



## Intelligence and deforestation: International data



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### ABSTRACT

This paper investigates the effect of intelligence on deforestation rates, using data from 186 nations, over the period 1990–2010. Our findings provide novel evidence that human psychology, measured by nation-IQ, is negatively related with deforestation. This paper documents that, on average moving from a country with the lowest IQ score (61) to the one with highest (107.1) is associated with a 1.15 percentage point reduction in the rate of deforestation. The negative link between intelligence and deforestation remains robust when we account for the feedback from environment to intelligence.

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### 1. Introduction

Deforestation is a critical aspect of international environmental transformation. For example, [Nabuurs et al. \(2007\)](#) cites deforestation as the major source of greenhouse gas emissions. Indeed, the ecological dimension of deforestation concerns biodiversity loss, soil erosion, and flooding (e.g. [Fearnside, 2005](#); [Kanninen et al., 2007](#)). Naturally, high rates of deforestation have significant implications for society as they have been linked with poverty, crime and forced migration ([Black, 1994](#)).

These concerns have motivated empirical literature to understand the driving forces of deforestation. Early research applied microeconomic models to explore the antecedents of deforestation in a single country or region. By and large these studies lend support that motives for habitation and land use, off-farm wages and job opportunities are linked to clear cutting. For example, [Bluffstone \(1995\)](#), [Holden \(1993\)](#), and [Ruben et al. \(1994\)](#) show that wage increases lead to reduction in forest clearing and motivate village citizens to switch from fuel wood to other sources of energy.

Later, the availability of cross-country data on forest clearing has shifted the empirical research to understand what determines deforestation across the countries. One strand of studies reports that property rights, institutions and political regime have impact on deforestation. For example, [Kazianga and Masters \(2006\)](#) find that deforestation in Cameroon decreases under secure land tenure. Under a fully protected tenure regime farmers introduce a new cocoa cultivar that offers relatively higher payoffs than those of clear-cutting. On the other hand “Insecure tenure might lead to less land investment and more soil exhaustion, thus increasing the need and/or incentives for cutting down more forest to replace degraded land” ([Angelsen, 2010, p. 19641](#)). In this vein, [Mendelsohn \(1994\)](#) argues that poorly defined

property rights in tropical countries make long-standing resources such as forests unattractive relative to clear-cutting activities that offer immediate returns. Similarly, several cross-country empirical articles attempt to link political regimes to deforestation. While earlier studies show that democracy reduces deforestation,<sup>1</sup> the recent empirical literature yields mixed results (e.g. [Bhattarai and Hammig, 2001](#); [Buitenzorgy and Mol, 2011](#); [Shandra et al., 2011](#)). For example, [Mak Arvin and Lew \(2011, p. 1159\)](#) conclude that “promotion of democracy reduces deforestation in certain regions, elsewhere the result is the opposite .... The fact that there are income and regional differences in the results can be attributed to the heterogeneity among developing countries and the multifaceted nature of the relationship between democracy and the state of the environment”. [Aurenhammer \(2013a\)](#) substantially contributes to the democracy–deforestation nexus by examining the links between deforestation and governance. The author fails to establish a significant association between democracy and deforestation. Indeed, the author supplies evidence that deforestation occurs in nations that are classified as democratic. Furthermore, in a meta-analysis of paradigms of ‘forestry development’, [Aurenhammer \(2013b\)](#) suggests that societal pressure, decision-making dominated by society, and policies derived from scientific knowledge lead to sustainable forest development.

The aim of this study is to contribute to the related literature on the determinants of deforestation by examining the role of intelligence.

<sup>1</sup> For example, [Didia \(1997\)](#) examines the democracy–deforestation nexus in tropical countries controlling for the size of the country. The author finds that tropical economies with democratic institutions have lower rates of deforestation. [Midlarsky \(1998\)](#) also investigates the association between democracy and deforestation using multiple regression analysis. He documents the negative link between three measures of democracy and clear-cutting.

Indeed, while there is plenty of evidence that intelligence fosters economic development through financial development, productivity and efficiently functioning institutions (Jones, 2011; Kodila-Tedika and Asongu, 2015, Salahodjaev, 2015a) the role of intelligence in the deforestation processes has not been investigated in this context. There are several reasons to anticipate the importance of intelligence in reducing deforestation. First, intelligence shapes society's institutional environment. Cross-national studies document that high-IQ nations are associated with better institutions (Kanyama, 2014), lower levels of corruption (Potrafke, 2012), and the sizes of shadow economies (Salahodjaev, 2015b). Although corruption and poor law enforcement emerge under a short time horizon, there is evidence that intelligent economic agents have longer time horizons (Shamosh and Gray, 2008; Jones and Podemska, 2010), and that intelligence is associated with rational decisions on the national level (Rindermann, 2008). In particular, the deforestation patterns in Africa after 2000 were substantially influenced by precolonial institutions. The comparative deforestation rates were highest in the communities where social leaders were appointed by means of social status in precolonial times (e.g. Larcom et al., 2016). Similarly, a recent paper (Rodrigues-Filho et al., 2015) suggests that deforestation rate in countries with weak institutions (e.g. Brazil) is driven by administrative shifts caused by presidential elections. While to secure political triumph newly elected governors are likely to satisfy competing elites (Gilens and Page, 2014), there is evidence that individuals in more intelligent nations improve the effectiveness of the political system and raises the marginal costs of populism (Kanyama, 2014). Thus, in line with related literature (e.g. McCarthy, 2014), we conjecture that intelligence plays an important role in shaping the environmental policy's outcomes.

In addition, deforestation rates are higher in resource rich countries with poor economic performance and exclusive economic development that failed to establish modern institutions (Mehlum et al., 2006). These market failures promote rent-seeking and unproductive activities (e.g. Congleton et al., 2008). Rent-seeking sentiments then extend to all levels of government causing the formation of illegal logging networks. The economic consequences of illegal clear cutting in developing nations are striking. For example, approximated rent losses due to illicit clear cutting accounts for 1.5% of Indonesia's GDP (Scotland and Whiteman, 1997). Corruption as a type of rent-seeking attitude supplies stimulus for political actors to collect forest rents via illegal payments, bribes and bureaucratic benefits. Corruption inhibits legitimate forest industry, pharmaceutical harvesting, or tourism ventures by increasing the costs and uncertainties of transport and trade (Irland, 2008). Karsenty and Ongolo (2012, p. 44) stress that bureaucrats in "fragile states" are often influenced by "private agendas" and will seek "to negotiate the most favorable rules for capturing" REDD money without having any intention to change the course of things". In this vein, intelligent societies punish rent-seeking behavior and build pro-market institutions (Jones, 2011). For example, Simpson (1997) argues that intelligence determines ability to handle complex information and to participate in politics. Further, Milligan et al. (2004) empirically show that educated individuals are more likely to support democratic institutions and possess liberal values (Dee, 2004). Hence, we would then anticipate intelligence to reduce deforestation rates as population with higher cognitive abilities understands the consequences of rent-seeking and supports rational policies (Caplan and Miller, 2010).

Second, intelligence is a good approximation for social capital (Sturgis et al., 2010). Bourdieu (1986) argues that higher levels of social wealth, resources that can be instantaneously capitalized by economic agents, furthermore, nurtured for prospective use, lead to considerable welfare gains for society. In particular, social capital promotes cooperation, reduces egoism and 'bolster the performance of the polity and the economy, rather than the reverse' (Putnam, 1993, p. 176). Furthermore, social capital is an important aspect of enhancing the attitude of society towards management of natural wealth (e.g. Aronson et al., 2006).

Empirical cross-country studies confirm that social capital is an important aspect in reducing deforestation rates in developed and developing countries (Bhattarai and Hammig, 2001). Moreover, managing forest cover is linked with difficulty in achieving a balance between individual, society, and national concerns of cooperation and conflict (McCay and Jentoft, 1998). Related studies show that intelligence promotes cooperation and trust within society and government, which is instrumental to generating public efficient outcome. On the other hand, implementation of environmental policy requires social capital (Jones et al., 2009; Pappila, 2013), which may indicate intelligence, as it is viewed as one of the main underpinnings of human society that enables the functioning of markets and institutions.

Similarly recent research documents that intelligence is instrumental to an understanding of the link between governance (democracy, institutional effectiveness) and economic development. For example, Salahodjaev (2015c), using data from 93 nations, reports that the interaction term of the intelligence and democracy index is statistically significant in growth regressions. Furthermore, democracy index attains its statistical significance only after intelligence is included in the empirical exercise. The author concludes that intelligence diminishes the harmful impact of weak political institutions on the GDP per capita growth rate. More recently, Rindermann et al. (2015), using path analysis for 174 nations, show that intelligence has an indirect effect on the wealth of nations through an impact on economic freedom and competence of leaders. As many studies have shown that intelligence predicts openness/intellect, liberalism and political participation (Rindermann, 2008; Solon, 2014) – then we may expect a negative effect of intelligence on deforestation.

Finally, the proposed link may be based on the following reasoning. Illegal logging is one of the major causes of deforestation in developing countries (e.g. Alemagi and Kozak, 2010). In contrast, a substantial line of studies documents that intelligence is negatively associated with criminal and delinquent involvement (e.g. Beaver and Wright, 2011; Burhan et al., 2014). Besides, intelligent individuals exhibit patience (Jones, 2008) and lower probability of being engaged in antisocial behavior (Levine, 2011). If deforestation is described by illegal activity, a behavior that has also been related to intelligence, the hypothesis predicts that more intelligent societies are likely to be associated with lower deforestation rates.<sup>2</sup>

Thus, the goal of the paper is to test this hypothesis on the macroeconomic level. This study documents that after controlling for various antecedents of deforestation rates, intelligence appears to have a statistically significant negative effect on deforestation. These findings contribute to the growing literature on ecological dimensions of intelligence based on the idea that there is robust evidence between social development and cognitive patterns of human development.

## 2. Data

In this study, we employ cross-section data on 186 low, middle and high-income economies for the period of 1990 to 2010. Investigating this period is important in a number of ways. First, using more recent data, we can revisit and update the results on the determinants of deforestation. Second, using this period we take into account increasing quality and availability of deforestation data (Choumert et al., 2013). For example, our sample includes 15 post-communist economies that are rich in natural resources but also described by poor quality of institutions. Furthermore, globalization had a significant institutional and ecological impact on developing countries during this period (e.g. Dollar, 2001; Frankel and Rose, 2005; Potrafke and Ursprung, 2012).

<sup>2</sup> Congleton (1992) argues that intelligent societies tend to recognize the needs and concerns of future generations.

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