

Comments on

"Energy Consumption and the Size of the Informal Economy"

This paper estimates the relationship between energy consumption intensity and the size of the informal economy with a panel database on 159 countries covering the period 1980-2012. The theoretical story recounted by the authors on this relationship is as follows.

First, the informal sector is relatively labor intensive. On the one hand, in order to avoid governmental authorities' scrutiny, the informal sector typically operates on a small scale. This limits the opportunity to operate with economies of scale and favors the use of labor relative to capital. On the other hand, given that the informal sector is only imperfectly monitored, the operation costs of labor are relatively lower than capital, thanks to the inexistence of minimum wage obligations, severance payments, or insurance premiums in this sector, which also encourages the use of labor. Second, for technological reasons, but also as classical econometric studies have largely shown, capital and energy are complement in the production of goods and services.

Putting these two arguments implies that countries with larger informal sectors should have lower levels of energy consumption. This implication translates into the null econometric hypothesis that the relationship between total energy consumption as a share of GDP (the independent variable) and the size of the informal sector also as a percentage of GDP (the independent variable) should be negative.

The rather standard panel data econometric estimation techniques the authors use (based on Baltagi and Wu, 1999) allow them to handle some missing data points for some of 159 countries in their sample. They specify a dynamic log-linear regression, a linear regression that allows them to account a possible quadratic effect of the informal sector variable, and a log-linear "asymmetric" regression that allows them to distinguish, through the introduction of a dummy variable, a decrease from an increase in the size of the independent variable. In their empirical analysis, the authors use the whole set of countries in their sample, but also five groups of countries (Oil importing countries, Emerging economies, G20 countries, G7 countries, and OECD countries) that they construct for the purpose of checking the robustness of the relationship of interest and test if there are any differences in the strength of this relationship across these groups of countries.

In my opinion, this paper deserves publication for at least two reasons. It is very clearly written and it has some pedagogical value on how applied economics research should be done. The objective is well stated, the theory related to the objective discussed, the empirical implication from this theory specified, and the test of this implication well executed. The authors also provide a discussion of the policy implications of their results.

I have a couple of comments that I'm hoping will go in the direction of strengthening this end-to-end (modern) applied economics approach utilized by the authors, and thus making their empirical results somewhat more credible.

The concept of economies of scale relates to the characteristics of the technology that reflects in the total average cost function. While they are quite right that diseconomies of scale are most likely to affect capital relatively more than labor, the authors' argument that the informal

economy should be seen as capital intensive has to be moderated, in particular, because their observations are not directly on capital, but on energy, a complement production factor.

The other authors' argument of the informal sector being capital intensive is also to be moderated. Labor costs are clearly lower in the informal sector than in the formal one, but can't we think of advantages of using more capital in the informal sector relative to the formal sector such as possibly lower costs related to maintenance and equipment warranty?

The policy implications discussion is strikingly asymmetric for reasons the reader does not quite understand. Indeed, the authors indicate both in the introduction and the conclusion that when fighting the informal economy policy makers should take into account the negative relationship they find between its size and energy intensity, but do not say much about how. In contrast, they discuss in much more details the implications of their results for energy policy.

I found a few typos.

Page 3, line 9: Delete the word "that"

Page 3, line 12: Delete the words "the they argue that"

Page 4, line 9 : Delete "with" (or replace it with "against" ?) (see also page 20, line 11)

Page 6, line 10 : ", **and** revenue-raising activities."

Page 10, line 22 : "The coefficient **attached** to the lagged..."

Page 16 : The title of Figure 1 is too far from the plot.

Page 18 : Delete space between lines 6 and 7.

Page 19, line 4 : "**the** informal sector..."

Page 19, line 14 : Need a coma the citation.

Page 21, line 10 : Replace "yield" with "indicate."

Page 21, line 15 : "**for** future research. "