

## **Economics – E-Journal**

### **“Energy Consumption and the Size of the Informal Economy”**

This paper empirically finds out that there is a negative relationship between energy consumption and the size of the informal economy. The authors also highlight the existence of a non-linear and asymmetric relationship between the two variables of interests. My opinion on this paper is quite mitigated. Hence, what the authors investigate and find is very close to push an open door. As a consequence I advise the author to be much more rigorous.

#### **Main comments:**

- Endogeneity problem: one of the main problems of the paper is that the reader suspects almost immediately an endogeneity problem between the two variables of interest. Hence, it can be the case that energy consumption will determine the size of the informal sector. This effect will certainly go through the quality of energy production and delivery. I am aware of the difficulty to tackle this endogeneity problem; however, the author should at least discuss this very important issue.
- Determinant of energy use: what is quite astonishing to me is that, according to the author, energy consumption is only a function of the size of the informal economy. The authors invite potential readers to interpret their results “ceteris paribus”. I deeply suspect that there are other important variables which drive energy consumption. I believe that very high R squares presented in various regressions are a direct consequence of important missing explanatory variables in the econometric models. The authors should at least take into account some control variables.
- Theoretical model: Considering that the findings of this paper are strongly predictable, the authors should present or at least discuss some theoretical model. The authors should add a theoretical section to this paper. They should model the energy consumption and the possible relationship with the size of the informal economy. Then the authors should present the main findings of their theoretical model (the negative relationship) and test them empirically.

#### **Particular Remarks (still important):**

- Definition of variables of interest: the author should be much more rigorous and explain in detail how the two variables of interest are constructed. For example, IS is sometime described as a share of the formal sector size and sometime as a share of GDP. The reader continuously questioned himself what the variables of interests really are. Is informal economy taken into account in the GDP? Is informal energy use taken in total energy consumption? The authors should define very clearly these variables.

- Policy implications must be strongly strengthened. Especially considering the implications of the non-linearity and asymmetry, which I believe are the main contribution of the paper. More precisely (page 19), the comparison with the link between informality and pollution is very interesting but should not be presented in the conclusion. Discussing the potential deregulation and scale effects should become an important contribution of the paper and not simply relegated in the conclusion.
- Descriptive statistics on the size of informal sector: The authors should present some descriptive statistics concerning informal sector size in various countries known for their specificity toward shadow economy. For example Switzerland, Sweden ... or Italy, Romania ... This should convince the reader of the quality of the measurement of the informal sector.
- Informal energy use: The author should discuss deeper this issue. Hence, informal sector often use energy illegally. How the paper takes into account this dimension?
- Asymmetry vs non linearity: the authors try to convince us that both asymmetry and non-linearity are observed between energy consumption and informal sector size. What is quite puzzling is that Asymmetry is only significant for a sub group of countries whereas non-linearity is only significant at the aggregate level. The authors must be very cautious when they interpret both results.
- Elasticity interpretation: in table 4 the parameter estimate for ISt-1 in emerging countries is - 0.13. If I understood well the econometric specification both explained and explanatory variables are expressed in log. Therefore, the associated parameter must interpret as an elasticity. Therefore, a one percent increase in the size of the informal sector generates a 0.13 percent decrease in energy intensity. And not 13% ! This mistake should be corrected. Hence, this mistake is typically an undergraduate student error and has no room in a research paper.