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Analysis

The short-run and long-run effects of corruption control and political stability on forest cover

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ABSTRACT

This article examines how governance, particularly corruption control and political stability, affects deforestation due to agricultural land expansion. We estimate the short-run and long-run effects of corruption control and political stability on deforestation in South American and Asian countries using data from 1990 to 2003 where converting forest land into agricultural land is a significant problem. Political stability has a positive and significant effect on forest cover in the short run but an insignificant effect in the long run. In contrast, corruption control has a negative and significant effect on forest cover in the short run and the long run with a larger magnitude in the former. One possible explanation is that corruption control induces more technological productivity and, if technology and land use are complements, increases in technological development lead to agricultural land expansion.

1. Introduction

The determinants of deforestation are categorized as direct factors and underlying factors. Direct factors of deforestation, such as logging, agricultural land expansion and road building, immediately contribute to the conversion of forest land to other land uses while underlying factors influence the severity of the direct factors. Many underlying factors have been analyzed such as economic growth (Koop and Tole, 1999), political institutions (Barbier, 2004; Nguyen Van and Azomahou, 2007), exchange rates (Arcand et al., 2008), trade openness (López and Galinato, 2005), poverty (Chomitz, 2007; Zwane, 2007), community management (Antinori and Rausser, 2007), population, market forces and property rights (Angelsen, 1999; Araujo et al., 2009).[1]

Understanding the effect of governance on economic growth has become an important issue in the literature (World Bank, 2002). Weak institutions due to corruption or political instability can hinder economic development. Corruption and political instability at the national level can impede rural development by reducing public expenditure (Anriquez, 2007). Corruption also skews policies in favor of rent seeking firms (Bulte and Damania, 2008) and political instability creates uncertainty that leads to less resource conservation (Deacon and Mueller, 2004) and a reduction in resource stocks.

This article examines the effect of governance, particularly corruption control and political stability, on forest cover in developing countries through two important direct factors of deforestation. We estimate a model that measures the effect of corruption control and political stability on deforestation in developing countries through agricultural land expansion and road building.[2] The empirical analysis has important policy implications because it measures the immediate and long-term importance of controlling corruption and correcting political instability on forest cover using a structural framework.

Ferreira and Vincent (2010) estimate the effects of an index of government integrity and government stability on timber harvest rates across a range of countries. They find that improved governance could increase harvest in countries with initially weak governance levels but reduces harvest with initially stronger governance. Their study illustrates an important non-monotonic relationship between

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[1] Geist and Lambin (2001) provide a meta-analysis that examined various drivers of tropical deforestation and categorized underlying factors into five types: economic factors; policy and institutional factors; technological factors; cultural or socio-political factors; and demographic factors.

[2] One important direct factor is logging. The fact that initial logging is often followed by agricultural production (López and Galinato, 2005) especially in developing countries makes it difficult to empirically separate the effect of logging and agricultural land expansion on deforestation. Thus, we opt to focus our analysis on agricultural land expansion and road building. Our analysis of agricultural land expansion refers only to crop production and not livestock production because the mechanisms by which governance affects deforestation may differ between the two production technologies.

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governance and timber harvest using reduced form estimation. However, their model does not measure the effects of governance on other direct factors of deforestation such as agricultural land expansion and road building. Without such an analysis, it is difficult to make policy recommendations that affect these direct factors through governance.

Corruption control, which is the ability of the government to prevent bribery and the influence of special interest groups, is an important factor that affects deforestation. It is not uncommon for large commercial loggers to disregard their concession contracts with governments of developing economies (Contreras-Hermosilla, 2002). This has led to overharvest of timber or the use of unsustainable forest management practices when there is a lack of institutions enforcing rules or officials are swayed through bribes. Agricultural development is another channel by which corruption affects deforestation in developing countries. Wealthy farmers in Latin America can influence policy makers to select inefficient modes of agricultural production (Bulte et al., 2007) which could lead to agricultural extensification into forest land.

Political stability, which is defined as the probability that the government is overthrown, can also have a significant effect on deforestation through agricultural land use decisions. For instance, in Uganda, political instability has been linked to the collapse in the production of cotton but led to increased production of cassava and rice, both land intensive crops (Ebanyat et al., 2010). Political instability has also been a significant factor affecting infrastructure spending in Argentina, Colombia, Nigeria and Thailand (World Economic Forum, 2011).

Most empirical models that estimate the effect of macroeconomic variables on forest cover use a cross-country, reduced form approach (Antle and Heidebrink, 1995; Barbier and Burgess, 1997, 2001; Cropper and Griffiths, 1994; Deacon, 1999; Koop and Tole, 1999; Scrieciu, 2007; Shafik, 1994; Southgate, 1994). There are two significant criticisms with regard to this approach. First, a reduced form approach does not disentangle the channels by which such variables affect deforestation. By not modeling the channels through which governance affects deforestation, appropriate policies may not be identified. Second, all cross-country forest data rely on projected and interpolated data from the Food and Agricultural Organization (FAO). Two prominent analysts have concluded that FAO forest cover data is unsatisfactory in implementing some types of econometric analysis of deforestation (Angelsen and Kaimowitz, 1999).

A number of microstudies that analyze the determinants of deforestation have relied on data from local surveys, remote sensing and satellite images (Chomitz and Thomas, 2003; Cropper et al., 2001; López, 1997, 2000; Panayotou and Sungsuwan, 1994). An advantage of these types of studies is the strong quality of forest cover data and direct factor data. Unfortunately, given the local nature of the data, it is difficult to analyze the effect of macroeconomic variables.

López and Galinato (2005) were the first to develop a methodology to bridge the link between macroeconomic analyses with estimates from microstudies by formulating a structural framework using data from the Philippines, Indonesia, Brazil and Malaysia. They combine the elasticities from their regressions on direct factors of deforestation with parameter estimates from microstudies where direct factors are regressors to obtain the total effect of macroeconomic variables on forest cover.

We use and extend the methodology of López and Galinato. We do so by analyzing the effect of political stability and corruption control on deforestation using a larger number of countries in our sample and creating a unique dataset that isolates the amount of agricultural land encroaching on forest cover. Lastly, we measure the short-run and long-run effects of macroeconomic variables on deforestation. This is the first study we are aware of that compares the long-run and short-run effects of underlying factors on forest cover.

The following section presents the conceptual framework that is used as the basis for the empirical model. Section 3 specifies the empirical model. Section 4 describes the data. Section 5 presents the empirical estimates and the final section concludes the study.

2. Conceptual Framework

Microstudies of deforestation have identified land use patterns as the most important source of deforestation (Chomitz, 2007; Chomitz and Thomas, 2003; Cropper et al., 2001; López, 1997, 2000; Panayotou and Sungsuwan, 1994; Pfaff, 1999). Expansion of agricultural land or cropland and construction of roads into forest areas are the most important direct factors determining deforestation especially in Latin America and Asia (Houghton et al., 1991; Rerkasem et al., 2009).[3] There may be a bi-causal relationship between agricultural land expansion and road building. Road construction in forest regions induces rural population migration and land clearing for agricultural purposes. Also, agricultural expansion can lead to increased lobbying to develop rural infrastructure.

We follow a method developed by López and Galinato (2005) to determine the effect of governance on forest cover as illustrated in Fig. 1. Governance and other economy-wide policies are considered underlying factors. We focus on two direct factors of deforestation: agricultural land expansion and road building. Changes in governance affect agricultural land expansion and road infrastructure in the rural sector, which, in turn, affect forest cover. There are two blocks of causation. Block I shows the effects from the underlying factors on the direct factors of deforestation. We estimate the short-run and long-run effects of corruption control and political stability on the two direct factors of deforestation. Block II shows the effect of direct factors on forest cover. We rely on coefficient estimates from microstudies that estimate the impact of agricultural land expansion and road building on forest cover. We measure the total effect of governance on forest cover by combining our original regression coefficients and estimates from microstudies.

Political stability affects the provision of additional road networks in the rural sector. Turnover could occur from coup attempts or votes of no confidence leading to a reduction or cessation of infrastructure projects such as road networks (Gimenez and Sanau, 2007). If the government is overthrown, it is likely that current government projects will be stopped. More political stability will likely increase road building. Political stability could also affect the cost of forest land clearing. More stable governments are likely to continue and enforce policies that govern natural resource management. Political stability is likely to decrease forest land clearing if the current government already has strict natural resource conservation laws but this may not occur if current policies are lax.

Corruption control influences technology adoption in the agricultural sector (Bulte et al., 2007). Lobbying groups have incentives to block the adoption of superior technologies in order to maximize rents (Bridgman et al., 2007). Corruption control through technological productivity may have a positive or negative effect on forest land clearing. Agricultural technology choice significantly determines the extent to which deforestation occurs (Angelsen and Kaimowitz, 2001). Technological productivity has increased deforestation when annuals are planted in the Amazon forest but this relationship is not always the case for perennials (Cattaneo, 2002). If technology and the amount of land cleared are complements then corruption control may lead to increases in technological productivity which increases demand for land. Hence, corruption control could lead to agricultural intensification or extensification depending on the complementarity or substitutability of land use and technology.

The development of new varieties of soybeans (annuals) that adapt to tropical climate in Brazil and Bolivia is an example of a new technology that complements land use. On the other hand, if

[3] There has been a significant expansion of agricultural land expansion over the past 50 years especially in Southeast Asia, parts of Central and West Asia and the Southern Amazon Basin. This has coincided with more rapid deforestation in the tropical regions. From 1950 to 1990, global agricultural land expansion from crops and pasture use covered 45.7 to 51.3 million km^2 and forest cover diminished by 11 million km^2 (Solomon et al., 2007) showing a negative correlation between agricultural land expansion and forest cover growth.