Pollution and informal economy

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ABSTRACT

In this study, we investigate the relationship between the size of the informal economy and the level of environmental pollution/energy use. To this end, we first use different indicators of environmental pollution along with a measure of energy use intensity in a panel dataset consisting of 152 countries over the period 1999–2009 and empirically examine the relationship between pollution and the shadow economy. The estimation results show that there is an inverse-U relationship between the size of the informal economy and environmental pollution, that is, small and large sizes of the informal economy are associated with lower environmental pollution and medium levels of informality are associated with higher levels of environmental pollution. Next, we build a two sector dynamic general equilibrium model to suggest an economic mechanism for this observation. Our model identifies two channels through which informality might affect environmental pollution: The scale effect, whereby a larger (smaller) informal economy size is associated with a lower (higher) level of environmental pollution, and the deregulation effect, whereby a larger (smaller) informal economy is associated with higher (lower) pollution levels. As these two effects work in opposite directions, the changing relative strength of one with respect to the informal sector size creates the inverted-U relationship between pollution indicators and informality.

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1. Introduction and related literature

The informal economy (sector), sometimes also titled the shadow, hidden or underground economy, is generally defined as a set of economic activities that take place outside the framework of bureaucratic public and private sector establishments (Hart, 2008). Ihrig and Moe (2004) characterize it as a sector which produces legal goods, but does not comply with government regulations. Another definition is given by Tanzi (1999) as the production and distribution of goods and services that are unaccounted for in the official national income accounts of a country. All these definitions share a common feature in describing the informal sector, as opposed to the formal sector, as imperfectly regulated (if at all) and not subject to government scrutiny (also see Thomas, 1992; Schneider and Enste, 2000; Elgin and Oztunali, 2012).

It is a well-established fact in the environmental economics literature that environmental pollution highly depends on the intensity of government regulations, overseeing and enforcement of environmental standards. As argued by Baksi and Bose (2010), the presence of a large informal sector in developing countries indicates a serious challenge for the implementation of environmental regulations in these countries. Therefore, it is crucial to understand the links between informality and environmental performance and it would be a mistake to overlook the presence of a shadow economy when analyzing environmental policy outcomes.

To fill the gap in the literature, in this paper we investigate the relationship between the informal economy and environmental pollution/energy use. To this end, we employ three different pollution indicators in the empirical part of this paper which are among the mostly widely used pollution variables in the literature: CO_2, SO_2 emission per capita and the energy use intensity (EUI) index. We use annual data from 1999 to 2009 for 152 countries. The cross-country panel data analysis we conduct shows strong evidence toward the existence of an inverted-U relationship between informal sector size (relative to official GDP) and environmental pollution, i.e. the presence of an environmental Kuznets curve relationship for the informal economy. Specifically, small and large sizes of the informal economy are associated with little environmental pollution and medium levels of the size of the informal economy are associated with higher levels of environmental pollution. To account for this non-linear relationship, we identify two channels through which the presence of informality might affect environmental pollution. We name the first channel as the *scale effect* through which a larger (smaller) informal sector size is associated with a lower (higher) level of environmental pollution. This effect is motivated by the fact that the informal economy operates on a small scale (especially compared to the formal sector) with a highly labor-intensive and less capital-intensive production technology. The low level of capital intensity and the small scale of production make the informal sector less prone to environmental pollution. However, on the other hand there is also the *deregulation effect* of informality, through which a larger (smaller) informal sector size is associated with higher (lower) levels of environmental pollution. This effect is motivated through an intrinsic factor of informality, that is, the absence of regulation in the informal economy. As these two effects work in opposite directions, the changing relative strength of one builds the inverted-U relationship between pollution indicators and informal sector size. We then build a two sector dynamic general equilibrium model to formally account for the observed relationship in the data. Our model provides a strong theoretical foundation for the empirical observation we make in the empirical part of the paper.

Apart from a number of notable exceptions, literature on the environmental impacts of the informal sector is rare. In one study, Blackman and Bannister (1998a) claim that in various developing countries the informal sector, which they argue is comprised low technology unlicensed micro enterprises, "... is a major source of pollution" and that "... environmental management in this sector is exceptionally challenging." In line with this study, Blackman and Bannister (1998b) argue that it is virtually impossible to regulate the informal sector with conventional tools. Furthermore, Blackman et al. (2006) make a similar argument and focus on estimating the benefits of controlling informal sector emissions. In a theoretical work, Chaudhuri (2005) builds a three-sector general equilibrium model with an informal sector and then uses this model to analyze the effects of different policies on the environmental standard and welfare of the economy. In a somewhat related work Baksi and Bose (2010) analyze the effects of environmental