

Climate changes and new trade dynamics in global trade of wine

Fabio Gaetano Santeramo, Emilia Lamonaca¹, Gianluca Nardone, Antonio Seccia

University of Foggia (Italy)

Keywords (max 15 words)

Global trade; Climate change; Productivity.

Research question (max 30 words)

Understanding the interconnections between climate changes, productivity levels, and trade in global wine market.

Methods (max 30 words)

The study adopts a two-stage least square procedure and use instrumental variables to explain how imports react to variations in areas under vines due to climate change.

Results (max 30 words)

Wine trade has been affected by climate change. We found that the expansion of areas under vines, due to climate change, tend to be detrimental for wine trade.

Abstract (min 800, max 2000 words)

Climate change has the potential to impact the agricultural sector. In particular, the narrow climatic zones for growing grapes may be severely affected both by short-term climate variability and long-term climate change (Mozell and Thach, 2014).

Previous studies reveal that the impacts of climate change are likely to differ across producing regions of wine. Currently, Old World Producers (i.e. European regions) benefit of better growing season temperatures than New World Producers. Future climate scenarios may push some regions into climatic regimes favorable to grape growing and wine production (Jones et al., 2005). All in all, there is the potential for relevant changes in areas planted with vines due to changes in climate (Moriondo et al., 2013).

Projected scenarios of future climate change at the global and wine region scale are likely to impact the wine market. In particular, spatial changes in viable grape growing regions and opening new regions to viticulture would determine new productive scenarios and, as a results, new dynamics in global trade of wine.

Within this context, the international trade is likely to experience new dynamics reflecting the impact of climate change (Zimmermann et al., 2018).

Our contribution aims at understanding the interconnections between climate changes, productivity levels, and trade in global wine market. Do areas under vines change according to climate change? Do changes in

¹ Corresponding author: Emilia Lamonaca. Email: emilia.lamonaca@unifg.it.

areas under vines, due to climate change, contribute to reshape trade? We examine how climate change affects trade dynamics in the wine sector.

We adopt a two-stage least square (2SLS) procedure and use instrumental variables (IVs). In the first stage, we predict the productivity level with respect to which bilateral imports of wine will have to be estimated in the second stage. We proxy productivity levels with areas under vines, and assess how they change according to country-specific climate-related variables. In particular, we use climatic variables (i.e. temperatures and precipitations), and a flexible form of country characteristics and time trend as IVs. Following Dell et al. (2012), we control for country fixed effects and time fixed effects.

In the second stage, we use the forecasted areas under vines to explain how bilateral imports depend on the productivity levels of countries. Following Baldwin and Taglioni (2006), we control for country-pair and time fixed effects: while country-pair fixed effects reduce cross-section correlation, time fixed effects completely remove time series correlation.

We perform sensitivity analyses, in order to test the robustness of our results. The second stage of the model is estimated using as regressors: (i) the climatologies (i.e. 30-years average) of temperatures and precipitations of the importer, in order to test the direct linkages between trade and climate change, and (ii) areas under vines of the importer not adjusted for climate trends. The results are compared with the benchmark effects estimated through the main model to disentangle the contribution of climate change.

All the specifications are also estimated controlling for exporter-specific regressors. Further, we posit a quadratic relationship between climate and imports.

Our analysis relies on annual data collected from 1996 to 2015 for 13 countries. We consider both Old World Producers (France, Germany, Italy, Spain, United Kingdom) and New World Producers (Argentina, Australia, Brazil, Canada, China, New Zealand, South Africa, United States). The selected countries account for more than two-third of the volume of wine production (70% in 2016, Global Wine Markets, 1860 to 2016 database). We focus on bilateral imports data (in US\$) collected from the UN Comtrade database. We work at the four-digit level of the HS classification and use wine of fresh grapes (2204). Data on areas planted with vines (in ha) and yields (in hl/ha) are from the OIV database. We collected historical country-specific climate data from the Climatic Research Unit (CRU) of University of East Anglia (UEA) and the International Water Management Institute (IWMI), which provide quality controlled temperature and rainfall values from thousands of weather stations worldwide.

The estimation results of the first stage reveal that higher average temperatures in the importing country are detrimental for its areas under vines. Vice-versa, greater level of precipitations in the importing country favour its areas under vines. No effects is found for areas under vines of the exporting countries. The results are robust also controlling for climatic variables and their squares.

The estimation results of the second stage using areas under vines demonstrate that the larger the areas under vines both in the importing and in the exporting countries, the higher the bilateral imports, the opposite is true if the area is adjusted for climate trends. These evidence are robust also if the areas adjusted for climate trends are predicted controlling for climatic variables and their squares.

The estimation results of the second stage using climatic variables as regressors show that higher average temperatures in the importing country favour bilateral imports. The opposite is true for the exporting countries, whose exports are lowered by that higher average temperatures. We also found that greater average precipitations both in the importing and in the exporting countries are detrimental for bilateral imports.

Our preliminary results highlight the existence of a mediated relation between trade and climate change. Put differently, climate change variations, via changes in the areas under vines of the major producing countries of wine, contribute to reshape trade patterns.

References

Baldwin, R. and Taglioni, D. (2006). Gravity for dummies and dummies for gravity equations. National Bureau of Economic Research Working Paper No. 12516.

Dell, M., Jones, B.F. and Olken, B.A. (2012). Temperature Shocks and Economic Growth: Evidence from the Last Half Century. *American Economic Journal: Macroeconomics* 4(3): 66–95.

Jones, G.V., White, M.A., Cooper, O.R., and Storchmann, K. (2005). Climate change and global wine quality. *Climatic Change* 73(3): 319-343.

Moriondo, M., Jones, G.V., Bois, B., Dibari, C., Ferrise, R., Trombi, G., and Bindi, M. (2013). Projected shifts of wine regions in response to climate change. *Climatic Change* 119(3-4): 825-839.

Mozell, M.R., and Thach, L. (2014). The impact of climate change on the global wine industry: Challenges & solutions. *Wine Economics and Policy* 3(2): 81-89.

Zimmermann, A., Benda, J., Webber, H. and Jafari, Y. (2018). *Trade, food security and climate change: conceptual linkages and policy implications*. Rome, FAO. 48 pp.