# Bordeaux 2016 Abstract Submission

## Title

The World Wine Web: Structure and Dynamics of the Global Wine Economy

I want to submit an abstract for:

Conference Presentation

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## Keywords

Global Wine Trade Network methods

## Research Question

What is the structure of the global wine trade and how has it changed over the past half century

## Methods

Network methods

## Results

We characterize the WWE and show how that structure has changed.

## Abstract

We use network analytic methods to characterize the structure of the global wine economy and its change over the last half century. Standard methods involve calculation of standard measures of network size (e.g. in and out degree—in this context the number and value of imports and exports); density; centrality and centralization. In addition, we are interested in testing for the presence of center-periphery and sub-groups. In addition to statistical analysis, we will also present these results using visualization methods from graph theory. Finally, these structures show directionality over time.

This is what we plan to do. Apparently, this refuses submission without at least 800 words (which is more than most journals permit for abstracts). I will meet this condition by copying from our recent paper on this topic that is under submission to World Economy. The goal in this paper is to present a more detailed analysis of the data
It is a commonplace observation that wine is one of the oldest products to be traded over long distances (Johnson 1989, Unwin 1991, Pellechia 2006, Simpson 2011, Lukacs 2012). In recent decades, as we detail below, the wine trade has grown dramatically on both the intensive and extensive margins. In this paper we explore some of the gross facts about the growth of the global wine industry, leaving theoretical development for later work. The next section provides a basic narrative account of recent developments in the world wine industry, the following section applies some basic network measures to characterize the structure and dynamic of the product’s international trade, and this is followed by a more detailed analysis of intra-industry trade in wine.

Table 1 shows the evolution of total trade from 1964 through 2009. It is clear that the global wine economy expanded dramatically over this period. Even though the number of wine-trading countries increased by 50 percent (much of this being new countries, formed in a variety of ways, but some being new importing or exporting countries), the number of links between countries increased by 450 percent and the volume of trade increased more than 45 fold! This suggests that not only are more countries involved in importing and/or exporting wine, but these countries are trading with more partners and that the links themselves involve more trade on average. Direct evidence of this is in the next several rows in Table 1.

In network analysis, degree is simply the number of links between a given node (i.e. economy in our case) and other nodes. Because we consider both exports and imports as links, each node is potentially linked to every other node via exports and imports, thus we show both out degree (economies to which a given economy is linked by exports) and in degree (economies to which a given economy is linked by imports). The country that exported to the largest number of countries in 1964 (France) exported to 141 countries. In fact, France was the country with the maximum out degree in every year in our data, and by 2009 it was exporting to 190 countries. Because we are also interested in the value of exports or imports of wine between a pair of countries, we represent the structure of trade by considering the links between a pair of nodes as weighted by the value of exports or imports. France was also the country with the highest total value of exports (weighted out degree) in every year except 1964 (when Algeria was the country with the highest weighted out degree, but 97 percent of its exports went to France).

The mean number of links rises strongly over this 45-year period, from 8 to 22, while the mean weighted degree increases by a factor of 49. As we shall see, this growth is primarily a function of increasingly intensive trade among the core members of the world wine economy, but it should be noted that the median country, which was not an exporter in 1964, was exporting to six countries in 2009.

Table 1 shows similar growth in both the size and extent of importing in the world wine economy. The largest importer in 1964 was sourcing its wine from 34 supplier countries, and by 2009 this had more than doubled to 86 supplier countries. Similarly, the volume imported by the largest importer had increased by a factor of 23. Unlike the case of exports, where France has dominated over essentially the entire period, the identity of the largest importer has changed over time. Over this period Great Britain, the USA and Germany were the largest importers by value, with Great Britain often substantially the largest. Over the first half of the period of our data, Great Britain usually has the largest number of suppliers, while in the latter half of our sample period this is usually the US. As with exports, we again find substantial growth in both the number of suppliers to and the imports of the median economy.

The previous two paragraphs suggest that the world wine web should have been growing progressively denser. The standard network-theoretic definition/measure of density is simply the number of (unweighted) links observed in the data as a proportion of the number of possible links. With \( n \) countries, the number of possible links in a directed network (i.e. a network in which import links and export links are both possible) is just \( n(n - 1) \). Thus, density is the number in the second row of table 1 divided by the number of possible links. So, from 1964 to 2009, density doubles, even though the number of nodes (i.e. countries) increases by just 50 percent. That is, not only do countries have more trading partners on average, but the world wine economy is more
intensely interconnected. By way of comparison, the density of the entire world trade web, as reported by De Benedictis and Tajoli (2011), also doubles over this period, however, density of total trade for approximately comparable years ranges from 0.27 in 1970 to 0.40 in 2000. That is, as one would expect when comparing the network for a single commodity to the network for all commodities, the latter is consistently something like 5 times as dense as the wine trade network over the whole period.