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Title
The interactions between wine and energy prices in South Africa: an empirical analysis

I want to submit an abstract for:
Conference Presentation

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Keywords
Wine prices, Co-integration, Causality, Energy Price

Research Question
Does energy price uncertainty influence wine prices in the South Africa wine industry?

Methods
We draw our empirical results and conclusions by implementing a modeling framework namely multivariate Vector Autoregressive (VAR) provided by Granger (1969), to measure spillover effect between fuel, electricity and wine.

Results
Our preliminary results show no long term interaction between energy and wine series, However, we reject the hypothesis that there is no short-term causality relationship between wine and energy prices.

Abstract
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Author: Lydia Chikumbi
Co Authors: Edwin Muchapondwa, Djiby Thiam

Summary:
Although a large number of empirical papers have examined the price spillover in global oil and agricultural commodity markets, very little is known about the extent of transmissions between energy and wine. The South Africa wine industry practice a form of industrialized agriculture that relies heavily on energy inputs to not only grow grapes but also for wine processing and distribution to different locations. This study investigates the extent energy costs contributes to wine prices. We employ an econometric approach to quantify the linkages between energy and wine prices, which has a large impact on farmers, investors and policy makers.

Keywords: Wine prices, Co-integration, Causality, Energy Price

In recent decades the production cost of grapes and wine has increased greatly in the South African wine industry. From 2006 to 2017, a steady upward trends in input production costs raised concerned about the welfare and sustainability of the industry. The increase and changes in production input costs has negatively affected the primary producers to levels where over a thousand grape farmers have shut down operations (VinPro, 2017). Out of a total of 3,145 remaining grape farmers 13% are producing at sustainable income levels, 47% are operating at break-even point and about 40% are making losses. Furthermore, the area under vine cultivation has reduced drastically from 102,146 hectares in 2006 to 95,775 hectares in 2016 (VinPro, 2017). The major attributes to the overall production input costs are labor and energy costs. Energy is the focus of this paper.

South Africa wine industry practice a form of industrialized agriculture that relies heavily on energy inputs to not only grow grapes but also for wine processing and distribution to different locations. Any changes that affect energy prices are expected to influence the social welfare of the wine industry. The linkages between energy price transmissions to agricultural commodity output is of considerable economic interest since the increases in price influences output prices.

Even though literature on the relationship between energy prices and agriculture commodity prices is extensive (Du et al.,2011; Chen et al.,2010; Nazlioglu, 2011; Adämmer and Bohl, 2015; Nazlioglu et al.,2013; Gozgor and Kablamaci, 2014; Mutuc et al., 2010; Wang et al.,2014; Gilbert, 2010; Kaltalioglu and Soytas, 2011; Reboredo, 2012; Rosa and Vasciaveo, 2012; Fang et al., 2014; Zhang and Chen, 2014) few studies focus on the impact of energy prices on wine prices (Cevik and Sedik, 2011; Bouri, 2013; Kwon, 2014). Most of these studies find evidence for a strong level of integration between the markets of energy and related agricultural commodities. However, evidence for an effect of fuel and electricity price changes on wine prices is limited. Especially looking at the domestic price effects on a specific crop such as grape/wine. To the best of our knowledge, VAR has never been implemented in studying causality using domestic time series variables of wine, fuel and electricity as a multivariate input.

We contribute to the relevant literature by thoroughly examining, the short and long term relationships of energy (fuel and electricity) and wine prices and establish the extent by which price uncertainty in the energy market affects wine prices. We opted to model the domestic prices for energy and wine knowing that CPI (price proxy for fuel, electricity and wine) reflects the true domestic values – and plays the role as a major input in the production of grape; the processing of wine and; the distribution to wine to end-users in the supply chain. Moreover, given that energy is key input in wine production, it is of interest to unveil the extent to which changes in the fuel, electricity and wine prices influences change in another, and vice versa. The study contributes to a better understanding of input price volatility effects and identifies tools and management approaches that could support farmers mitigate uncertainty associated with energy price changes.

The data used for the analysis are monthly CPI for fuel, electricity and wine from 2002:Q1 through to 2017:Q4. The prices for all three markets are obtained from Statistics South Africa (STATS SA, 2017). The figure below presents a graphical exposition of the three data series under study:

(see attached) Pdf

We draw our empirical results and conclusions by implementing a modeling framework namely multivariate Vector Autoregressive (VAR) provided by Granger (1969), to measure spillover effect between fuel, electricity and wine. Granger causality is a concept of causality derived from the notion that causes may not occur after effects and that if one variable is the cause of another, knowing the status on the cause at an earlier point in time can enhance prediction of the effect at a later point in time (Granger, 1969; Lütkepohl, 2005, p. 41). The VAR model has been widely employed in econometric analyses (Granger & Newbold, 1986) and in accessing the interactions between energy and agriculture commodity prices (Adämmer and Bohl, 2015; Nazlioglu and Soytas, 2012; Nazlioglu et al.,2013; Gozgor and Kablamaci, 2014; Wang et al.,2014; Kaltalioglu and Soytas, 2011; Reboredo, 2012; Rosa and Vasciaveo, 2012; Fang et al., 2014; Zhang and Chen, 2014). VAR modeling with Granger causality tests is one of the most flexible ways to explain underlying causal mechanisms in time series data (Bose et al.,2017). Prior to investigating the interactions of wine, fuel and electricity, the uniform time series for each vital sign was assessed for stationarity; appropriate lag was determined using a lag-length selection criteria; the VAR model was constructed; residual autocorrelation was assessed with the Lagrange Multiplier test; stability of the VAR system was checked; and Granger causality was evaluated in the final stable model. The general structure of the VAR model used in multivariate time series (a trivariate VAR (1) model for wine, fuel and electricity is as follows:

$Y_{Wine,t} = \alpha + \beta_{1,1} Y_{Wine,t-1} + \beta_{1,2} Y_{Fuel,t-1} + \beta_{1,3} Y_{Electric,t-1} + e_t$ (1)
$Y_{Fuel,t} = \alpha + \beta_{2,1} Y_{Wine,t-1} + \beta_{2,2} Y_{Fuel,t-1} + \beta_{2,3} Y_{Electric,t-1} + e_t$ (2)
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where, regressors of each outcome are same, which are the lagged values of wine, fuel and electricity respectively. α is the constant, β are the coefficients and e is error and t is the time. The equations are estimated using ordinary least squares (OLS) estimation in STATA 15. Since within the VAR (p), each equation has the same explanatory variables, each equation may be estimated separately (Lütkepohl, 2005 and Hamilton, 1994).

Our preliminary results indicate no long term interaction between energy and wine series. However, we reject the hypothesis that there is no short-term causality relationship between wine price and energy prices. The study finds bi-directional causality relationships from both fuel and electricity prices to wine and vice versa. These findings support Nazlioglu et al. (2013) that found a bi-directional volatility spillover between oil-soybeans and oil-wheat.

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The interactions between wine and energy prices in South Africa: an empirical analysis

Lydia Chikumbi, Edwin Muchapondwa, Djiby Thiam

ABSTRACT

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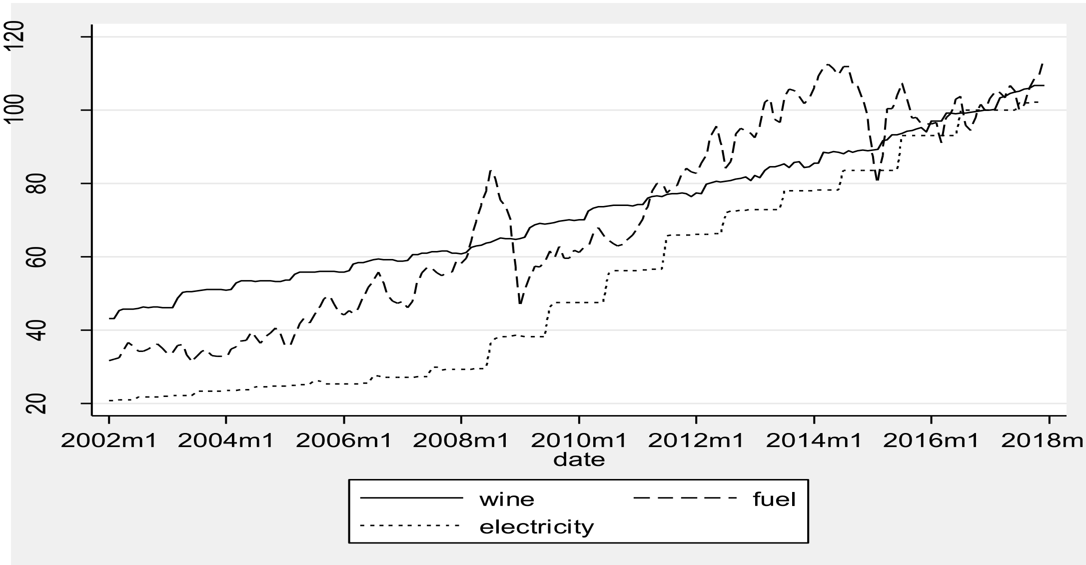

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