaper wine.

This article thus suggests an explanation for the proliferation of wine regulations before and after World War I in France. They stemmed from the wine producers who had previous benefited from the protection of internal taxes and who lobbied from increased regulation to act as a barrier to entry against competitors who produced cheaper wine. It would thus seem that greater market integration triggered the political forces which shaped the system of food regulation that persists to this day.

## References

- Aidt, Toke S., Dutta, Jayasri, Loukoianova, Elena, 2006. Democracy comes to Europe: Franchise extension and fiscal outcomes 1830-1938. *European Economic Review* 50, 249-283.
- Aidt, Toke S., Dutta, Jayasri, Daunton, Martin, 2010 The Retrenchment hypothesis and the extension of the franchise in England and Wales, *The Economic Journal* 120, 990-1020.
- Aidt, Toke S., Jensen, Peter S., 2009. Tax structure, size of government and the extension of the voting franchise in Western Europe, 1860-1938. *International Tax and Public Finance* 16(3), 362-394.
- Alchian, Armen Albert and William Richard Allen. 1972. *University Economics: Elements of Inquiry*, Belmont, California: Wadsworth Pub. Co.
- Baldwin, R.E., Forslid, R., Martin, P., Ottaviano, G.I.P., Robert-Nicoud, F. ,2003. *Economic Geography and Public Policy*, Princeton University Press, Princeton, NJ.
- Baldwin, R.E., Krugman, P.R., 2004. Agglomeration, integration and tax harmonization, *European Economic Review* 48, 1–23.
- Bayet, A. 1997. "Deux Siècles D'évolution Des Salaires En France," INSEE: Document de travail. Paris.
- Benabou, Roland, 2008, Ideology, *Journal of the European Economic Association* 6 (2-3), 321-352.
- Bertrand, M.; E. Duflo and S. Mullainathan. 2004. "How Much Should We Trust Differences-in-Differences Estimates?" *Quarterly Journal of Economics*, 119(1), pp. 249-75.
- Block, Maurice. 1898. *Dictionnaire de l'Administration Française*. Paris [etc.]: Berger-Levrault et cie.
- Boserup, M. 1965. "Agrarian Structure and Take-Off", in Walter Rostow, ed. *The Economics of*

- Take-Off into Sustained Growth., pp. 201-24.
- Bosher, J.F. 1964. *The Single Duty Project: A Study of the Movement for a French Customs Union in the Eighteenth Century*. London: University of London Press.
- Caron, François, 1979, *An economic history of modern France*, Columbia University Press: New York, NY.
- Clemens M., and J.G. Williamson, 2004, Wealth bias in the first global capital market boom, *Economic Journal* 114 (2), 304-337.
- Cohen, William B. 1998. *Urban Government and the Rise of the French City: Five Municipalities in the Nineteenth Century*. New York: St. Martin's Press.
- Colman, Tyler. 2008. *Wine Politics*. University of California Press.
- Cointet, Paul. 1901. *Guide Pratique De Régie Concernant Spécialement Le Service Des Boissons*, Poitiers: Société française d'imprimerie et de librairie.
- Coppin, Clayton, High, Jack, 1999, *The politics of purity*, Ann Arbor, MA: University of Michigan Press.
- Dincecco, M. 2009. "Fiscal Centralization, Limited Government, and Public Revenues in Europe, 1650-1913." *Journal of Economic History*, 69(1), pp. 48-103.
- France. M. d. Finances. 1894-1907. *Bulletins De Statistique et de Législation Comparée*, Paris: Imprimerie Nationale.
- France. D. Générale. 1894-1907, 1934. *Annuaire Statistique De La France*, Paris: Imprimerie Nationale.
- Galet, Pierre. 1988. *Cépages Et Vignobles De France. Tome III Les Vignobles De France*. Paris: Tec & Doc.
- Galtier, Frédéric. 1901. *La Suppression de l'Octroi. Thèse Pour Le Doctorat*. Paris: A. Rousseau.

- Glaeser, Edward L. and Andrei Shleifer. 2003. "The Rise of the Regulatory State." *Journal of Economic Literature*, Vol. 41, No. 2, pp. 401-425.
- Grantham, George, 1975, "Scale and Organization in French Farming, 1840-1880", in Eric Jones and W.N. Parker (eds.), *European Peasants and their Markets*, Princeton: Princeton University Press, pp. 293-326.
- Grantham, George, 1997. *The French cliometric revolution: a survey of cliometric contributions to French economic history*, *European Review of Economic History* 1, 353-405.
- Hettich, W., Winer, S., 1988. *Economic and political foundations of tax structure*. *American Economic Review* 78, 701-12.
- Heywood, Colin. 1981. "The Role of the Peasantry in French Industrialization, 1815-80", *The Economic History Review*, 34(3), pp. 359-76.
- Husted, T.A., Kenny, L.W., 1997. *The effect of the expansion of the voting franchise on the size and scope of government*. *Journal of Political Economy* 105, 54-82.
- Levy-Leboyer, Maurice and François Bourguignon, 1990. *The French Economy in the Nineteenth Century*, Cambridge, UK: Cambridge University Press.
- Irwin, D. A. 2000. "Did Late-Nineteenth-Century US Tariffs Promote Infant Industries? Evidence from the Tinplate Industry." *Journal of Economic History*, 60(2), pp. 335-60.
- Irwin, D. A. 2002. "Interpreting the Tariff-Growth Correlation of the Late 19th Century." *American Economic Review*, 92(2), pp. 165-69.
- Jacks, David S., 2006. "What drove 19th century commodity market integration?", *Explorations in Economic History*, 43(3), pp. 383-412.
- Jacks, David S., Christopher M. Meissner and Dennis Novy, 2010, *Trade costs in the first wave of globalization*, *Explorations in Economic History* 47 (2), 127-141.

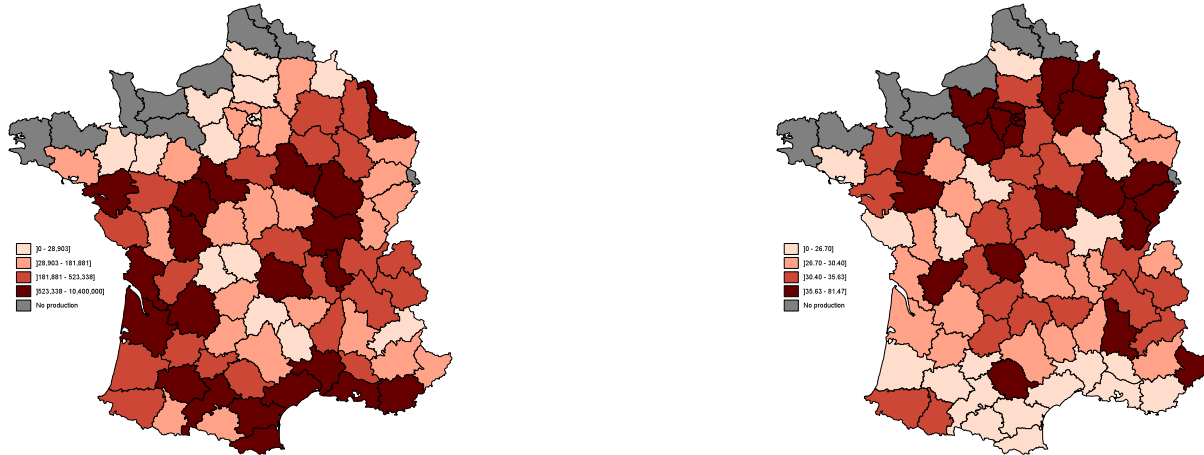
- James, Jennifer S. and Julian M. Alston. 2002. "Taxes and Quality: A Market-Level Analysis." *The Australian Journal of Agricultural and Resource Economics*, 46(3), pp. 417-45.
- Kind, H.J., Midelfart Knarvik, K.H., Schjelderup, G., 2000. Competing for capital in a 'lumpy' world, *Journal of Public Economics* 78, 253–274.
- Lachiver, Marcel. 1988. *Vins, Vignes et Vignerons: Histoire du Vignoble Français*. [Paris]: Fayard.
- Law, Marc and Sukkoo Kim. 2005. "Specialization and Regulation: The Rise of Professionals and the Emergence of Occupational Licensing Regulation." *The Journal of Economic History*, 65 (3), pp. 723-756.
- Lévy-Leboyer, Maurice. 1978. "Capital Investment and Economic Growth in France, 1820-1930", in Peter Mathias and M.M. Postan eds., *The Cambridge Economic History of Europe*, vol. 7 : *The Industrial Economies : Capital Labour, and Enterprise*, Cambridge : Cambridge University Press, pp. 231-95.
- Lévy-Leboyer, Maurice and François Bourguignon. 1985. *L'économie Française Au XIXe Siècle: Analyse Macroéconomique*. Paris: Economica.
- Ljunge, Martin. 2006. "Do Taxes Produce Better Wine?," Working Paper: University of Copenhagen.
- Lott, J. R., Kenny, L.W., 1999. Did women's suffrage change the size and scope of government? *Journal of Political Economy* 107, 1163–1198.
- Ludema, R.D., Wooton, I., 2000. Economic geography and the fiscal effects of regional integration, *Journal of International Economics* 52, 331–357.
- Masten, Scott E., 2010, "Public Utility Ownership in 19th Century America: The "Aberrant" Case of Water, *Journal of Law, Economics and Organization*, forthcoming.



- Marion, Marcel. 1927. *Histoire Financière De La France Depuis 1715*, Paris: Rousseau.
- Nye, John V. C. 2007. *War, Wine, and Taxes: The Political Economy of Anglo-French Trade, 1689-1900*. Princeton, N.J.: Princeton University Press.
- O'Rourke, K.H. and J.G. Williamson, 1999, *Globalization and History: The evolution of a nineteenth-century economy*, Cambridge, MA: MIT Press.
- Pech, Rémy. 1975. *Entreprise Viticole Et Capitalisme En Languedoc Roussillon : Du Phylloxera Aux Crises De Mévente*. Toulouse: Association des publications de l'Université de Toulouse-Le Mirail.
- Persson, T., Tabellini, G., 2003. *The economic effects of constitutions*. Cambridge, Mass., The MIT Press.
- Saint-Amour, Pascal and Jean-Michel Chevet. 1991. « L'intégration des marchés du ble en France au XIXe siècle. » *Histoire et Mesure*, 6, no. 1-2, pp. 93-119.
- Saint-Paul, Gilles, 2010, Endogenous indoctrination: occupational choices, the evolution of beliefs and the political economy of reforms, *Economic Journal* 120, 325-353.
- Sicsic, Pierre. 1992. "City-Farm Wage Gaps in Late Nineteenth Century France". *The Journal of Economic History*, 52(3), pp. 675-95.
- Simpson, J. 2005. "Cooperation and Conflicts: Institutional Innovation in France's Wine Markets, 1870-1911." *Business History Review*, 79(3), pp. 527-58.
- Simpson, James. 2010. "Simpson Wine Ms," Forthcoming Manuscript.
- Smith, J. H. 1978. "Agricultural-Workers and French Wine-Growers Revolt of 1907." *Past & Present*, (79), pp. 101-25.
- Stanziani, A. 2003. "The Falsification of Wine in France, 1880-1905: A Case of Agricultural and Alimentary Fraud." *Revue d'Histoire Moderne et Contemporaine*, 50(2), pp. 154-86.

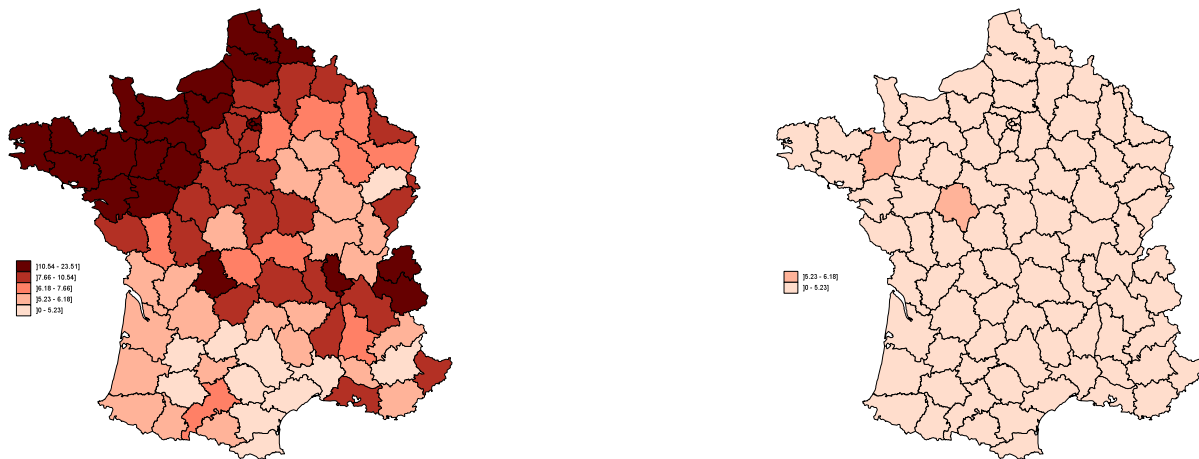
- Steinberger, Michael. 2009. *Au Revoir to All That: Food, Wine, and the Decline of France*.  
Doubleday Canada.
- Temin, Peter 1980, *Taking your medicine: drug regulation in the United States*, Cambridge MA:  
Harvard University Press.
- Veber, Adrien-Jean-François and Alexandre Millerand. 1899. *La Suppression Des Octrois*. Paris:  
V. Giard et E. Brière.
- Warner, Charles K. 1975. *The Winegrowers of France and the Government since 1875*.  
Westport, Conn.: Greenwood Press.
- Wolfe, Martin. 1972. *The Fiscal System of Renaissance France*. New Haven: Yale University  
Press.
- Wood, Donna, 1986, *Strategic uses of public policy*, New York: Pitman Publishing
- Young, Arthur (1792) [1929], *Travels in France during the years 1787, 1788, 1789*, London,  
George Bell and Sons.

## Figures 1 and 2: Departmental Wine Production and Value, 1896-1900



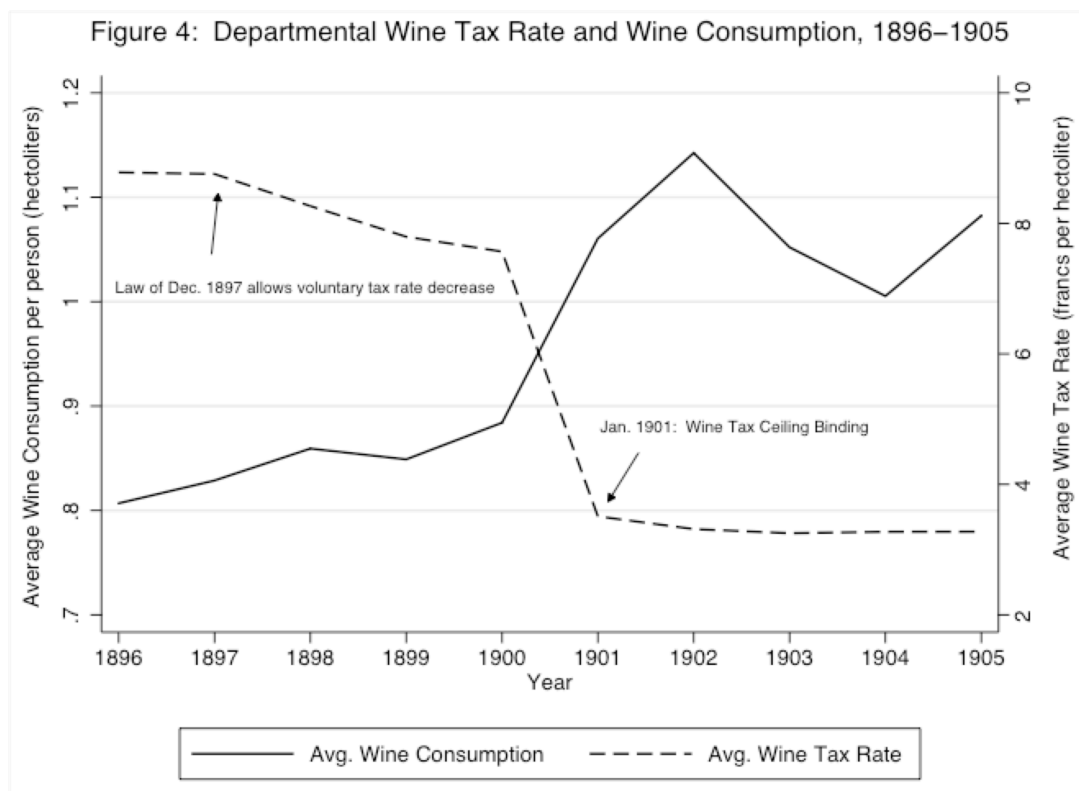
Note: Wine production in hectoliters, broken down by quartiles. Source: Data collected from various volumes of the *Annuaire Statistique de la France* and *Bulletins de Statistique et de Législation Comparée* between 1894 and 1906. Value of Wine Production in French francs, broken down by quartiles. Source: Data collected from various volumes of the *Annuaire Statistique de la France* and *Bulletins de Statistique et de Législation Comparée* between 1894 and 1906.

## Figures 3a-b: Departmental Wine Tax Rate Before and After Law of 1901



Note: Wine tax rates before and after 1901, broken down in quartiles.

Source: Data collected from various volumes of the *Annuaire Statistique de la France* and *Bulletins de Statistique et de Législation Comparée* between 1894 and 1906.



Source: Data collected from various volumes of the *Annuaire Statistique de la France* and *Bulletins de Statistique et de Législation Comparée* between 1894 and 1906.

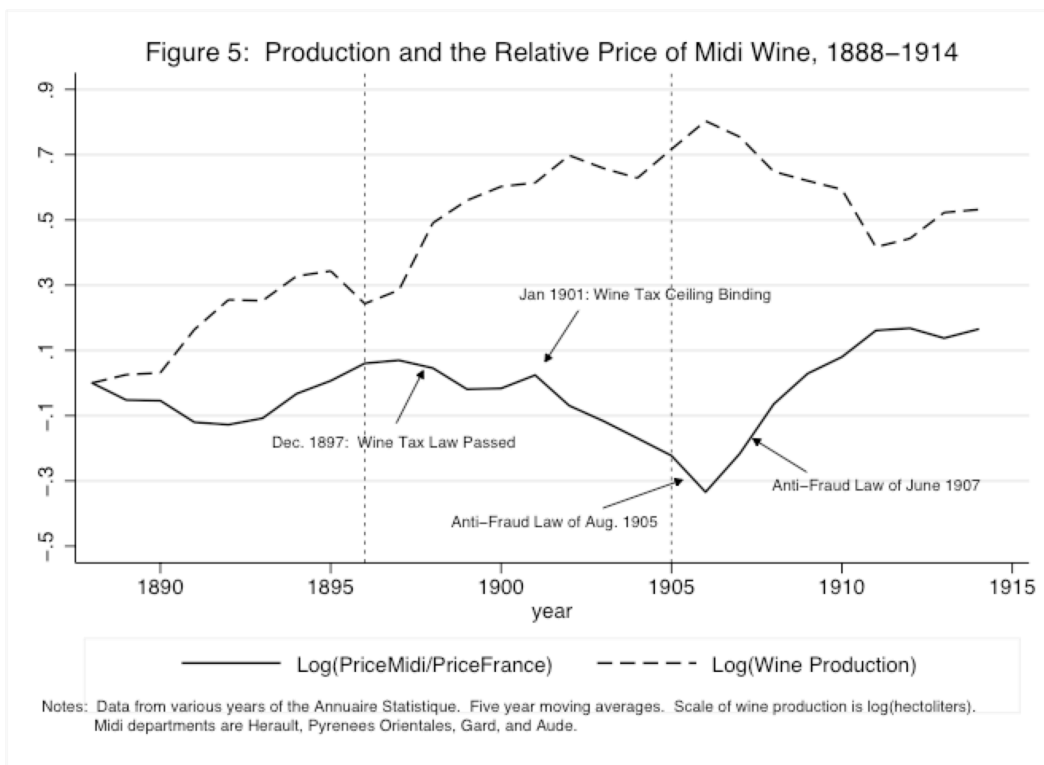


Table 1: Descriptive Statistics

<b>Panel A: Full Sample</b>						
Variable Name	Description	Obs	Mean	Std. Dev.	Min	Max
<i>Dependent Variables</i>						
DiffProduction	Difference in Log of Wine Production (hectoliters)	76	0.247	0.398	-0.713	1.646
DiffRecoltants	Difference in Log Number of Wine Producers	76	-0.036	0.243	-1.131	0.435
DiffWineTaxRate	Difference in Log of Real Wine Tax Rate (real francs per hectoliter)	76	-0.924	0.368	-2.309	-0.355
<i>Explanatory Variables</i>						
CostSchool	Log of Average Cost of High School Construction (Francs)	76	10.036	0.295	8.894	10.571
CostWine	Log of Value of Production After Tax Decrease (francs)	76	3.171	0.308	2.326	4.147
Dichotomous Tax Rate Treatment	= 1 if change in tax rate < mean change	76	0.289	0.457	0	1
DiffPropEnFranchise	Difference in Log of Proportion of Consumption on Farm	76	-0.072	0.527	-1.549	1.692
InitialValueProd	Log of Initial Value of Production per Hectare (francs), 1896-1900	76	3.416	0.317	2.803	4.400
Interact	(DiffWineTaxRate) x (InitialValueProd)	76	-3.181	1.354	-7.432	-1.054
<i>Instrumental Variables</i>						
DiffProdWheat	Difference in Log of Wheat Production (hectoliters)	76	0.037	0.164	-0.410	0.399
DiffRailways	Difference in Log of Railway Track (kilometers)	76	566003.6	208329.7	191381.9	1129018
<b>Panel B: Sample Restricted to top Ten Percent of Wine Producers</b>						
Variable Name	Description	Obs	Mean	Std. Dev.	Min	Max
<i>Dependent Variables</i>						
DiffProduction	Difference in Log of Wine Production (hectoliters)	69	0.219	0.341	-0.612	1.036
DiffRecoltants	Difference in Log Number of Wine Producers	69	-0.018	0.210	-0.571	0.435
DiffWineTaxRate	Difference in Log of Real Wine Tax Rate (real francs per hectoliter)	69	-0.893	0.365	-2.189	-0.355
<i>Explanatory Variables</i>						
CostSchool	Log of Average Cost of High School Construction (Francs)	69	10.025	0.303	8.894	10.571
CostWine	Log of Value of Production After Tax Decrease (francs)	69	3.147	0.299	2.326	4.147
Dichotomous Tax Rate Treatment	= 1 if change in tax rate < mean change	69	0.246	0.434	0	1
DiffPropEnFranchise	Difference in Log of Proportion of Consumption on Farm	69	-0.060	0.445	-1.358	0.814
InitialValueProd	Log of Initial Value of Production per Hectare (francs), 1896-1900	69	3.420	0.316	2.809	4.400
Interact	(DiffWineTaxRate) x (InitialValueProd)	69	-3.084	1.350	-7.432	-1.054
<i>Instrumental Variables</i>						
DiffProdWheat	Difference in Log of Wheat Production (hectoliters)	69	0.027	0.165	-0.410	0.399
DiffRailways	Difference in Log of Railway Track (kilometers)	69	562462.1	207596.1	191381.9	1129018

Notes: Panel A: Full sample (76 departments). Panel B: Excludes the lowest ten percent of wine producers (69 departments). Data collected from various volumes of the *Annuaire Statistique de la France* and *Bulletins de Statistique et de Législation Comparée* between 1894 and 1906. All variables are logged.

Table 2: Did High Internal Taxes Impede Market Development?

Dependent Variable = Difference in Proportion of Wine Consumed Off Market (DiffPropEnFranchise)

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	LIML	LIML	OLS
DiffWineTaxRate	0.4231*** (0.1299)	0.3497** (0.1372)	0.3534*** (0.1142)	0.9012*** (0.2854)	0.6744*** (0.2567)	
Dichotomous Tax Rate Treatment (=1 if change < mean)						-0.3238*** (0.1169)
Controls		x	x		x	x
Restricted Sample			x	x	x	x
Observations	76	76	69	69	69	69
R-Sq	0.104	0.135	0.251			0.253
First Stage F-stat				8.09	7.29	
Shea Partial R-sq				0.2858	0.277	
Hansen-J (p-value)				0.4003	0.633	
Hausman test (p-value)				0.1106	0.165	

Notes: Data collected from various volumes of the *Annuaire Statistique de la France* and *Bulletins de Statistique et de Législation Comparée* between 1894 and 1906. All variables are logged. Controls include the difference in railway mileage and difference in production of wheat at the department level. The “Restricted Sample” excludes the lowest ten percent of wine producing departments. Significance levels are denoted by: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Huber-White robust standard errors are reported for all specifications.

Table 3: Did High Internal Taxes Protect Local Producers?

Dependent Variable = Difference in Number of Wine Producers (DiffRecoltants)

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	LIML	LIML	OLS
DiffWineTaxRate	0.2181*** (0.0616)	0.1804*** (0.0595)	0.1428** (0.0564)	0.2883** (0.1200)	0.2668** (0.1261)	
Dichotomous Tax Rate Treatment (=1 if change < median)						-0.1255** (0.0587)
Controls		x	x		x	x
Restricted Sample			x	x	x	x
Observations	76	76	69	69	69	69
R-Sq	0.131	0.181	0.136			0.132
First Stage F-stat				8.09	7.29	
Shea Partial R-sq				0.2858	0.2772	
Hansen-J (p-value)				0.7771	0.7409	
Hausman test (p-value)				0.1621	0.1892	

Notes: Data collected from various volumes of the *Annuaire Statistique de la France* and *Bulletins de Statistique et de Législation Comparée* between 1894 and 1906. All variables are logged. Controls include the difference in railway mileage and difference in production of wheat at the department level. The “Restricted Sample” excludes the lowest ten percent of wine producing departments. Significance levels are denoted by: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Huber-White robust standard errors are reported for all specifications.

Table 4. Falsification test

Panel A. Falsification test for the regressions in Columns (1)-(3) of Table 2.

	(1)	(2)	(3)
	0.023	0.019	0.021
	[0.0047]	[0.0043]	[0.0045]

Panel B. Falsification test for the regressions in Columns (1)-(3) of Table 3.

	(1)	(2)	(3)
	0.002	0.103	0.018
	[0.0014]	[0.0096]	[0.0042]

Note: This Table presents the results of a falsification test on the OLS regressions in Columns (1), (2) and (3) of Tables 2 and 3. We report the percentage of times our randomly-generated reforms were significant at the 5% level, and its standard error in brackets.

Table 5: Were Departments with Higher Initial Values of Wine Affected More By Tax Reform?

Dependent Variable	(1) DiffPropEnFranchise	(2) DiffPropEnFranchise	(3) DiffRecoltants	(4) DiffRecoltants	(5) DiffTotalProduction	(6) DiffTotalProduction
DiffWineTaxRate	-2.5195** (1.1091)	-2.6452** (1.2093)	-1.4688*** (0.5505)	-1.5753*** (0.5727)	-1.7241** (0.6635)	-1.8436*** (0.6287)
InitialValueProd	0.4956** (0.2089)	0.4723* (0.2492)	0.1886 (0.1149)	0.1769 (0.1187)	0.6306*** (0.1365)	0.6124*** (0.1316)
Interact	0.8658** (0.3268)	0.8690** (0.3528)	0.4717*** (0.1630)	0.4914*** (0.1692)	0.5586*** (0.1960)	0.5702*** (0.1847)
Controls		x		x		x
Restricted Sample	x	x	x	x	x	x
Observations	69	69	69	69	69	69
R-squared	0.209	0.296	0.191	0.235	0.133	0.204

Notes: Specifications (2), (4), and (6) are plotted in Figures 6 (a) – (c). Data collected from various volumes of the *Annuaire Statistique de la France* and *Bulletins de Statistique et de Législation Comparée* between 1894 and 1906. All variables are logged. Controls include the difference in railway mileage and difference in production of wheat at the department level. The “Restricted Sample” excludes the lowest ten percent of wine producing departments. Significance levels are denoted by: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Huber-White robust standard errors are reported for all specifications.